Code of Practice
AS5100 Part 5

1. Scope and application

BTN025 Part 5 states VicRoads' requirements regarding the application of AS5100.5 Concrete to the design and assessment of reinforced and prestressed concrete structural members.

Bridge Technical Notes are a Code of Practice. Compliance with Bridge Technical Notes is mandatory.

BTN025 Part 5 is to be read in conjunction with the following documents:

- Standard Specification 610
- Standard Specification 611

Other than as stated in this document and relevant VicRoads standard specifications, the provisions of AS5100:2017 shall apply. Where this document differs from AS5100:2017, its requirements override those of AS5100:2017.

2. Additional requirements

2.1. Section 6 Methods of structural analysis

Strength of beams in shear and torsion
Modified Compression Field Theory in accordance with Cl8.2 of AS5100.5:2017 may be used to determine the strength of reinforced concrete beams in shear and torsion.

Modified Compression Field Theory is not to be used to determine the strength of prestressed beams in shear and torsion. In this case, the methodology described in Cl8.2 and 8.3 of AS5100:2004 is to be used.

2.2. Section 13 Stress development of reinforcement and tendons

Compression reinforcement and secondary reinforcement
Mechanical splices may be used provided that:

- a proprietary connector is used; and
- the connector has appropriate dynamic capacity

If the structure containing the coupler could be subjected to dynamic loads, the time dependant properties of the coupler system must be established by testing for the effects of cyclical loading. The chosen coupler must perform satisfactorily over the design-life of the structure;

Tension reinforcement
Mechanical splices may not be used to join tension reinforcement in structures when the maximum permissible crack-width is less than 0.3mm.

Mechanical splices may be used to join tension reinforcement when the maximum permissible crack width is 0.3mm or more provided that:

- a proprietary connector is used in accordance with the manufacturer's recommendations
- not more than 50% of the total area of tensible reinforcement shall be mechanically spliced at any one section
- the splice is not placed at a position of maximum stress. For the purposes of this clause, the use of mechanical splices shall be restricted to those parts of the span at which the bending-moment causing the tensile stress in the reinforcement being coupled is not greater than 75% of the maximum bending-moment causing the tensile stress in the span being considered.

The following factors must be considered when selecting a coupler:

- minimum yield stress – the coupler system must be strong enough to develop the characteristic yield stress of the smallest diameter reinforcing bar in the connection
- dynamic capacity – if the structure containing the coupler could be subjected to dynamic loads, the time-dependent properties of the coupler system must be established by testing for the effects of cyclical loading. The chosen coupler must perform satisfactorily over the design-life of the structure
- tensile strength / yield stress ratio – to maintain the ductility of the structure, the Tensile Strength / Yield Stress Ratio of the coupler system should not be less than 1.08, measured for actual stress across the full range of yield stresses (500MPa to 650MPa for a grade 500N bar). Further consideration should be given to the tensile strength / yield stress ratio in designs for seismic conditions

- uniform elongation – a minimum uniform elongation of 3.5% is required for mechanical splices in order to maintain the ductility of the structure. Care should be taken when locating couplers to ensure the ductility of the structure is not reduced below the requirements of the design
- slip – slip in the coupler may lead to cracking in the concrete above the coupler. In order to limit the width of cracks in the concrete above the coupler to 0.3mm, slip in the coupler shall be limited to 0.1mm at 60% of the yield load. The effects of shrinkage, creep and flexural cracking on the actual crack-width must be combined for this purpose
- the designer shall ensure that the performance of the selected coupler and the design of the reinforcement are consistent with the ductility of the reinforcement.

Cover to the connector
Where the external diameter of the connector is such that it will encroach into the cover zone, the designer must consider the following:

- the durability of the connector
- the minimum depth of concrete at the connector consistent with the maximum aggregate size of the concrete
- the effects on the strength of the reinforced concrete section should it be necessary to reduce the effective depth of reinforcement to achieve adequate cover to the connector.

2.3. Section 16 Steel fibre-reinforced concrete

Steel fibre-reinforced concrete is not to be used in the manufacture of structural components in both site and pre-casting processes.

Steel fibre-reinforced concrete may be used in the construction of non-structural reinforced concrete.

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Bridge Technical Notes are subject to periodic review and may be superseded.