H_2HUBB TEST REPORT

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Evaluation Introduction

This report provides a comprehensive evaluation of the AquaCure AC60 Oxyhydrogen Inhalation Therapy Device manufactured by Eagle Research, a U.S.-based company. H_2HUBB classifies this unit as a Home-Grade, Mid-Flow-Rate Alkaline Oxyhydrogen Inhalation System.

The AquaCure AC60 utilizes alkaline oxyhydrogen electrolytic cells (without membrane separation) operating with a sodium hydroxide (NaOH) electrolyte dissolved in distilled water. Gas produced through electrolysis passes through a two-stage humidification and bubbler purification system designed to capture electrolyte aerosols and condition the gas before inhalation. The device offers programmable session durations of 1, 5, 10, 20, 30, and 60 minutes, along with a continuous operating mode that supports extended inhalation sessions, subject to the manufacturer's operating and maintenance guidelines.

As part of our evaluation, H_2HUBB conducted controlled flow-rate testing to quantify hydrogen gas production (mL/min) across five duty-cycle settings under monitored electrical and operating conditions. Measured performance was compared against theoretical electrolysis calculations to assess electrochemical efficiency and output consistency. Additionally, H_2HUBB conducted extended purifier performance testing, monitoring total dissolved solids (TDS), pH, and water temperature to evaluate electrolyte accumulation and downstream carryover. This evaluation also incorporated hexavalent chromium (Cr(VI)) screening of the final gas-delivery capture water to provide an additional assessment of potential contamination.

Beyond gas production and purifier performance, H_2HUBB examined the system's architecture, electrolyte management, operational safeguards, and flashback protection. Functional testing of the inline flashback arrestor was conducted across all five duty-cycle settings evaluated, both with and without a nasal cannula, alongside observations of open-air ignition behavior at the cannula outlet. Together, these evaluations provide an independent assessment of the AquaCure AC60's hydrogen production capabilities, purification performance, and operational safety features to determine whether the device meets H_2HUBB's standards for official approval and public recommendation.

To learn more about our hydrogen product performance standards and evaluation requirements, visit **H_2HUBB**.

H_2 Products

- Company: Eagle Research
- Product Name: AquaCure AC60
- System Type: Oxyhydrogen Inhalation Device
  - Gas Composition: ~66.7% Hydrogen (H_2) / ~33.3% Oxygen (O_2)
  - Electrolysis Technology: Alkaline oxyhydrogen cell (non-membrane design)
  - Electrolyte: Sodium Hydroxide (NaOH) in distilled water
  - Flow Classification (H_2HUBB): Mid-Flow-Rate Home-Grade System
- URL Link: **https://eagle-research.com/product/aquacure-model-ac60/**

Method and Procedure

- Distilled Water (test medium): Initial purifier water pH 5.6–5.8
- Electrolyte: Sodium hydroxide (NaOH), crystalline form, dissolved in distilled water
- Electrolytic Cell Configuration: 11 cells connected in series
- Electrolyte Reservoir Volume: Approximately 1.0–1.2 L (estimated)
- Initial Purifier Water Volumes: Stage 1: 350 mL | Stage 2: 920 mL | Final Cannula Capture: 500 mL
- Water Temperature Prior to Purifier Testing: 68.5°–68.7°F (20.3°–20.4°C)
- Hydrogen Output (100% capacity): 667 mL/min H_2 | ≈54.60 mg/min H_2 at SATP
- Combined H_2/O_2 Output (100% capacity): 1000 mL/min (60 L/hr)
- Test Elevation: 277 meters (909 ft above sea level)
- Flow Testing Equipment: Alicat H_2 Mass Flow Meter, with electrical measurements recorded at each output setting
- Measurement Standardization: Alicat standardized gas-flow readings (SLPM); H_2 and O_2 production calculated using the theoretical 2:1 volumetric ratio
- Output Levels Evaluated: 20%, 40%, 60%, 80%, 100% capacity
- Purifier Testing Protocol: 12.5-hour continuous operation at 100% duty, with TDS, pH, and water temperature monitored at 2.5-hour intervals
- Cr(VI) Screening: Hanna HI749 Chromium VI Low Range Checker; final 500 mL cannula capture water tested following extended operation
- Additional Safety Testing: Inline flashback arrestor functional testing across all five duty-cycle settings, with and without a nasal cannula

Test Results

To evaluate hydrogen gas flow rate and inhalation gas purification performance, the AquaCure AC60 system was assembled according to manufacturer specifications using sodium hydroxide (NaOH) dissolved in distilled water. The device was evaluated at 20%, 40%, 60%, 80%, and 100% duty-cycle output settings, with electrical measurements and gas production recorded at each level. In addition, extended purifier testing was conducted at 100% duty to assess electrolyte accumulation and downstream gas purification performance over prolonged operation.

Produced oxyhydrogen gas was routed through a drying column, followed by an inline humidity and temperature sensor to monitor environmental conditions before entering an Alicat Mass Flow Meter for precise flow-rate measurement (mL/min). Gas flow measurements were recorded using the Alicat's standardized flow output (SLPM). Total oxyhydrogen production was measured directly, with corresponding hydrogen (H_2) and oxygen (O_2) production calculated using the theoretical 2:1 volumetric ratio of water electrolysis. Voltage, amperage, and wattage were recorded at each duty level to evaluate electrochemical performance and consistency.

Additionally, H_2HUBB conducted a 12.5-hour continuous purifier stress test at 100% duty, monitoring total dissolved solids (TDS), pH, and water temperature at 2.5-hour intervals across the two-stage humidifier/purifier system. A separate 500 mL distilled-water capture stage was connected to the final gas-delivery line to screen for potential downstream contamination. The collected water was evaluated for conductivity, TDS, pH, and hexavalent chromium (Cr(VI)) using a Hanna HI749 Low Range Chromium VI Checker. These measurements provided additional screening evidence regarding electrolyte accumulation, potential downstream carryover, and gas purification performance.

The results below present measured combined oxyhydrogen output, calculated hydrogen and oxygen production, corresponding electrical performance, and estimated inhaled H_2 and O_2 concentrations for an average adult (6.5 L/min minute ventilation). Inhaled gas concentrations were modeled using a standard nasal cannula with a 20-second inhalation / 40-second exhalation breathing cycle.

H_2 Flow Rate Test Results at SATP

Output Level: 20% Capacity

- Device H_2 Flow Rate (mL/min | mg/min): ≈106.67 mL/min H_2 (≈8.8 mg/min)
- Device O_2 Flow Rate (mL/min): ≈53.33 mL/min
- Total H_2/O_2 Flow Rate (mL/min): ≈160 mL/min
- Inhaled Gas (6.5 VE): H_2 ≈0.55% | O_2 ≈21.05%

Output Level: 40% Capacity

- Device H_2 Flow Rate (mL/min | mg/min): ≈200 mL/min H_2 (≈16.5 mg/min)
- Device O_2 Flow Rate (mL/min): ≈100 mL/min
- Total H_2/O_2 Flow Rate (mL/min): ≈300 mL/min
- Inhaled Gas (6.5 VE): H_2 ≈1.03% | O_2 ≈21.14%

Output Level: 60% Capacity

- Device H_2 Flow Rate (mL/min | mg/min): ≈306.67 mL/min H_2 (≈25.30 mg/min)
- Device O_2 Flow Rate (mL/min): ≈153.33 mL/min
- Total H_2/O_2 Flow Rate (mL/min): ≈460 mL/min
- Inhaled Gas (6.5 VE): H_2 ≈1.57% | O_2 ≈21.24%

Output Level: 80% Capacity

- Device H_2 Flow Rate (mL/min | mg/min): ≈420 mL/min H_2 (≈34.62 mg/min)
- Device O_2 Flow Rate (mL/min): ≈210 mL/min
- Total H_2/O_2 Flow Rate (mL/min): ≈630 mL/min
- Inhaled Gas (6.5 VE): H_2 ≈2.15% | O_2 ≈21.35%

Output Level: 100% Capacity

- Device H_2 Flow Rate (mL/min | mg/min): ≈662 mL/min H_2 (≈54.60 mg/min)
- Device O_2 Flow Rate (mL/min): ≈331 mL/min
- Total H_2/O_2 Flow Rate (mL/min): ≈993 mL/min
- Inhaled Gas (6.5 VE): H_2 ≈3.39% | O_2 ≈21.58%

Manufacturer's Rated Gas Output Confirmed: Yes — H_2HUBB measured a combined oxyhydrogen production rate of 993 mL/min (59.58 L/hr) at 100% duty, achieving approximately 99.3% of the manufacturer's nominal 60 L/hr combined gas-production rating. Hydrogen production was calculated at 662 mL/min using the theoretical 2:1 H_2:O_2 ratio, consistent with the expected gas composition of alkaline water electrolysis.

H_2HUBB Hydrogen Flow Rate Assessment:

H_2HUBB's hydrogen gas flow rate testing confirms the manufacturer's performance claims for the AquaCure AC60 oxyhydrogen inhalation device. At standard atmospheric pressure (SATP), the unit produced between 106.67–662 mL/min of hydrogen gas across the 20–100% duty output range, aligning with expected electrochemical performance for a mid-flow alkaline oxyhydrogen system. When operated within these duty levels using a single-user nasal cannula, the device delivers an estimated inhaled hydrogen concentration of approximately 0.55–3.39% for an average US adult (6.5 L/min rest ventilation). These inhaled concentrations fall within ranges commonly used in human clinical research and do not exceed safety thresholds reported in the literature. It is important to clarify that while the final inhaled hydrogen concentration at the user interface is within safe therapeutic ranges, the pre-mixed gas composition within the cannula line (approximately 66.67% H_2 / 33.33% O_2) remains flammable and potentially detonable under certain conditions. Proper safety considerations and adherence to manufacturer handling guidelines are therefore essential when operating oxyhydrogen systems.

Overall, the measured results at 60–100% duty exceed **H_2HUBB's minimum performance standards for hydrogen inhalation devices.** Based on our inhaled concentration modeling, H_2HUBB recommends operating within the 60–100% duty range for most average adults to achieve approximately 1.57–3.39% inhaled hydrogen, supporting therapeutic potential consistent with clinical research.

Extended-Duration Purifier Scrubbing Results:

(Continuous Operation – 100% Duty Output)

12.5-Hour Continuous Runtime

- Purifier 1 (350 mL): ≈709 ppm TDS | pH ≈12.2
- Purifier 2 (920 mL): ≈15 ppm TDS | pH ≈10.6
- Final Cannula Water Capture (500 mL): 0 ppm TDS | pH ≈6.8 | Conductivity ≈0.490 µS/cm | Cr(VI) ≈1 ppb

H_2HUBB Purifier Scrubbing & Gas Cleanliness Assessment:

According to our testing, the 12.5-hour continuous-use results demonstrate progressive alkaline accumulation within Purifier 1, which measured approximately 709 ppm TDS and a pH of 12.2. Secondary-stage loading (Purifier 2) remained considerably lower at approximately 15 ppm TDS, while downstream ionic presence within the final cannula water capture remained extremely low, with 0 ppm TDS and a pH of 6.8. Additional hexavalent chromium (Cr(VI)) screening recorded approximately 1 ppb in the final capture water, below H_2HUBB's proposed 10 ppb screening benchmark.

Hexavalent chromium (Cr(VI)) screening is particularly important when evaluating alkaline oxyhydrogen inhalation systems because Cr(VI) is a recognized toxic and carcinogenic contaminant, with inhalation exposure presenting significant respiratory health concerns. Conventional TDS and pH measurements cannot identify specific heavy-metal contaminants, making targeted screening an important additional safeguard. The AC60's final cannula water capture registered approximately 1 ppb Cr(VI) after 12.5 hours of continuous operation, a favorable screening result.

Chemical saturation capacity is not the primary limiting factor for purifier maintenance. The more practical consideration is the gradual buildup of hydroxide (OH^-) within the purifier water. Because distilled water has virtually no buffering capacity, rising hydroxide concentration results in a rapid increase in pH over time. By 5 hours, Purifier 1 had reached approximately 235 ppm TDS and pH 11.7, increasing to 476 ppm and pH 12.0 after 7.5 hours. This progressive accumulation supports proactive water replacement to minimize potential alkaline carryover into downstream stages.

Based on these findings, H_2HUBB recommends replacing the water in the smaller humidifier/purifier every 5–8 hours of operation when used exclusively. When the additional large-volume secondary humidifier/purifier is installed, H_2HUBB recommends replacing the water in both purifiers every 12 hours of operation. These intervals represent conservative maintenance recommendations based on observed purifier loading and downstream screening results, rather than established chemical saturation limits. Manufacturer instructions requiring earlier replacement should also be followed.

The additional large-volume purifier provides a secondary stage for capturing potential electrolyte carryover, helping maintain lower downstream dissolved-solids levels during extended operation. Although measurable alkaline accumulation occurred within both purifiers, the final cannula capture water measured 0 ppm TDS at the completed testing endpoint, with low conductivity and a favorable Cr(VI) screening result.
When maintained within these recommended replacement intervals, the AquaCure AC60's staged purifier system demonstrates favorable gas-cleaning screening performance for a mid-flow, home-grade alkaline oxyhydrogen inhalation device.

Internal Performance

Measured Electrical Performance:

- **Type of Device/Electrolytic Cell**
  - Oxyhydrogen (H_2/O_2) Alkaline Electrolysis
  - No membrane (NaOH electrolyte system)
- **Confirmed Electrical Values (Measured):**
  - Applied Voltage (100% duty): 24.60V DC
  - Measured Current (100% duty): 12.40 A
  - Total Calculated Electrical Power: 305.04 Watts (24.60V × 12.40 A)
- **Cell Configuration:**
  - Number of Stacks: 1
  - Cells per Stack: 11 (in series)
  - Electrolyte: NaOH dissolved in distilled water
  - Cell Production Efficiency (calculated): ~64.0%
- **Electrolytic Cell Stack Characteristics:**
  - Voltage per Stack (100% duty): 24.60 V
  - Cells per Stack: 11 (in series)
  - Voltage per Cell: 2.24 V (24.60 ÷ 11)
  - Current per Cell: 12.40 A (same across all cells in series)
  - Effective Electrochemical Current per Stack: 136.40 A-cells (12.40 A × 11 cells)
  - Power per Stack: 305.04 W (24.60 V × 12.40 A)
  - **Note: "Effective electrochemical current" represents the total electron activity across all 11 cells combined for calculating theoretical gas production. The actual electrical current flowing through the system remains 12.40 A, since the cells are wired in series.**
- **H_2 Production (Based on Measured Amperage @ SATP)**
  - Theoretical Maximum:
  - 1,036.64 mL/min H_2
  - 518.32 mL/min O_2
  - 1,554.96 mL/min total H_2/O_2
- **Electrolytic Cell Production Efficiency (Measured vs. Theoretical @ 100%)**
  - 662 ÷ 1,036.64 = ~64% theoretical hydrogen-production efficiency

Product Assessment

Functionality:

- **Master Power Switch:**
  - Controls overall system power (on/off).
- **Water Level Indicator Lights:**
  - **Yellow Refill Indicator:** Illuminates when additional distilled water is required. Distilled water should be added until the yellow indicator light turns off.
  - **Red Overfill Indicator:** Warns when the electrolyte reservoir contains excessive water.
  - **Red Low-Water Indicator:** Warns when the electrolyte reservoir water level is insufficient.
- **Session Timer Function:**
  - Allows selection of preset inhalation sessions (1, 5, 10, 20, 30, and 60 minutes).
  - Activates the timing circuit and electrolysis process for the selected duration.
- **Continuous Operation Mode:**
  - Enables extended operating periods beyond the preset session durations.
- **Water Reservoir:**
  - Requires distilled water for subsequent refilling after the initial electrolyte solution has been prepared and added.
  - Estimated reservoir capacity: approximately 1.0–1.2 liters (1,000–1,200 mL).
- **Electrolyte Requirement:**
  - Requires sodium hydroxide (NaOH) crystals dissolved in distilled water to establish the conductive alkaline electrolyte necessary for electrolysis.
  - Once the initial electrolyte solution is prepared and added, subsequent reservoir refilling requires distilled water rather than additional NaOH under normal operating conditions.

- **Digital Display & Output Control:**
  - A front-mounted digital display (approximately 2" × 3") shows the selected gas output percentage and provides touch controls for adjusting the duty cycle (20%, 40%, 60%, 80%, and 100%).
  - The display provides clear visibility of operating status and selected output settings.
- **Electrolyte Drain Port:**
  - Provides a designated outlet for draining the electrolyte solution from the reservoir during maintenance or electrolyte replacement.
- **Gas Purifiers (Humidifier / Scrubbing System):**
  - The AquaCure AC60 utilizes a staged purification system designed to reduce sodium hydroxide (NaOH) aerosol carryover from the generated oxyhydrogen gas before inhalation.
  - Purifier 1 (Primary Humidifier): Serves as the initial gas-scrubbing stage, capturing electrolyte aerosols and conditioning the generated gas.
  - Purifier 2 (Large-Volume Drinking Bubbler): An optional secondary purification stage that provides additional gas scrubbing and helps reduce potential downstream electrolyte carryover.
  - **H_2HUBB Recommendation: We recommend using the large-volume Drinking Bubbler primarily as a secondary gas purifier rather than for producing hydrogen-rich drinking water. Hydrogen-rich water can be prepared separately using the diffusion stone provided with the device. This allows the Drinking Bubbler to remain dedicated to gas purification, providing an additional protective stage before inhalation.**

Product Safety

Safety Components:

The AquaCure AC60 system incorporates multiple safety mechanisms designed to support operational safety, thermal stability, and protection against gas pressure buildup and flashback:

- **Low-Water Protection:**
  - Automatically shuts the system off when reservoir water levels become insufficient, helping protect the electrolysis cells from overheating.
- **Reservoir (Approximately 1.0–1.2 L):**
  - Provides thermal buffering capacity to help reduce excessive heat buildup during extended operation.
- **Large Cooling Fan:**
  - Assists with heat dissipation and ventilation, helping reduce excessive internal temperature accumulation.
- **Purifier System:**
  - Distilled water-based purifiers designed to capture sodium hydroxide aerosols and improve inhalation gas cleanliness.
  - The optional large-volume secondary purifier provides an additional stage of gas scrubbing before inhalation.
- **Pressure Sensor Kill Switch:**
  - Automatic shutdown mechanism reportedly triggered at approximately 2.0 psi, helping prevent excessive internal pressure buildup.
- **Stage-One Purifier Pressure Relief Valve:**
  - Additional mechanical pressure relief reportedly rated at approximately 3 psi, providing a secondary safeguard against excessive pressure.
- **Inline Flashback Arrestor:**
  - Incorporates a dedicated inline flashback arrestor designed to prevent flame propagation backward through the gas-delivery line.
  - H_2HUBB conducted functional flashback testing at all five duty-cycle settings (20%, 40%, 60%, 80%, and 100%), both with and without a nasal cannula.
  - Flashback Test Results: PASS — All 10 tested configurations successfully stopped flashback propagation.
  - These findings demonstrate successful functional protection under the tested conditions but do not constitute standardized flame-arrestor certification.
- **Heat Ventilation Ports:**
  - Allow passive heat escape to help prevent excessive internal temperature accumulation.

H_2HUBB Flashback Arrestor & Ignition Safety Assessment:

Oxyhydrogen systems such as the AquaCure AC60 produce a premixed hydrogen/oxygen gas stream (approximately 66.67% H_2 / 33.33% O_2). This mixture is inherently flammable and potentially detonable under certain conditions. Because the gases are premixed before delivery, ignition at the nasal cannula outlet from an open flame, spark, or other ignition source may allow combustion to propagate backward through the gas-delivery pathway.

To evaluate this risk, H_2HUBB conducted direct functional flashback testing of the AquaCure AC60's inline flashback arrestor across all five operating duty cycles (20%, 40%, 60%, 80%, and 100%). Testing was performed both with and without an attached nasal cannula, resulting in 10 separate test configurations. During these evaluations, the escaping oxyhydrogen gas was intentionally ignited to observe whether flame propagation would travel backward through the delivery pathway and whether the inline flashback arrestor would successfully stop it. The arrestor successfully stopped flashback propagation in all 10 tested configurations, achieving a 100% pass rate under H_2HUBB's test conditions. These results demonstrate excellent functional performance across the device's operating output range.

Additional open-air ignition testing provided important insights into the rapid dilution of oxyhydrogen gas after discharge from the nasal cannula. **With the cannula tips exposed to ambient air, ignition was observed at approximately 0.15 inches at 20% duty, 0.50 inches at 40%, 0.75 inches at 60%, 1.0 inch at 80%, and 1.50 inches at 100% duty.** These findings demonstrate that, under the tested conditions, ignition required an open flame to be positioned in close proximity to the cannula outlets, even at the device's maximum gas production rate. The observations are consistent with rapid atmospheric dilution of the oxyhydrogen mixture, reducing its combustibility as it disperses and is diluted into the surrounding air.

These findings highlight an important aspect of oxyhydrogen inhalation safety: direct exposure to ignition sources near the cannula or user's face represents a significant and potentially preventable hazard. Smoking, open flames, sparks, improper handling, and failure to observe established inhalation safety protocols can create dangerous conditions that would otherwise be avoidable. **H_2HUBB's experimental observations reinforce the importance of proper user education and responsible operation. Based on these findings, H_2HUBB considers negligence, improper safety practices, and inadequate user education to be potentially primary contributing factors in preventable oxyhydrogen ignition accidents.** The observed ignition distances should not be interpreted as established safe separation distances but provide experimental evidence supporting rapid dilution into ambient air as an important characteristic of discharged hydrogen–oxygen mixtures.

Based on these findings, H_2HUBB recommends that all hydrogen inhalation devices incorporate a properly rated and appropriately installed flashback arrestor as a standard safety component, particularly systems producing premixed hydrogen and oxygen. A flashback arrestor provides a dedicated protective barrier designed to stop flame propagation through the gas-delivery pathway before it can reach upstream tubing, purification components, or the electrolysis system. The arrestor must be compatible with the specific gas composition, operating pressure, and flow characteristics of the device. H_2HUBB considers this an important safety feature that manufacturers should prioritize when designing hydrogen inhalation equipment.

The AquaCure AC60 also incorporates staged water-based purifiers, a pressure sensor shutdown mechanism (approximately 2.0 psi), and a stage-one pressure relief valve (approximately 3 psi), providing additional safeguards against gas contamination and excessive pressure buildup. Combined with the demonstrated performance of its inline flashback arrestor, these components contribute to the AC60's overall safety design. While no individual safety mechanism eliminates every potential hazard, H_2HUBB's functional testing provides favorable evidence of the device's ability to mitigate flashback propagation under the conditions evaluated.

Overall, H_2HUBB's experimental findings emphasize that both engineering safeguards and responsible user behavior are essential to oxyhydrogen inhalation safety. The successful flashback arrestor tests demonstrate the value of incorporating dedicated flame-propagation protection, while the open-air ignition observations highlight the importance of avoiding ignition sources near the cannula interface. Users should never smoke, use open flames, or expose the cannula tips to sparks or high-heat sources during operation. Proper adherence to manufacturer safety guidelines and established inhalation protocols remains essential for minimizing preventable accidents.

Overall Opinion

The AquaCure AC60 Oxyhydrogen Inhalation Device has been evaluated and verified through independent H_2HUBB testing, demonstrating performance consistent with an approved mid-flow alkaline oxyhydrogen system for hydrogen inhalation. The manufacturer specifies a combined oxyhydrogen gas output of approximately 60 L/hr (1,000 mL/min), consisting of approximately 66.67% H_2 and 33.33% O_2 under standard operating conditions. Our independent testing confirmed a combined gas production rate of 993 mL/min at 100% duty, equivalent to approximately 662 mL/min of hydrogen and 331 mL/min of oxygen, achieving 99.3% of the manufacturer's rated gas output. Testing across all five duty settings further demonstrated progressive and consistent gas production corresponding to the device's operating capacity.

Unlike membrane-based PEM/SPE systems, the AC60 utilizes a no-membrane alkaline electrolysis configuration with a sodium hydroxide (NaOH) electrolyte solution. While this design represents a long-established and effective method for oxyhydrogen gas production, it introduces additional specific maintenance requirements and safety considerations, including electrolyte concentration management, purifier water replacement, and appropriate safeguards against alkaline aerosol carryover and flashback propagation.

Through empirical flow-rate analysis, inhaled concentration modeling, and extended purifier pH/TDS testing, H_2HUBB confirmed that the device produces modeled inhaled hydrogen concentrations of approximately 0.55–3.39% across its five duty settings for an average adult (6.5 L/min resting minute ventilation). These concentrations overlap ranges investigated in human clinical research. Additionally, our 12.5-hour continuous purifier evaluation demonstrated substantial alkaline accumulation within the primary purifier while maintaining significantly lower dissolved-solids concentrations in the secondary purifier and final cannula capture water. These findings support the effectiveness of the device's staged gas-scrubbing configuration when operated within H_2HUBB's recommended maintenance intervals.

At present, no universally adopted IHSA or American Hydrogen Health Association gas-purity certification specific to alkaline oxyhydrogen inhalation systems was provided with this unit, nor was independent third-party gas chromatography analysis available at the time of evaluation. In lieu of SGS laboratory gas composition analysis, H_2HUBB conducted extended purifier durability testing, multi-hour pH and TDS monitoring, electrical performance verification, and targeted hexavalent chromium (Cr(VI)) screening to assess potential electrolyte and contaminant carryover. Following 12.5 hours of continuous operation, the final cannula capture water measured 0 ppm TDS, pH 6.8, and approximately 1 ppb Cr(VI), below H_2HUBB's proposed 10 ppb screening benchmark. These favorable screening results provide additional evidence supporting the device's purification performance.

H_2HUBB also evaluated the AC60's integrated flashback arrestor through direct functional testing at all five duty-cycle settings, both with and without an attached nasal cannula. The arrestor successfully stopped flashback propagation in all 10 tested configurations. Additional open-air ignition observations demonstrated that ignition required close proximity to the cannula outlets under the tested conditions, consistent with rapid atmospheric dilution of the discharged oxyhydrogen mixture. Together, these findings support H_2HUBB's favorable assessment of the AC60's incorporated safety mechanisms and reinforce the importance of appropriate equipment design, user education, and adherence to established inhalation safety protocols.

Hydrogen gas output flow rate is a critical performance parameter for inhalation devices. **At H_2HUBB, the minimum performance standard for flagship hydrogen generators or inhalation units—whether pure hydrogen or oxyhydrogen—is 300 mL/min of H_2.** At typical resting ventilation rates (approximately 5–8 L/min), using a nasal cannula for an average adult, this corresponds to roughly 1.25–2.0% inhaled hydrogen through our H_2 inhalation modeling. Human clinical research on molecular hydrogen inhalation commonly utilizes concentrations ranging from 0.5% to 4% or higher at resting breathing rates, levels that have demonstrated therapeutic potential across various conditions. Based on this body of evidence, H_2HUBB establishes 300 mL/min of hydrogen output as the baseline requirement for flagship inhalation systems to ensure meaningful therapeutic capability. **The AquaCure AC60 oxyhydrogen inhalation device meets and exceeds this minimum standard at its 60–100% duty settings, producing approximately 306.67–662 mL/min of molecular hydrogen and supporting inhaled concentrations consistent with those investigated in clinical research.**

H_2HUBB's independent evaluation demonstrates that the AquaCure AC60 delivers excellent hydrogen production performance relative to its manufacturer specifications, favorable staged purification results, and effective functional flashback protection under the conditions tested. **Based on these findings, H_2HUBB considers the AquaCure AC60 a qualified home-grade, mid-flow alkaline oxyhydrogen inhalation system worthy of official H_2HUBB approval and public recommendation, provided users follow appropriate operating, maintenance, and safety guidelines.**

The AquaCure AC60's electrolytic cell performance corresponds well with our measured gas output testing. At 100% duty, the 11-cell alkaline electrolysis system operated at 24.60V and 12.40A, consuming approximately 305 watts while producing 662 mL/min of hydrogen gas. Compared with the theoretical maximum of 1,036.64 mL/min calculated using electrochemical principles, the device achieved approximately 63.86% theoretical hydrogen-production efficiency. These results demonstrate satisfactory electrochemical performance consistent with its mid-flow alkaline oxyhydrogen design.

From an overall design perspective, the AquaCure AC60 represents an improvement over the AC50, which was independently tested and approved by H_2HUBB in 2019. One of the most significant improvements is the incorporation of an effective inline flashback arrestor, a safety component H_2HUBB has recommended and encouraged hydrogen equipment manufacturers to adopt for more than six years. Given the inherent flammability of premixed oxyhydrogen systems, integrating a quick-connect flashback arrestor into the external gas-delivery line represents an important advancement in user protection and operational safety.

Flashback arrestors are commonly used in industrial hydrogen and combustible-gas applications to quench flame fronts and prevent backward flame propagation. H_2HUBB's independent testing confirmed the effectiveness of the AC60's arrestor across all five duty settings, both with and without a nasal cannula, successfully stopping flashback propagation in all 10 tested configurations. Combined with the device's staged water purifiers, pressure-sensitive shutdown system, and mechanical pressure-relief safeguards, this additional protective component strengthens the AC60's overall safety design and provides greater confidence in its operation.

Conclusion

In conclusion, the AquaCure AC60 delivers therapeutically relevant and electrochemically consistent hydrogen output across its tested duty levels, achieving approximately 99.3% of the manufacturer's rated combined gas production at maximum capacity. Its hydrogen output of 306.67–662 mL/min at 60–100% duty exceeds H_2HUBB's 300 mL/min flagship performance standard, supporting modeled inhaled hydrogen concentrations within ranges investigated in human clinical research.

The AC60 also demonstrated favorable purifier scrubbing performance during extended operation, low downstream contaminant screening results, and effective flashback protection throughout H_2HUBB's functional testing. These findings represent meaningful improvements in the device's overall performance and safety assessment compared with its predecessor.

While the device produces clinically relevant inhaled hydrogen concentrations, proper operation and routine maintenance remain essential due to its premixed oxyhydrogen configuration. Users should strictly avoid ignition sources near the cannula interface and follow H_2HUBB's recommended purifier water replacement intervals of 5–8 hours for the primary purifier alone or 12 hours when operating with both purification stages.

Based on our independent evaluation, H_2HUBB approves and recommends the AquaCure AC60 as a reliable, home-grade, mid-flow alkaline oxyhydrogen inhalation system with excellent gas-production performance and meaningful safety improvements over the previous AC50 model.

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Approved By: Tywon Hubbard

TYWON HUBBARD

CEO, H_2HUBB LLC