Health

External Audience Protocol (EAP)

Bike Helmets

©2021 Consumer Reports, Inc. This document is the property of Consumer Reports and is intended for the recipient’s internal use only. You may not republish this document or provide copies to third parties or authorize anyone else to do so without Consumer Reports’ prior written consent. You may not use or authorize any third party to use Consumer Reports’ names, ratings or trademarks (i) in any form of advertising, marketing or promotion; (ii) in any manner that may be construed as an endorsement by Consumer Reports; or (iii) in any manner inconsistent with CR’s No-Commercial Use Policy without Consumer Reports’ prior written consent.

This document’s contents may not be used in connection with any legal proceedings (including but not limited to litigation involving warranties, marketing claims, product liability, market share, injury or property), regulatory standard setting, administrative investigations or enforcement proceedings, or in connection with any other type of proceedings to which Consumer Reports is not a party. This document is otherwise subject to the terms of Consumer Reports’ User Agreement. Learn more at CR.org.
Introduction

This document describes the protocol for testing bike helmets at Consumer Reports. The purpose of this testing is to evaluate the safety and overall performance of bicycle helmets, which includes testing for fit adjustment, ease of use, ventilation, weight, retention system strength and impact attenuation. The results of this testing are used to evaluate and create a relative rating of the helmets.

Testing

Pre-test Preparation

Model Selection

As part of our standard helmet testing, Consumer Reports (CR) chooses a number of adult and youth helmets from among those that are considered top sellers, have interesting or innovative design features, and/or technological improvements. Helmets are selected from brands that are available nationwide from retail outlets or from online stores. Road, mountain, urban and skate-style helmets are chosen, in order to provide consumers with rating information that covers a broad range of helmet styles and prices.

Fit Adjustment Test

Helmets are examined to determine the features available to adjust the fit of the helmet.

Ease of Use Test

The adjustable features of the helmet are evaluated to determine how easily they are to operate.

Ventilation Test

Two CR technical experts subjectively evaluate ventilation performance. Testing is conducted indoors at ambient indoor conditions in front of a ducted air flow, created by a fan blowing air through a wind-concentration fixture. Reference helmets retained from previous testing projects are first worn to calibrate the sensitivity of the testers for a poor, good and excellent performing helmet. Wearing each helmet model, the technical experts use their judgment to independently assess how well the ventilation system works. They then confer to agree upon a consensus score. Models that are not designed to fit an adult’s head (i.e.: youth helmets) are assessed for ventilation based on each model’s ventilation design in comparison to a similarly designed adult helmet.
Weight
Two helmets are weighed and their weights averaged. The helmet is weighed with a detachable visor if available. If the helmet is available in multiple sizes, a size medium is used. If size medium is not available a larger and smaller size are used and their weight averaged.

Retention System and Impact Attenuation Tests
The retention system strength and impact attenuation tests are patterned after the CPSC’s 16 CFR Part 1203 Safety Standard for Bicycle Helmets; Final Rule (pages 11711 to 11747 March 10, 1998) which describes test methods and defined mandatory minimum performance standards for all bicycle helmets sold in the United States. Tests are conducted at ambient indoor conditions, with temperature ranging between 62 and 81 degrees F and relative humidity between 20 to 80 percent. CR uses only one size of helmet for each model, the size that best fits the A, E, J or M head-form without using extra padding. The best fit is considered to be when the smallest head-form that best fills the volume of the helmet cavity, without the use of any extra padding, partially compresses all of the padding within the helmet. Samples are conditioned and stabilized to the ambient testing environment for at least four hours prior to testing.

Retention System Strength
Tests are conducted on a commercially available Biokinetics bike helmet retention system tester pictured below. A minimum of two and a maximum of three helmet samples are used; if one of two samples fail, a third sample is used. CR’s test parameters are listed in the table below.
The helmet is fitted to the mounted head-form and the chin strap buckled under the stirrup and adjusted so that the buckle does not contact the rollers of the stirrup. The retention system is pre-tensioned with the anvil/drop weight system and the drop weight raised to the drop height and released. The extension length is measured via a linear voltage differential transducer (LVDT). If on 2 samples elongation is measured at more than 30 mm a scoring deduction is imposed. A complete separation of the retention system where the chin strap is no longer a closed loop connected to the helmet, is considered a failure of CR’s test, regardless of the elongation measured.

Impact Attenuation

Tests are conducted on a commercially available Cadex uni-axial impactor. A minimum of two and a maximum of three helmet samples are impacted. A third sample is used if statistical analysis of the first two samples deems it necessary. A check of the impactor is completed before and after every series of tests conducted on the same day. Only the flat anvil is used, and helmets are subjected to 4 impacts at a nominal velocity of 6.2 m/sec on the front, crown, side (right) and rear of the helmet. The helmet is oriented so that the center of impact is above the impact line, and at least 120 mm separated from the center of any previous impact site. A peak acceleration greater than CR’s established threshold, at 2 of 8 impact sites across two helmet samples, is considered a failure of CR’s test.