

# Creep Testing System: Product Design Specifications

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**Function:** To measure creep properties of hydrogels in a pH and temperature controlled environment.

## Client Requirements:

- Maintain the pH of a solution from 2-10
- Maintain the temperature of a solution at approximately 4-44 °C
- Chamber should not interfere with creep testing

## Design Requirements:

### 1. Physical and Operational Characteristics

- Performance Requirements:* The creep testing apparatus should be capable of being used for consecutive and possibly simultaneous tests.
- Safety:* The chamber should be securely sealed to prevent potentially acidic, basic, very hot, and/or very cold solutions from escaping and causing injury to both the user and any surrounding lab equipment. Gloves should be worn when handling the solutions to be used in the chamber. Oven mitts should be worn if the solution to be used is very hot.
- Accuracy and Precision:* The temperature and the pH should not vary significantly. Method to measure creep must be as accurate and precise as possible.
- Life in Service:* The chamber should maintain the temperature and pH of a solution over a time period of one creep test (possibly 1-2 days).
- Shelf Life:* The chamber should be stored in a cool, dry place.
- Operating Environment:* The chamber is to be used at room temperature, atmospheric pressure, and normal humidity. It will also be exposed to solutions with temperature ranging from 4 – 40 degrees Celsius and pH ranging from 2 – 10.
- Ergonomics:* The chamber should be easy to transport.

- h. *Size:* The chamber should be of appropriate height to accommodate for tripling of hydrogel sample length during creep testing.
- i. *Weight:* The chamber should be light enough to be lifted by one person.
- j. *Materials:* The materials of the chamber should be durable, transparent, easy to manufacture, affordable, insulating, and able to withstand changes in temperature from 4 – 44 degrees Celsius and changes in pH from 2 – 10.
- k. *Aesthetics, Appearance, and Finish:* The chamber should have a transparent shell so that the user can see the hydrogel sample inside. It should also have no sharp edges or extrusions.

## **2. Production Characteristics**

- a. *Quantity:* One creep testing apparatus is needed.
- b. *Target Product Cost:* N/A at this time

## **3. Miscellaneous**

- a. *Standards and Specifications:* Testing system should accommodate hydrogel samples of ASTM approved dog-bone shape.
- b. *Customer:* See client requirements.
- c. *Patient-Related Concerns:* N/A
- d. *Competition:* None commercially available.