Technical Note

Understanding VicRoads' Skid Resistance Investigatory Levels

TN 111

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Purpose

This Technical Note provides information on Investigatory Levels to provide an understanding of their purpose and how they relate to skid resistance. It should be read in conjunction with VicRoads Technical Note TN 110 – *Measurement and Interpretation of Skid Resistance using a SCRIM® Machine* [(1)].

Note : SCRIM® is a registered trademark of W.D.M. Limited.

What is Skid Resistance?

Skid resistance is a condition parameter that characterises the contribution that a road surface makes to the total level of friction available at the contact patch between a road surface and the vehicle tyre during acceleration, braking and cornering manoeuvres (Austroads, AGAM05F-09)[(2)].

If the forces exerted at the tyre–road surface interface by the manoeuvre being attempted exceeds the available friction, the wheels of the vehicle can slip which may lead to skidding.

Why and How is Skid Resistance Measured?

The VicRoads' Road Management Plan requires skid resistance surveys to be carried out in a systematic manner with priority given to high risk sites, sites with a crash history and sites identified from the results of road condition surveys.

VicRoads has adopted the Sideways-force Coefficient Routine Investigation Machine (SCRIM®) as its testing device for network level assessment and a British Pendulum Friction Tester for discrete or confined locations (e.g. bicycle lane, pedestrian crossing).

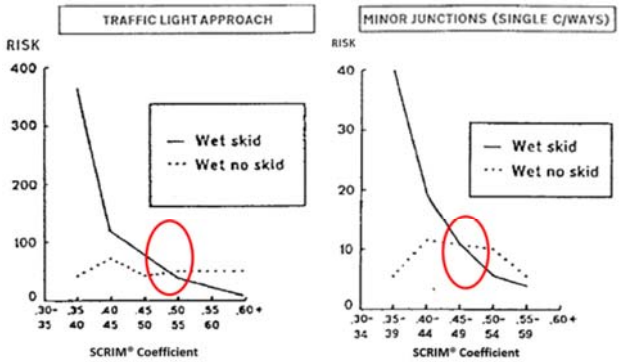
There are numerous other skid resistance measurement devices and associated test methods, with each one measuring skid resistance in a different way. As such, their outputs cannot be directly compared. For example, SCRIM® readings cannot be directly compared with the output from devices used in 'skid to stop' tests, such as the triaxial dynamometer used by Victoria Police in their crash investigations.

It should be noted that the skid resistance measured at the time of testing is a 'snap shot in time' and should not be considered as the skid resistance of the surface at the time of an earlier or later incident.

How is Skid Resistance Managed on a Network Level?

A comprehensive body of crash studies has shown that it is not necessary for road agencies to provide a uniform level of skid resistance across their entire road network. The practice that has been accepted in many countries is one where a risk management approach is adopted, which utilises Investigatory Levels. The approach sets out to equalise the risk of having a wet weather skidding crash with the risk of having a wet weather non-skidding crash across sites within each of the nominated site categories (refer to Technical Note TN 110 [(1)] for further details on site categories).

An Investigatory Level is generally nominated as the level of skid resistance for each site category where there is a noticeable increase in the risk of wet weather skidding crashes, when compared to wet weather non-skidding crashes. The following diagrams show examples of this.



Example – Wet Weather Crashes (skid vs no-skid)
(Adopted from Rogers & Gargett – 1991)

Higher Investigatory Levels are nominated at sites where the demand for skid resistance is highest (e.g. signalised intersections, tight curves) and lower Investigatory Levels at sites where the demand for skid resistance is lowest (e.g. manoeuvre free road sections, multiple lane divided roads).

Investigatory Levels – What They Are

The most frequent misconception relating to skid resistance is that Investigatory Levels are often incorrectly viewed as being a 'black and white' indicator of the safety of road surface (Austroads, AP-G83/05)[3]. Skid resistance data should not be considered in isolation and it needs to be recognised that a crash is nearly always a true random, multi-factor event that is often the result of multiple interrelated factors.

Investigatory Levels **are**:

- Values of skid resistance assigned to different road site categories (e.g. approaches to intersections or pedestrian crossings) which are related to the friction requirements for that type of situation.
- Values of skid resistance, that when not met, are a trigger for a reasoned consideration of the need for remedial action at that site, taking into account other factors that influence safety and the competing demands within the available road maintenance budget.

It is largely impossible to predict the critical level of skid resistance for a particular site or road section. Further, it is not unusual for a site triggering an investigation with respect to skid resistance to conclude that no immediate action is needed (Austroads, AGAM05F-09)[2].

Test results obtained that are below an Investigatory Level must not be described as "deficient", as this is misleading and must be discouraged.

Investigatory Levels – What They Are Not

Investigatory Levels are **not:**

- A mandatory requirement.
- A minimum level of skid resistance of a particular road that must always be met.
- A level of skid resistance that will reliably prevent skidding at that site.
- A clear indicator that remedial action (e.g. resurfacing) is required.
- An absolute or critical value which, if not met, will result in a high number of wet weather skidding crashes.

Investigatory Levels **must not** be regarded as intervention levels which need to be acted upon in all circumstances, as the term can imply a general in-built factor of safety.

How do test results relate to real life crashes?

Skid resistance measurements *'are used to characterise the road surface and assess the need for maintenance, but cannot be related directly to the friction available to a road user making a particular manoeuvre at a particular time'* (Highways England 2015)[4]. This is because skid resistance is only measured in the wheel path and is affected by non-road factors such as the presence of moisture, dust and other contaminants, the condition of the vehicle and its tyres, tread depth, inflation, and driving style (e.g. harsh acceleration, heavy braking).

For the road surface to mitigate the risk of wet weather skidding crashes, it must provide sufficient skid resistance to enable vehicles to manoeuvre as required. As the requirements for friction vary from situation to situation, the required levels of skid resistance required from the road surface also vary to correspond with the demands for friction.

As there is no clear dividing point between 'safe' and 'dangerous' conditions, there is no skid resistance value above which it can be guaranteed no wet weather skidding crashes will occur. Vehicle design and load, speed and the condition of tyres are some of the other factors that may affect crash occurrence.

References

1. VicRoads, *Measurement and Interpretation of Skid Resistance using a SCRIM® Machine*, Technical Note TN 110, 2018
2. Austroads *Guide to Asset Management* Part 5F*: Skid Resistance* AGAM05F-09, 2009
3. Austroads *Guidelines for the Management of Road Surface Skid Resistance* AP-G83/05, 2005
4. Rogers, M.P & Gargett, T. (APRG No.2). *A skidding resistance standard for the national road network,* 1991
5. Highways England, *Design Manual for Roads and Bridges*, Vol 7, Sec.3, Part HD 28/15, Skidding Resistance, 2015.

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VicRoads Technical Note - Revision Summary

TN 111 – Understanding VicRoads' Skid Resistance Investigatory Levels

Date	Clause	Description of Revision	Authorised by
November 2018	All	New document	Principle Advisor – Pavement, Geotech & Materials