Austroads Safety Barrier Assessment Panel – Technical Advice

Technical Conditions for Use

SBTA 22-001

Preamble

Road safety barrier systems and devices for use on the Australasian road network are assessed by the Austroads Safety Barrier Assessment Panel (ASBAP) in accordance with AS/NZS 3845 Parts 1 and 2. Technical Conditions for Use (TCU) documents are developed for all products which are 'recommended for acceptance'. These documents are a summary of the ASBAP's assessment.

This technical advice provides guidance on interpreting the information contained in the TCU documents.

Audience

- Road agencies
- Road designers.

Using the Austroads Technical Conditions for Use

The TCU document is a summary of the ASBAP's assessment of the technical performance of the product against AS/NZS 3845 Parts 1 or 2. The TCU is based on the product specific information provided by the proponent and therefore may be different even if the system appears similar.

Each TCU provides Road Agencies with a range of recommended conditions in which to use the product. Road Agencies may choose to accept the product in accordance with these Austroads conditions or may impose additional or different conditions for use.

For this reason, the Austroads TCU does not take precedence over any Road Agency specifications and standards. Although in many cases, the Road Agency specifications will align with the Austroads TCU.

The existence of a TCU does not imply that the product is accepted for use by a Road Agency. As such, users should refer to individual Road Agency websites to determine whether a product is accepted for use within that jurisdiction, and if the Road Agency has adopted additional or varying requirements.

Product Outline

The first section of the TCU document identifies the product, issue date, proponent, ASBAP disclaimer, product status, accepted impact speed and product manual reviewed at the time of assessment.

Status

Each product will have one of the following statuses:

- **Recommended for Acceptance** – assessed by the ASBAP and recommended for acceptance.
- **Legacy** – previously assessed by the ASBAP, but no longer recommended for use. Existing permanent installations may remain in service until the end of service life, but no new installations should be permitted.

  Products with a legacy status continue to provide the level of performance at which they were originally tested. As such, the relevant road agency will determine when it is considered worthwhile (net beneficial) to replace or upgrade existing installations.

- **Phase Out** – previously assessed by the ASBAP, but no longer recommended for use. This status is adopted for temporary products. Road Agencies are recommended to phase out the product and its use, by a certain date. The date fixed for phase out should allow time for manufacturers, users and hire companies to depreciate their investment and adjust their business model.

Sudden changes in acceptance status will be avoided unless a critical safety issue emerges.

Accepted Impact Speed

The accepted impact speed is typically aligned with the highest test level submitted, e.g., 50 km/h for TL-1, 70 km/h for TL-2 or 100 km/h for TL-3.

Where the ASBAP identifies an undesirable behaviour that is compliant with AS/NZS 3845 Parts 1 or 2, it may be recommended that the product be restricted to roads with a lower operating speed. This may occur when the occupant severity values are above the preferred limit but below the maximum limit.

Product Manual

This section lists the product manual version that was submitted to the ASBAP. The product manual forms part of the assessment but it should be noted that a comprehensive review is not undertaken.

It should be noted that the ASBAP does not necessarily accept everything within this listed Manual. Some manuals may include details that should only be considered outside the 'Normal Design Domain' for use in unique circumstances.

The primary purpose of the product manual is to assist installers and traffic management companies to install or deploy the product, and for maintainers to inspect and repair the product. This primarily includes the bill of materials, handling, component assembly and installation tolerance requirements of the product.

Maintenance needs and complexity can vary among products, even within the same category. These can be difficult to assess during the product recommendation. Consequently, certain maintenance details might not be addressed in the TCU. For more precise information, the product manual typically offers detailed guidance.

The product manuals are subject to change outside the review and/or control of the ASBAP.

Design Requirements

The design requirements section outlines information derived from physical crash testing undertaken in accordance with AS/NZS 3845 Parts 1 and 2. As such, these design values must be provided to achieve the associated containment level specified.

Where a product has multiple configurations or has achieved multiple containment levels, it is imperative that the associated design values (e.g., point of redirection, anchor/post spacing, dynamic deflection and working width) are used.

Containment Level

The MASH Test Level of the specific barrier configuration. It is important to note that each MASH test level contains a range of impact scenarios (crash tests) that must be undertaken, therefore the design values provided are a consolidation of all the associated tests.

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Point of Redirection (PoR)

The point at which the barrier will redirect the test vehicle(s) within the working width listed. For more information refer *ASBAP Technical Advice SBTA 21-001 Downstream Point of Redirection*. By default, the PoR is based on the crash tested impact point, unless additional evidence has been provided. Users may notice that the TL-3 and TL-4 point of redirection are often different. This is a result of the larger/taller vehicle needing additional upstream barrier to achieve the specified working width.

While vehicles that impact the barrier upstream of the approach PoR may still be contained, they may not be redirected. In these circumstances, the vehicle behaviour and/or barrier performance is likely to differ (e.g., the barrier may deflect more).

Where the safety barrier TCU states “Interface between barrier and end treatment”, this infers that the terminal may have redirective capability, therefore the PoR may be measured from the connection point between the terminal and longitudinal barrier, or within the terminal length if detailed on the product specific terminal TCU.

Tested Article Length

The total length of barrier installation during crash testing, measured between the start and end PoR. For more information on minimum barrier lengths refer *ASBAP Technical Advice SBTA 21-002 Minimum length of W-beam barriers*.

Anchor/Post Spacing

The nominal post or anchor spacing used during the crash tests for the associated test level. It is also the anchor/post spacing required to achieve the specified deflection and working width values for the associated test level.

Dynamic Deflection

The maximum dynamic deflection observed during all the associated crash tests for the relevant containment level. Dynamic deflection is defined as “the largest transverse deflection of any part of a road safety barrier system recorded during a full-scale crash test”. For more information refer *Austroads Guide to Road Design Part 6.*

It is important to highlight that although dynamic deflection values are frequently measured with millimeter precision during physical testing, this precision isn't necessarily repeatable. The purpose of presenting these dynamic deflection values is not to suggest a specific level of accuracy, but rather to provide insights into how the product typically responds and performs under impact conditions.

Working Width

The maximum working width observed during all the associated crash tests for the relevant containment level. Working width is measured from the outermost extremity of any part of a road safety barrier system on the traffic side, regardless of shape, to the furthest extremity of any part of the system or vehicle during and after the impact. Working width is recorded during full scale crash testing and contains three sub-elements; deflection, system width and roll allowance. For more information refer *Austroads Guide to Road Design Part 6* and *ASBAP Technical Advice SBTA 20-002 Working Width for Temporary Barriers*. Similar to dynamic deflection above, it is important to highlight that although working width values are frequently measured with millimeter precision during physical testing, this precision is not necessarily repeatable.

System Width

The width of all above ground assembled barrier components. This will include the toe of barrier or the top rail, but it may not include the sub-surface foundation.

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Minimum Support Width

Safety barriers are to be installed with sufficient width to a hinge point or excavation.

The width should accommodate the accepted dynamic deflection to provide stable vehicle redirection unless otherwise specifically designed and documented on the TCU. This width should also sufficiently restrain the system posts and/or anchors laterally during an impact to ensure the barrier performs as expected.

For permanent systems refer to the TCU and *ASBAP Technical Advice SBTA 17-002 Proximity to Batter Hinge.*

Temporary safety barriers may require a support width exceeding the accepted dynamic deflection. This is particularly applicable to systems with minimal or limited deflection, where additional support width is necessary to prevent anchors from pulling through the excavation, potentially causing breach or failure of the system. Consequently, it's advisable for a geotechnical engineer to conduct a site-specific analysis to ensure sufficient material for the necessary lateral restraint.

Minimum Installation Length

The desirable minimum installation length is the crash tested article length. While barrier lengths shorter than the tested article length are possible, the designer must consider how this will affect other performance values (e.g., deflection). Designers should consult with the product supplier or mitigate the risk through additional controls, such as reducing the posted speed. For more information refer *ASBAP Technical Advice SBTA 21-002 Minimum Length of W-Beam Barriers* and *Austroads Guide to Road Design Part 6*.

System Conditions

This section may note product limitations (e.g., minimum curve radii) or limitations regarding where the product can be placed (e.g., cannot be placed adjacent to a kerb). It may also list any additional conditions that are required to achieve the associated test level. This may include a specific anchor type, or it may recommend restrictions on certain value combinations.

Users should note that some products may achieve different test levels based on the specific combination of anchor spacings, length and/or foundation. For example, some temporary products may achieve MASH TL-4 when installed with a larger post spacing and subsequent deflections, and only MASH TL-3 when installed with a smaller post spacing. This is because configurations with larger deflections will often result in a more stable outcome for taller vehicles.

In addition, some TCUs may contain variants that are considered suitable in constrained locations (e.g., base plated posts or reduced post spacings) but are not listed as a separate configuration within the design requirements section. These variants have not demonstrated compliance with a specific containment level, but have been deemed acceptable by the ASBAP, to accommodate common constraints on the network. They are generally only suitable for consideration over limited lengths.

As such, it is imperative that designers use a combination of appropriate values for the desired test level.

Approved Variants

This section provides a list of product variations which have been assessed by the ASBAP as being suitable. The functional purpose of the product variation is noted to provide an understanding of its appropriate application. Any specific additional conditions or limitations are also provided.

Variants that are not listed are not recommended by the ASBAP. It should also be noted that combinations of product variations are not recommended unless noted in the conditions.

Approved Connections

This section provides a list of end treatments, transitions and attachments which have been assessed by the ASBAP as being suitable.

All safety barriers must have an accepted connection or terminal attached at both the leading and trailing end. Only connections or terminals that are listed in the TCU are recommended for use. This ensures that an assessment of the proposed transition has been undertaken and that the suppliers of proprietary products are satisfied with the connection proposed.

For longitudinal barriers, this section will list all accepted terminals and any specific conditions.

Transitions/connections are critical especially when moving from a flexible (low stiffness) longitudinal barrier to a stiffer terminal.

- Where the TCU recommends use adjacent one-way traffic, this may be due to a lack of testing of the terminal or connection in the reverse (adverse) direction.
- Where the TCU recommends a risk assessment adjacent two-way traffic, this may be because the occupant injury values were marginally below the maximum threshold during reverse (adverse) direction impacts.

For end treatments, this section of the TCU is limited.

Foundation Pavement Conditions

Indicates the range of post/pin types that have been deemed suitable and the foundations in which they can be installed. It is important to note that the post/pin may have a significant influence on how the system performs during an impact (e.g., how much the post/pin rotates or when the post/pin shears).

Steel rail barriers on concrete pavements, typically have two options: a base plate post which attaches directly to the concrete or a driven post with coring holes which requires the installer to drill holes within the concrete foundation. Where neither option is listed, then the product has not demonstrated suitable performance with a base plated post variant or within a cored hole. As such, the product is not recommended for use with these pavement conditions.

Safety barriers are often tested with strong foundations. To achieve the tested containment, equivalent foundation soil strength must be verified on site. If a weaker soil is realised, it is likely that as a minimum the safety barrier will have a greater deflection, if not fail, during impact. If the foundation soil type cannot be verified through geotechnical testing, it is recommended that a post pull-over test be conducted to validate the capacity of the soil and foundation.

Panel Crashworthiness Assessments

Crashworthiness assessments are issued for products which have been assessed by the ASBAP against MASH test protocol in accordance with AS/NZS 3845. There may be other approvals required for these products prior to their consideration for use.

Therefore, a product which has been issued a ‘Crashworthiness Assessment’ has been deemed to be crashworthy however, this is not the only consideration. Users should select products which are fit for purpose to their total requirements, noting that crashworthiness is just one aspect to consider.

References

AASHTO (2016) *Manual for assessing safety hardware*, 2nd edn, American Association of State Highway and Transportation Officials, Washington, DC, USA

Austroads (2022) *Guide to road design part 6: roadside design, safety and barriers*, AGRD06-22, Austroads, Sydney, NSW

AS/NZS 3845.1:2015, Road safety barrier systems and devices: part 1: road safety barrier systems

AS/NZS 3845.2:2017, Road safety barrier systems and devices: part 2: road safety devices

ASBAP 2020, *ASBAP Technical Advice SBTA 20-002 Working Width for temporary barriers,* Austroads, Sydney. NSW.

ASBAP 2017, *ASBAP Technical Advice SBTA 17-002 Proximity to Batter Hinge,* Austroads, Sydney. NSW.

ASBAP 2021, *ASBAP Technical Advice SBTA 21-001 Downstream Point of Redirection,* Austroads, Sydney. NSW.

ASBAP 2021, *ASBAP Technical Advice SBTA 21-002 Minimum length of W-beam barriers,* Austroads, Sydney. NSW

Amendment Record

Amendment no.	Amendment	Date
1	New Technical Advice Note	January 2022
2	Updated to include Panel Crashworthiness Assessments	June 2023
3	Updated in line with TCU Template Update	July 2024