

Most current Snell helmet standards require that helmets be tested in impact on the largest and also the smallest appropriate head forms. This was not the case for helmet standards prior to 2010 which called for impact testing on the largest appropriate head form only. Helmets which met previous Snell standards on the largest appropriate head form would continue to meet those requirements when tested on smaller head forms. But, for standards published after 2010, it is expected that helmets will have more trouble meeting flat impact requirements when tested on smaller, lighter head forms and more trouble meeting hemispherical impact requirements when tested on larger, heavier head forms.

The lab had worked out an objective method for determining when a head form was too large to fit inside a particular helmet but, as yet, Snell has no objective procedure to analyze a particular helmet configuration in order to determine the smallest appropriate test head form. Therefore, the selection for both the largest and the smallest appropriate head forms will depend on the size range for which the helmet is intended. That is, the technicians will consult the manufacturers declared size range for a helmet in order to determine the test head forms.

When helmets are submitted for testing the manufacturer must provide the circumference size of the smallest head for which that helmet is intended and also the largest head for which that helmet is intended. The smallest appropriate head form will be the largest head form whose circumference is no greater than the smallest intended head size and the largest appropriate head form will be the largest whose circumference is no greater than the largest intended head size.

For example: if the intended size range for a helmet is 58 cm through 61 cm, the J head form would be the smallest appropriate. The J circumference is 57 cm while the circumference of the next larger M head form is 60 cm, exceeding the smallest size intended for the helmet. The largest appropriate head form would be the M because the next larger O head form has a nominal circumference of 62 cm.¹

Sometimes a manufacturer will use several different sets of foam fit pads to accommodate a single helmet structure to a broader range of head sizes. A particular shell and impact liner might be equipped with a thin set of pads for larger heads and thicker sets of pads for progressively smaller heads. So long as the shells and impact liners are identical in all properties, the fit pads will not make any reasonable difference in impact test results. As with previous Snell standards, all the fit pad variations can be included in a single certification. However, the head form selection will be based on the size ranges for all the fit pad sets. For example: a single shell and impact liner comes in three fit pad configurations with size ranges of 51-53 cm, 54-55 cm and 56-57 cm. The 51 cm figure dictates that the smallest appropriate head form will be the A with a nominal circumference of 50 cm because the next larger C head form has a circumference of 52 cm. The 57 cm figure dictates the J head form whose nominal circumference is also 57 cm.

Of course, if the largest head form selected in this manner proves to be too large to fit within the helmet, the next smaller standard head form will be use instead. The objective method used to select the largest appropriate head form for previous Snell standards will determine whether the largest head form indicated by the helmet’s size range is, in fact, too large.²

Preparing a Submission

Determine the intended head size range for the particular shell and impact liner configuration. If there are several sets of fit pads planned, the largest head circumference will correspond to the largest head circumference intended over all the fit pad sets, this will generally be the largest head circumference intended for the helmet when equipped with the thinnest of the planned fit pads. Conversely, the smallest head circumference will correspond to the smallest circumference intended over all the fit pads; generally, this will be the smallest intended circumference for the helmet when equipped with the thickest planned fit pad set.

Compare the largest and smallest circumferences to the ideal circumferences specified for the six standard head forms. The smallest appropriate head form will be either the A head form or that head form whose circumference is not greater than the smallest head circumference for which the helmet configuration is intended. The largest appropriate head form will be the largest standard head form whose circumference does not exceed the largest head circumference for which the helmet configuration is intended. The following table might be useful:

Test Head Forms as Determined by Size Specification (Head Circumference in cm)							
		Largest Size Specified					
		50 -51	52 - 53	54 - 56	57 - 59	60 - 61	≥ 62
Smallest Size Specified	< 52	A	A-C	A-E	A-J	A-M	A-O
	52-53		C	C-E	C-J	C-M	C-O
	54-56			E	E-J	E-M	E-O
	57-59				J	J-M	J-O
	60-61					M	M-O
	≥ 62						O

Find the row corresponding to the smallest intended head size for a given shell and impact liner and the column corresponding to the largest intended size. The intersection will give the appropriate head forms. In some cases, the largest and smallest appropriate head forms are the same. These are shown in gray.

If the largest and smallest appropriate head forms are the same, five identical samples are necessary for testing to "M" standards, six are necessary for testing to "CM" and "E" designated standards and 8 sample for testing to "SA" and "K" requirements. If there is more than one set of fit pads, the samples should be equipped with the thinnest of the sets.

If the largest and smallest appropriate head forms are not the same, seven samples are necessary for "M" testing: five equipped with the thinnest planned fit pads and two more equipped with the thickest planned fit pads. Similarly for "SA" and for "K": Ten samples are necessary; six equipped with the thinnest of the planned fit pads and four more equipped with the thickest of the planned fit pads. The samples equipped with the thinnest fit pads will be tested on the largest appropriate head form and the other two with the thickest fit pads will be tested on the smallest appropriate head form. Given periodic changes in testing requirements, review the most current appropriate standard release to determine the number of helmets required.

Pre-Test Information

All helmets sent to the Foundation must be submitted with a "pre-test information sheet." This sheet is essentially a form which must be filled out by the manufacturer and which will help the Snell staff shepherd the helmets through the testing process. If the necessary information is not provided, the manufacturer may not get his results in a timely manner and may not get them at all.

If the technicians have any questions, they will consult the manufacturer before proceeding. In particular, if there is any contradiction regarding head form selection and test set up, the manufacturer will be advised and testing suspended until the matter is resolved. In most instances, this need not delay actual testing.

Size Labels

Helmet units certified to current Snell helmet standards and distributed for sale must include size labels indicating the largest and smallest head circumferences for which the helmet is intended. This size range need not be the same as those first declared when the helmet was submitted but must not include any head circumferences not included in the range of which the particular shell and liner configuration was certified.

¹ In some cases the largest circumference size reported for a helmet structure may not accurately indicate the largest appropriate head form for a particular structure. If the technical staff determines the circumference size of the test sample provided does not match the circumference information provided on the Pre-test Form, changes to the test head for, or reported circumference sizes may be required.

² Reference Snell publication "Check Procedure For Largest Appropriate Head Form" *EBB*. 2007.