Updated 4/2024

**Instructions for Manikin Tests on Children’s Sleeping Bags at KSU**

The manikin test measures the insulation (clo) value of a sleeping bag or sleeping bag system (i.e., bag, clothing, pad, etc.) according to basic principles in ASTM F 1720 using a child-size manikin. We put the insulation value of a sleeping bag system into body heat loss models to predict the temperature ratings for children of different ages – 5, 8, and 11 years old.

Every time you send a set of products for testing, please email the **KSU Submission Form for Bags - Children** file to [merediths@ksu.edu](mailto:merediths@ksu.edu). Please send the file in Word format – not PDF. Once you fill out the form, the only thing that should change is the product list. Only one form is needed for a set of bags; we will prepare one report and invoice. ***If you require a separate report and invoice for each test, then prepare separate submission forms.***

**1. Company Information.** Please enter your contact information on the form.

**2. Purchase Order, Invoice, and Payment.** Please enter your purchase order number on the form (if you have one) or indicate that a PO will be sent. We will put the PO number on the invoice that is sent to you. Companies may pay by check, wire transfer, or credit card. Instructions are given on the invoice. If you want the invoice sent to someone other than the company contact, please indicate this on the form.

**3. Test Protocol.**

A. ASTM F 1720 – Option #1: Bag Alone. Nude child manikin is placed in the bag on a thin cot for testing. *This method is used when comparing small differences in design and/or materials between bags.*

B. ASTM F 1720 – Option #2: Mummy Bag Systems. Bag is tested with auxiliary products as a system, and KSU models are used to predict temperature ratings for children. Indicate whether you want us to test your bag with our standard thermal underwear, socks, and pad or whether you will be providing your own auxiliary products. *Note: Our base ensemble and pad are similar to those we use for testing adult bags according to ISO 23537.*

C. ASTM F 1720 – Option #2: Rectangular Bag Systems. Bag is tested with auxiliary products as a system, and KSU models are used to predict temperature ratings for children. Indicate whether you want us to test your bag with our standard thermal underwear, socks, hat, camp pillow, and pad or whether you will be providing your own auxiliary products.

***Note: We can keep your auxiliary products in our inventory at IER to use for future testing.***

**Replications.** We have changed our policy and will now offer all types of replications for the same price. Selection A – 3 reps in a row on one sample – is the fastest method. Manikin system variability is reflected in this protocol. Selection B – 3 independent reps on one sample – also reflects variability in dressing the manikin. Selection C – 3 independent reps on 3 identical bag samples – also reflects sample variability.

**Thermal imaging.** A FLIR E5-XT infrared camera will be used.Thermal imaging is only available as an add-on service to manikin testing. Images are considered supplemental information. Due to issues with emissivity and reflectivity of different surfaces, associated temperature scales will not be provided. Color scales of different photos/samples may not match.

**Local insulation values.** Indicate whether you would like to have the local insulation values reported for the manikin’s 16 body segments in addition to the overall insulation value for the body.

**Bag weight.** We will provide this information upon request.

**4. Bag samples – sizing, labeling, and sending samples.** Label each bag with a letter or number code using a permanent felt-tip marker on a piece of masking tape or sticky label. Place the tape label on the draw cord at the neck or on the bottom of the footbox. Please list the bag descriptions on the form. This information will be copied and put in the report. Example: Bag 1. Peak One, Style 2568, Fill: 100 g/m2 of Climashield polyester fiberfill, youth size.

**Bag size and manikin measurements.**  Children’s bags vary in size; try to send bags that are all the same size for testing. The manikin’s measurements are given in the following table.

**Child Manikin: Sonny’s Body Measurements (Boy’s size 8)**

|  |  |  |
| --- | --- | --- |
| **Measurement Location** | **Amount** | |
|  | **cm** | **in** |
| Chest circumference at arm pit level | 66.0 | 26 |
| Natural waist circumference | 62.2 | 24.5 |
| Hip circumference (widest point) | 71.1 | 28 |
| Circumference of torso and arms at elbow level (33 in. from feet) | 87.6 | 34.5 |
| Circumference of torso and arms at hand level (23.5 in. from feet) | 85.7 | 33.75 |
| Height | 129.5 | 51 |

**Send the bags to:**

Meredith Schlabach  
Institute for Environmental Research   
Kansas State University Office Phone: 785-532-2284  
0056 Seaton Hall

Manhattan, KS 66506 email: [merediths@ksu.edu](mailto:merediths@ksu.edu)

*If you are sending products from a country other than the United States, please make sure that you pay all customs duties and brokerage fees associated with the shipment.*

**Timing.** We test bags in the order they are received at KSU. During holiday times and campus vacation breaks, our lab closes down.

**Test report.** A test report will be prepared and saved as an electronic PDF file with the company’s name and technical report number as the file name (example: LLBean17-145 bag report).

**5. Return of bags.** Please provide us with your company’s preferred shipping company and account number for return shipping (e.g., Federal Express, UPS, DHL) on the form. If you want overnight shipping, please indicate this on the form. If you want us to donate the bags to a charitable organization like the Boy Scouts or Girl Scouts, let us know. They really appreciate it.

**6. Export Controls Compliance.** Please indicate if you are contracting, working, or acting for or on behalf of a national government. Include information about the agency or the branch of a national government that you are associated with.