Philips NIBP cuffs prove strength and reliability

**Summary**

Rigorous testing helps demonstrate that Philips non-invasive blood pressure cuffs can withstand the demands of hospital use. Philips recently compared our cuffs to other manufacturers’ cuffs in a series of durability tests. Tested cuffs include both reusable and disposable adult cuffs.

**Purpose**

Philips durability testing program is designed to demonstrate that our NIBP cuffs can withstand extreme use, so that you can be confident of outstanding performance during typical use. Recently, we extended that testing to our competitors’ cuffs, to benchmark the performance of Philips cuffs vs. other options.

**Tests performed**

Four tests were performed on a sample size of three cuffs of each kind:
- Tube connection durability
- Hook and loop durability
- Seams durability
- Burst resistance

**Results**

Results were divided into green, yellow, or red ratings.
- Green: all three samples passed the test
- Yellow: One sample failed; cuff did not meet Philips standards but is probably adequate for most clinical uses
- Red: More than one sample failed

*All testing performed by the Andover Hardware Testing Center (AHTC).*
**Test protocol**

All cuffs were preconditioned for storage temperature, operating temperature and relative humidity in an environmental chamber, based on Philips limits. The cuffs were then subjected to the durability tests. All tests were performed by the same investigator, using the same equipment.

**Tube connection durability**

The tube connection durability test determines the cuff’s ability to withstand long-term flexing without forming leaks at the point where the tubing joins the cuff. First, the cuff is tested to identify any existing leaks. Next, a one-pound weight is attached to the tube and the cuff body is flexed through a 180° arc a specified number of times.

Following the test cycle, the investigator performs a final leak test. The Philips specification for acceptable leaks is 2mmHg/minute maximum, averaged over five minutes.

**Hook and loop durability**

The hook and loop durability test determines the cuff’s ability to withstand long-term open/close cycles of the hook and loop. Each cuff is attached to the Philips hook and loop cycle tester, which opens and closes the cuff a specified number of times.

Following the test cycle, the investigator performs a final leak test. The Philips specification for acceptable leaks is 2mmHg/minute maximum, averaged over five minutes.

**Seams durability**

The seams durability test determines the cuff’s ability to withstand long-term inflate/deflate cycling. After an initial test to identify any existing leaks, the cuff is inflated to 300mmHg and deflated to under 15mmHg within a 4-second cycle for a specified number of times.

<table>
<thead>
<tr>
<th>Test family</th>
<th>Number of cycles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult reusable cuffs</td>
<td>150,000 cycles</td>
</tr>
<tr>
<td>Adult vinyl cuffs</td>
<td>10,000 cycles</td>
</tr>
<tr>
<td>Adult soft cuffs</td>
<td>3,000 cycles</td>
</tr>
</tbody>
</table>

Following the test cycle, the investigator performs a second leak test. The Philips specification for acceptable leaks is 2mmHg/minute maximum, averaged over five minutes.

**Burst resistance**

This two-part test is designed to assess the ability of the cuff’s bladder and cover to resist bursting during a real-world torture test, as well as a lab robustness test.

In the first part of the test, the investigator places the cuff flat on a table and inflates it unbound up to 300mmHg. The cuff is held at that pressure for five seconds, and then deflated. This mimics the situation that arises when a cuff is attached to a monitor with auto-timed readings, and a user removes the cuff from a patient’s arm without turning off the monitor’s autotimer. In these cases, the monitor can inflate the cuff up to the maximum pressure the monitor is capable of producing (300mmHg) before the monitor detects that the cuff is not on a patient.

In the second part of the test, the same cuff is placed in concentric mandrels to control its swelling, and subjected to 700mmHg pressure for one minute. While this pressure is well outside the normal limits, the test is designed to demonstrate that the cuff can perform beyond expected use.

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