Wheelchair Cushion tests- Rehabilitation Engineering and Applied Research Lab

Dimensioning, loaded contour depth, overload depth
These tests are required for PDAC HCPCS coding
Overall height, width, and depth; weight; dimensions of features in a pre-loaded state; loaded contour depth test and overload test performed 3 times with the median values reported.

1st cushion: $600
2nd cushion: $300
3rd and up: $200 each

1 cushion $600
2 cushions: $900
3 cushions: $1100 plus $200 each afterward

Interface pressure tests
Human subjects

Wheelchair users. At least ten wheelchair users, five of whom are clinically insensate will be measured while seated on the test cushion and a reference foam cushion. Analysis includes calculation of several variables including the Peak Pressure Index required by the PDAC

$500/subject for up to 2 test cushions and one reference foam cushion
A 3rd test cushion will add $75/subject
Additional test cushions (4+) may require a 2nd test session and, therefore, costs will be determined once the number of cushions is defined.

Subjects without disabilities. Measurement of non-wheelchair users is logistically and technical simpler (i.e., recruitment, transferring) but provides much different information about cushions and supporting surfaces.

$200/subject for up to 2 test cushions and one reference material
A 3rd test surface will add $50/subject
Studies with >15 subjects may qualify for reduced rates depending on protocol

Buttock model using interface pressure mat
Interface pressures will be measured under three loading conditions corresponding to 3 body masses, 56, 70 and 84 kg. The ability of a cushion to accommodate different body weights will be compared to flat reference foam. Cushions will be adjusted for each loading configuration. CATEA has a variety of buttock models that reflect different types of people. Discussion would be needed to identify which model or models would be most useful. The final report will include Peak Pressure Index and Dispersion Index calculations. The pressure sensitive system will be calibrated immediately before data collection.

1st cushion: $700
each additional cushion: $350

Instrumented Buttocks model:
Compliant instrumented buttock models have been designed to represent different human morphology. Both internal pressures and strains are measured at multiple locations along the model midline. Different loading conditions have been defined to represent persons ranging from 56 to 114 kg. Most often, a flat reference foam is measured in parallel to the test cushions. Pressure metrics are calculated and compared to those metrics measured on a flat reference foam cushion.

The baseline test involves: 1 buttock model at 2 loads and includes reference foam testing

1st cushion- $1000
each additional cushion: $500

Positioning Tests:

Ability to accommodate pelvic obliquity- a buttock model is loaded in obliquity, and the symmetry of the forces is calculated and compared to a reference cushion.

1st cushion: $350
each additional cushion: $200

Positioning features under load:
Buttock models and thigh models are used to impart loading on cushion; the height of positioning features are then measured under load

1st cushion: $350
each additional cushion: $200

Cushion adjustability assessment

Instrumented Buttocks model: The compliant instrumented buttock model is applied to the cushion using 3 loading conditions representing 56, 70 and 84 kg persons. Two instrumented buttock models, varying in shape, will be the indentor. Pressures and strains are measured at multiple locations along the model midline. Pressure metrics are calculated and compared to those metrics measured on a flat reference foam cushion.

1st cushion- $1000
each additional cushion: $400

PDAC HCPCS (*SADMERC*) Simulated use tests: cushions will be exposed to four separate tests that simulate 12 or 18 months of use. Loaded Contour depth and overload depth tests will be run before and after simulation testing.

The simulated test protocol is as follows:
1. Laundering of cover. If the cushion is supplied with a removable cover, it will be exposed to 5 repeated washing and drying cycles
2. Accelerated heat aging. The cushion & cover are exposed to 70 °C for 48 hours
3. Dynamic cyclic loading. The test cushion is repeatedly loaded with 0-750 N. For a 12 month simulation test, 8700 +/- 200 cycles are performed and for an 18 month simulation, 13,000 +/- 200 cycles are performed.
4. Static/dynamic cyclic loading. Test cushion is exposed to a 400-600 N cyclic load. For a 12 month simulation test, 35,000 +/-200 cycles are performed and for an 18 month simulation, 52,500 +/- 200 cycles are performed.

Cost: 1st cushion: $800; each additional cushion: $600

Report: Test results will be tabulated into a single report; raw data will also be provided in a separate report summary.

Non-Human PDAC Testing (summary)

Dimensioning, loaded contour depth, overload depth
Simulated use tests
1 cushion $1400
2 cushions: $2300
3 cushions: $3100
Additional: $800

Advanced Simulated Use Testing
Cushions will be exposed to a sequence of simulated use protocols reflecting 12 or 18 months of use. Three tests batteries will be run before and after each cycle (either 12 or 18 months)

Measurements:
1) Loaded contour Depth & Overload Depth testing
2) Impact Dampening
3) Instrumented buttock testing (70 & 84 kg loading)

Loaded Contour depth and overload depth tests will be run before and after simulation testing.

Simulation protocol sequences

Cushions with removable covers	Cushion without removable covers (or no cover)
1. Soiling 2. Laundering cover (5 washer/dryer cycles) 3. Cleaning cushion if urine penetrates cover 4. Heat aging 5. Cyclic Loading a. Dynamic b. Static/dynamic	1. Soiling 2. Cleaning cover/cushion 3. Heat aging 4. Cyclic Loading c. Dynamic d. Static/dynamic

Cost: 1st cushion: $1000; each additional cushion: $800