



Riding SMART!

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SPECIAL EDITION Motorcycle Helmet Standards, Part I

President's News & Views

This special edition started when I linked to the FortNine YouTube video titled "The Snell Helmet Standard is Meaningless" through the MSF RiderCoaches Facebook page.

I watched the video, then like I do with lots of other "news" I find on Facebook, I checked other sources. I began digging and writing this newsletter. I completed my first draft in November of 2021 and sent my draft to Hong Zhang, Snell Foundation, Inc., Director of Education, whom I had met at the 2019 State Motorcycle Safety Association (SMSA - formerly the National Association of State Motorcycle Safety Administrators) national conference. She provided me with detailed information regarding Snell's 2020 standard revision and shared comments on my draft which were vital in making revisions for this *Riding Smart* edition.

The issues surrounding all aspects of establishing a helmet standard and testing to determine if a helmet meets the established standard are complex. There are differences of opinion and unanswered questions.

Initially this was going to be a single special edition, however, because of the amount of important information, I decided to divide it into two parts. This Part I Jan/Feb 2022 issue will focus on the FortNine video, the 2020 Snell standards and provide general information regarding helmet standards.

Dan

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The FortNine Video: The Snell Helmet Standard is Meaningless



FortNine is an online Canadian retailer, much like RevZilla. FortNine's YouTube channel has 1.3 million subscribers (<https://www.youtube.com/c/Fortnine>). The videos are written, produced and presented by Ryan Kluffinger, better known as RyanF9. Ryan and his crew are in charge of all of the video content the company creates. Here is a link to the video that got me started. It was published July 2021.

[https://m.youtube.com/watch?](https://m.youtube.com/watch?fbclid=IwAR2vyQzO0iV3p2UpZfcRJDgpoNqlrvOJXpBCPTFYGdcTA4mE6YaeaBqZYrl&v=76yu124i3Bo&feature=youtu.be)

[fbclid=IwAR2vyQzO0iV3p2UpZfcRJDgpoNqlrvOJXpBCPTFYGdcTA4mE6YaeaBqZYrl&v=76yu124i3Bo&feature=youtu.be](https://m.youtube.com/watch?fbclid=IwAR2vyQzO0iV3p2UpZfcRJDgpoNqlrvOJXpBCPTFYGdcTA4mE6YaeaBqZYrl&v=76yu124i3Bo&feature=youtu.be)

The video tells us that for 2020, Snell has two standards; M2020D, which is a continuation of the standard set for M2010 and M2015 and a new additional standard, M2020R, which should allow the helmet to meet the Economic Commission for Europe (ECE) Regulation.

The F9 video links the *meaningless* question of the Snell standard primarily to the fact that the Snell standard necessitates a hard shell which will withstand two hits to the same location. According to F9, that scenario does not represent a realistic motorcyclist crash. The video contrasts the Snell standard to the standards from FIM and ECE, which asks manufactures to build helmets that are softer. F9 says this sets up a conflict where manufactures cannot build a helmet that meets both Snell and ECE standards. The video claims Snell is now trapped as ECE is the bigger market and the Snell approved helmet market will shrink to the US only. F9 contends Snell's response was to create a second standard which the F9 video claims is not about rider safety, but about Snell not being shut out of the European market.

What Started All This?

Before we share information from Snell regarding their 2020 standard, there is a reason behind the shakeup in standards. In mid-2019 the Fédération Internationale de Motocyclisme (FIM), the European authority for motorcycle racing (think Moto GP), announced a standard and program for helmets testing used in their events. This was new. FIM did not previously have their own standard. Significantly, the new FIM standard contains an oblique/angular impact test component.

Editor's Note: *I knew that brain injuries in motorcyclists are frequently caused by rotational forces that are generated when motorcyclists crash and bounce their heads on the pavement at some kind of angular (oblique) impact. Knowledge of the connection between rotational forces and brain injuries and the fact that when a motorcyclist crashes and hits her/his head on something, the hit is almost always at some kind of angle is decades old. However, to my knowledge at the beginning of this investigation, no helmet standard organization included an oblique/angular impact test. Dan*

Following the FIM announcement, the Economic Commission for Europe (ECE), implemented (June 2020) an update to their standard. The update is ECE R 22-06, which in effect folds the FIM standards into the earlier ECE standards. A problem, however, is many helmets that did meet the old ECE R 22-05 did not meet the updated standard.

Helmets certified to other standards, such as Snell M2015, FMVSS 218 (DOT) or the Japanese standard (JIS T8133) have even more difficulty than ECE meeting the new FIM standard.

Snell's Response to FortNine

According to Snell, their directors anticipated this problem when FIM first announced their requirements. Snell's response was to formulate a second M2020 standard which they labeled M2020R, while retaining the M2020D. Snell says 2020R is their best estimate of what might be expected of an optimal helmet for use in FIM events or on roads where ECE regulations apply. This "two standards" is a major part of the issues addressed by the FortNine video.



Quoted below is part of the response we received from Hong Zhang on November 24, 2021. The document was written by Mr. Ed Becker.



Ed Becker
SNELL Memorial
Foundation

Snell M2020 includes two slightly different sets of requirements. One of these, Snell M2020D, applies to helmet models which had been developed to comply with the United States' DOT standard (FMVSS 218). The "D" in M2020D corresponds to "DOT" and M2020D itself encourages the continued production of helmet technologies developed for use with Snell M2010 and M2015. Snell's directors considered that M2010 and M2015 had specified the most protective helmets consistent with DOT demands that riders might reasonably be expected to wear. The Foundation was happy to continue to recommend them for use.

Snell M2020R is intended for compatibility with ECE Regulation 22-05 and also with FIM's FRHPhe-01. The "R" was taken from "Regulation 22" the United Nations Economic Commission for Europe's standard for motorcycle helmets. This standard had been promulgated back in 1957 and had largely languished until the formation of the common market when all the local national requirements of the common market countries were swept away in favor of a lowest common denominator update of the UN-ECE document. Snell hopes to recommend helmets certified to M2020R as the most protective helmets riders in Europe might reasonably be expected to wear.

It may seem remarkable that two different Snell motorcycle helmet standards seem necessary to serve riders in North America and Europe. After all, the heads that go into the helmets seem very much the same. But even if the motorcyclists are similar, the riding conditions are different. Motorcycle helmets sold in the US must meet DOT while those worn in traffic in Europe must meet ECE. That's the short of it.

Mr. Becker joined Snell in 1989. He holds Bachelor's and Master's degrees in Mechanical Engineering from the Massachusetts Institute of Technology. Mr. Becker served Snell as the Chief Engineer and Executive Director of Snell Foundation and oversaw the operation of all the Foundation's helmet certification programs. At the time of this writing, he had recently retired from this position but serves on the Snell Board of Directors as the Director of Standard Development.

We have posted Mr. Becker's complete response here: <https://smarter-usa.org/wp-content/uploads/2021/12/Snell-Ed-Becker-M2020-statement-for-posting.docx.pdf>. It includes a bit more regarding the M2020 standards and some great information regarding rotational testing which we will address in our next *Riding Smart*.

There are two other good sources about Snell's explanation for their response to FIM establishing a helmet standard. A special preface at the beginning of their *2020 Standard for Protective Headgear*, published in 2019, can be found here: https://smf.org/standards/m/2020/M2020_Final.pdf and Snell's FAQ document found here: <https://smf.org/faq>.

Help in Remembering the Snell 2020 Standards

To help remember which Snell standard is which, associate D with helmets designed to meet and exceed the DOT standard. M2020D is a continuation of the standard set for M2010 and M2015.

R is for Regulation as in the Recently Revised Snell standard for helmets that will likely meet the ECE standard - ECE Regulation 22.05.



Helmet Standards Research

The SMARTER website has 19 research reports in the section Helmets and Laws subsection Standards and Testing: <https://smarter-usa.org/research/helmets-laws/standards-and-testing/>. Of special note is the 2013 article “Motorcycle Helmets: A State-of-the-Art review” - https://smarter-usa.org/wp-content/uploads/2017/06/2_2013_Motorcycle_Helmets_.pdf

This report summarizes that motorcycle helmets are widely used, required in most countries and are the most effective means of protection available for a motorcyclist to protect her/his head in the event of a crash. The report however states there is no agreement on the criteria and associated thresholds for helmet standards. The report also states that lack of agreement is a problem for the global community because the standards are outdated and there is no agreement about which is the best standard or what an updated standard should be.

While this report is now approximately eight years old, it still sets the stage for the current helmet standards situation.

There are no research studies that compare the performance of helmets in real world crashes by standard certification and given how complicated such a research design would be it is highly doubtful we will ever see such research.

MOTORCYCLE HELMET SAFETY RATINGS	RATING	LOGO	INFO
	ECE 22.05		EUROPEAN STANDARD & LEGAL REQUIREMENT FOR UK RIDERS - 22.06 STANDARD COMING
	DOT		USA STANDARD, NOT LEGAL IN THE UK - NO CHIN BAR IMPACT TEST
	SHARP		UK GOVERNMENT BACKED TESTING SCHEME - 1 TO 5 STAR RATINGS - NO LEGAL STANDING
	SNELL		USA INDEPENDENT TESTING FACILITY - VERY HIGH LEVELS OF IMPACT TESTING - NO LEGAL STANDING

Motorcycle Helmet Standards Explained

Understanding the differences in motorcycle helmet certifications/standards gets difficult and confusing very quickly because many different standards are in common use. A helmet that meets the standards for one certificate may fail the tests for another. Which standard is the strictest? Which standard is the best/safest?

It is important to understand that there are no real-world research studies comparing the effectiveness of helmet standards. Also, unlike the “crash test dummies,” used in the automotive world, helmet tests are only marginally designed to simulate a crash. Instead, motorcycle helmet impact testing is designed to determine the ability of the helmet to manage different impact energies, and that information is translated into the relative “safeness” of the helmet.

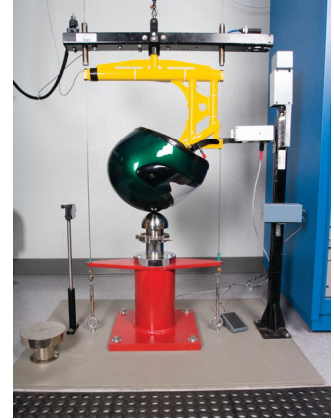
Defining and describing the details of each standard is simply too much for this newsletter. Readers who want more detail can do a web search. The most recent source SMARTER found is *Helmet Safety Ratings 101: Common Thread Article* by RevZilla, 2019 (<https://www.revzilla.com/common-tread/helmet-safety-ratings-101>).

This article provides some detail regarding the major standards, but does not include any information on the new FIM standard or the ECE update.

Helmet Standards Summarized

Many countries have published motorcycle helmet standards, including USA-DOT, European-ECE 22.05, Brazil-NBR 7471, Australia-AS 1698-2006, Japan-SG or JIS, New Zealand, NZ 5430. In addition, there are standards issued by independent or private organizations such as Snell-USA, SHARP-UK, ACU Gold-UK, BSI-UK. The focus of the standards discussion here in the US has largely been on just Snell and DOT. However, as the F9 video and Snell's 2020 standards explanation demonstrate, standards from Europe and other countries have entered the picture and can no longer be ignored. Here is a brief overview of the major standards:

- **DOT:** The U.S. Department of Transportation establishes the legal federal standard for motorcycle helmets for use on public roads and property in the United States. The DOT does not “approve” helmets. The DOT requires helmet manufacturers to certify that each model sold in the US meets the DOT standard. The DOT rating that is in effect now is the federal standard FMVSS 218 (<https://www.govinfo.gov/content/pkg/FR-2015-05-21/pdf/2015-11756.pdf>)
- **SNELL** (<https://smf.org/>): This standard is set by the Snell Memorial Foundation, which is a private non-profit organization. Snell testing and certification are voluntary. The current standard for motorcycle helmets is SNELL M2020D and M2020 (see above).
- **SHARP:** SHARP is a motorcycle helmet rating system (which uses the ECE standard) established by the Government of the United Kingdom in 2007. The British Government wanted to create a performance rating system for motorcycle helmets with the goal of improving motorcyclist safety on public roads in Britain. Helmets tested in the SHARP program are bought from retail dealers to make sure the helmets tested by SHARP are identical to the ones purchased and used by the public. SHARP is an acronym for the Safety Helmet Assessment and Rating Programme: <https://sharp.dft.gov.uk/>



Continued from page 5.

- **FIM:** The FIM test standards are set by Federation Internationale de Motorcyclisme (FIM) which is the world body that sanctions global professional motorcycle racing. See below for more information.
- **ECE:** This is the standard set by the [Economic Commission for Europe](#). This multinational standard is used by most European nations. The previous standard ECE 22.05 has been recently updated. See page 7 for more information.

FIM – Specifics

Until mid-2019 FIM relied solely on existing international standards for approval of helmets for use in FIM competition. However according to FIM, to address a more complete and demanding evaluation of performance deemed necessary for competition, the FIM Technical and Circuit Racing Commissions launched the FIM Racing Homologation Programme for helmets (FRHPhe). FIM labels their work as the latest state of the art methods of testing.

FIM only tests full-face helmets and emphasizes a helmet's resistance to rotational forces which demands an oblique impact test be included. The oblique test reflects a very common scenario occurring in real world accidents, although never previously addressed by any standard (see ECE update below).

The FIM grants helmets a homologation certificate and labels, which are mandatory for FIM competitions. In addition to being previously approved by ECE 22.05, Snell M 2015 or JIS T8133 2015, helmets must meet performance and quality standards set by the FIM. Only full-face, one-piece shell (not a modular) and double D-ring retention strap helmets are accepted for FIM testing.

Technical requirements, additional information, a list of helmets that currently meet the FIM standard, helmets that have been tested and are awaiting approval and those scheduled for testing are available here: <https://www.frhp.org/circuit-helmets>. At SMARTER's last check there were approximately 50 helmets that are FIM approved.



FIM - Fédération Internationale de Motorcyclisme 

ECE Update - Specifics

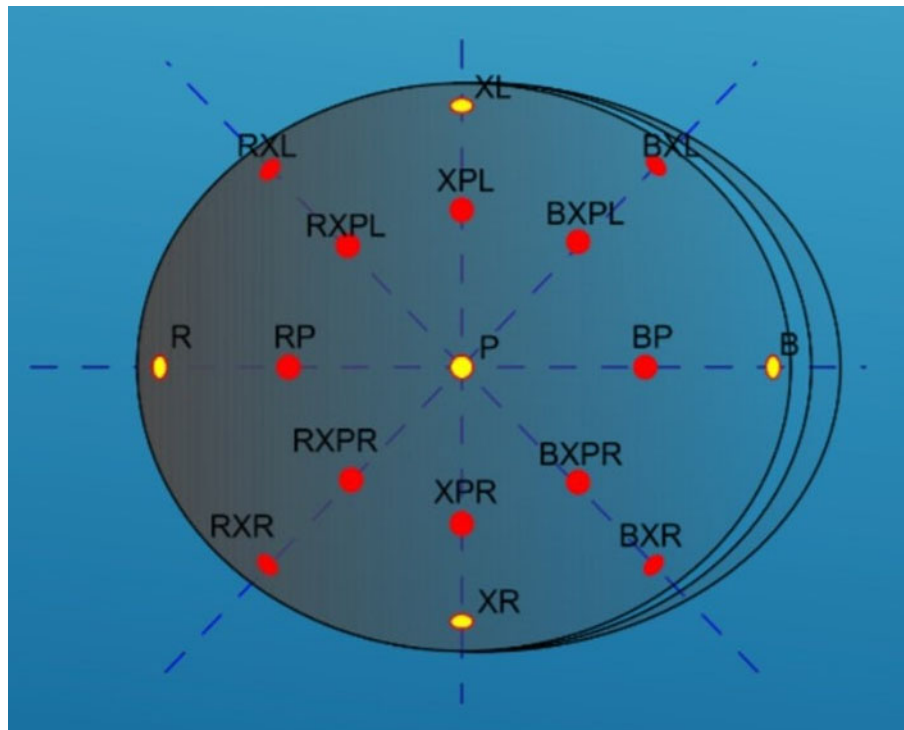
The Economic Commission for Europe (ECE) standard is the European version of the DOT standard. It is recognized by over 50 countries and by every major racing organization in the world. This standard has received a major update. ECE 22-06 incorporates impacts against an anvil with a 45-degree angle. SMARTER's investigation indicates the ECE 22-06 standard for oblique impacts is identical to the FIM standard. Other changes from the previous standard include testing of drop-down sun visors, impact testing on the helmet at additional locations, and specific tests for modular helmets. The big news is the inclusion of a measure for angler impacts.

The new standard ECE 22.06 went into effect in June 2020. Retailers will have three years to sell off the current ECE 22.05 standard helmets before they become illegal in the countries using ECE as their national standard.

A criticism of the old ECE 22-05 was the testing points were known by manufacturers allowing for the possibility that helmets could be specially prepared to pass the impact test. Under ECE 22-06, testers will randomly choose three more impact points from a selection of 12 (see red dots in photo below).

An excellent article on the ECE 22-06 update is here: <https://www.motolegends.com/reviews/ECE-22-06-The-new-safety-standard-for-motorcycle-helmets>. The article contains a link to an equally excellent 20-minute video. While the video focuses on the ECE standard update, it also provides an outstanding overview of how helmets are tested, includes a brief explanation of the basic differences between ECE and Snell, and the connection between the new FIM standard and ECE 22-06.

This link provides a list of five (5) helmets that are available that meet the ECE 22-06 standard. <https://bikerrated.com/gear/helmets/ece-22-06-helmet-guide/>



Helmet Standards Summarized - The Key Points

- ⇒ Helmets substantially reduce head injury – it is safer for a motorcyclist to wear a helmet rather than not wear a helmet.
- ⇒ There are no studies that compare the performance of helmets in real world crashes by standard certification.
- ⇒ Helmets are designed to meet standards. The tests required by any credible organizations that set helmet standards therefor influence helmet design and manufacturing.
- ⇒ There are many commonalities between each standard however there are also significant differences.
- ⇒ While standards have both similarities and differences in their individual components, they are all similar in their primary goal which is to assess a helmet's impact energy absorbing capability.
- ⇒ Helmets are usually efficient as head protection against skull fractures.
- ⇒ It has long been understood that non-penetrating head injuries are the most common and dangerous for motorcyclists and are often caused by blunt impact - not penetration
- ⇒ Rotational forces that are generated as a result of oblique (angular) impacts are a cause of brain injuries in motorcyclists. The seriousness or frequency of rotational force injuries is not known.
- ⇒ As of the date of this newsletter, only FIM and the ECE 22-06 update include an oblique impact test.

The March/April 2022 *Riding Smart* will be Helmet Standards Part II, with a focus on angular/oblique impacts, rotational force testing and the technologies being incorporated in helmet construction to mitigate the impact of rotational forces.



All the Gear All the Time!

SMARTER's Mission

The Skilled Motorcyclist Association – Responsible, Trained and Educated Riders, Inc. wants motorcycle riders, motorcyclist safety advocates and policy decision makers to make responsible decisions based on factual knowledge and the conclusions of quality research. Furthermore, our mission is to gather, examine, catalogue, share, post and distribute motorcyclist safety factual information and research and to advocate for the use of such knowledge as the basis of decisions.