

IMPACT TESTING OF MOUTH GUARDS

TECHNOLOGY CONDUCTED BY INTERTEK-PLASTICS LABORATORIES, INC.

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I. Review of Protocol

Objective:

Develop a testing method that will compare the impact transmitted when a mouth guard is worn against the same impact transmitted without a mouth guard.

Method:

The method simulates the mouth guard in actual use. A model was made of an individual's upper and lower teeth. A steel plate was bonded to the top surface of the upper teeth to reduce the possibility of cracking the model during impact testing. The model was made of a high impact plastic. Thirteen mouth guards were submitted for testing.

Each of the mouth guards was fitted to the upper teeth of the individual from whom the model was fabricated. The mouth guards were fitted according to the manufacturer's directions.

The model with each mouth guard was placed on the upper teeth. The impact test was conducted utilizing a Dynatub 8250 and Instron Dynatub Impulse Data Acquisition System v 2.0.0. The lower teeth were positioned to fit into the impression of the lower teeth on each mouth guard. Impact was made with a one-inch flat head. The impact force used was 8 pounds at a 6-inch height. The impact area was on the middle of the metal plate on top of the upper teeth. Once the impact transmitted through the model with each of the mouth guards was measured. The same test was conducted on the same model without a mouth guard in place. The results were determined by the difference between the impact transmitted through each of the mouth guards fitted on the model and the impact transmitted through the model without a mouth guard. Since this test did not destroy the model or the mouth guards, five tests were conducted on the model as well as five tests on each of the mouth guards in place and averages were determined.

II. Procedure

Intertek-Plastics Technology Laboratories, Inc. performed the tests. They employed a Dynatub 8250 and Instron Dynatub Impulse Data Acquisition System v 2.0.0. See attached sheet for more detailed information)

The test head utilized was 1" X 1" flat face @ 8.0 lbs. and a 6" drop.

Five impact tests per mouth guard were performed and an average taken. The same was tested for the model without a mouth guard in place.

Total Energy in Joules transmitted through each mouth guard was determined to be the best measure of actual use conditions. (A Joule is a measurement of units of energy. One Joule is equal to .7376 Foot Pounds which is the force generated by a one pound weight dropped from 16.087 feet.)

III. Test Results (Reduction in energy transmitted with a mouth guard in place as compared to no mouth guard in place)

Note: A higher score is better. Mouth Guards are listed in rankings from most force absorbed to least force absorbed.

<u>Mouth Guard Brand</u>	<u>Amount of Force Absorbed</u>
Shield MG2 Double Density	1.28 Joules
Shield MG3 Triple Density	1.21 Joules
Shock Doctor Gel Nano	1.11 Joules
Shield MGX – Series X	1.09 Joules
Shield MGB Braces	1.04 Joules
Shield 120 Single Density	1.04 Joules
Shock Doctor Ultra STC	1.01 Joules
Shock Doctor Gel Max	.98 Joules
Shock Doctor Pro	.81 Joules
Brain Pad Youth	.66 Joules
MG 180 Single Density	.65 Joules
MG 260 Custom-Fit	.61 Joules
Brain Pad Adult	.61 Joules

The testing proved that all the mouth guards tested were very effective in absorbing a severe impact. Even the lowest amount of force absorption (.61 Joules) is adequate to protect the teeth. However, higher impact absorption suggests a greater ability to absorb shock that can be transmitted to the brain thus reducing possible concussions.

IV.

IV. Attachments

1. Graphs showing the test results. The average of the fourteen impact tests.
2. Photographs of the test equipment.