SECTION 421 - HIGH BINDER CRUMB RUBBER ASPHALT

~~##This section cross-references Standard Section 407 and it must be included in the specification:~~

421.01 GENERAL

This section is a supplement to Standard Section 407 - Asphalt and covers special requirements for High Binder Crumb Rubber Asphalt (HBCRA) that are in addition to or override the requirements of Section 407.

421.02 DESCRIPTION

HBCRA is asphalt which contains crumb rubber obtained from waste tyres and a high binder content to improve flexural and elastic recovery properties and to delay reflective cracking.

421.03 STANDARDS

Standard Section 175 details the relevant references to Australian Standards (AS), Austroads Standards and Codes of Practice referenced in this section. These references are summarised in Table 421.031.

Table 421.031 Standards, Specifications and Codes of Practice

Australian Standards	
	Nil
Austroads Documents	
AGPT/T190	*Specification Framework for Polymer Modified Binders*
VicRoads Codes of Practice	
RC 500.01	*Registration of Bituminous Mix Designs*
RC 500.16	*Selection of Test Methods for Testing of Materials and Work*
VicRoads Test Method	
RC 200.01	*Design of Asphalt Mixes (Marshall Method)*

421.04 AGGREGATES

Unless otherwise specified, properties of the aggregates used in HBCRA shall comply with the requirements specified in clause 407.03. Size 10 mm and Size 14 mm HBCRA mixes must use aggregates that comply with the Type H requirements of clause 407.03. Size 20 mm HBCRA mixes must use aggregates that comply with the Type S series requirements of clause 407.03.

421.05 FILLER

The added filler shall be hydrated lime.

421.06 CRUMB RUBBER

Crumb rubber must:

(a) comply with the requirements of AGPT/T190; the use of uncured or devulcanized rubber is not permitted; an alternative grading for the crumb rubber will be considered subject to evidence being provided that demonstrates the alternative graded crumb rubber has no adverse impact on asphalt performance

(b) be processed from waste tyres generated in Australia and processed by a Tyre Stewardship Australia accredited supplier

(c) be a uniform material consisting of synthetic rubber or natural rubber from car or truck tyres, or a mixture of both, and shall be free from cord, wire, fluff and other deleterious material.

A certificate of compliance may be requested to demonstrate that all crumb rubber requirements have been met.

421.07 BINDER

The bitumen shall be Class 320 complying with the requirements of AS 2008.

421.08 RECLAIMED ASPHALT PAVEMENT (RAP)

The use of RAP is not permitted in HBCRA.

421.09 WARM MIX ASPHALT ADDITIVE

Warm mix asphalt additive may be included in the asphalt mix to reduce the asphalt manufacturing and placement temperatures or to aid compaction.

421.10 MIX DESIGN REQUIREMENTS

(a) Mix Design

The asphalt mix shall be registered in accordance with clause 407.06 and RC 500.01 and designed in accordance with RC 201.01.

(b) Grading

Unless otherwise specified, the grading of aggregate with added filler after mixing but before compaction, and the proportions of aggregate, added filler, granular crumb rubber and bitumen in the mix shall comply with Tables 421.101 and 421.102.

Table 421.101 Grading of Aggregate with Added Filler

Sieve Size (mm)	Percentage Passing (by Mass)		
	Mix Size 10	Mix Size 14	Mix Size 20
19.0	-	100	90 - 100
13.2	100	90 - 100	75 - 85
9.5	90 - 100	65 – 75	60 - 70
6.7	64 - 74	40 - 50	38 - 46
4.75	36 - 46	30 - 40	24 - 36
2.36	20 - 30	15 - 25	12 - 23
1.18	12 - 22	10 - 19	8 – 17
0.600	8 - 17	7 - 15	6 – 14
0.300	6 - 11	5 - 10	4 - 10
0.150	4 – 8	4 - 8	3 – 8
0.075	3 – 5	3 - 5	3 – 5

Note: For purposes of grading, the grading of the aggregates includes the added filler and excludes the crumb rubber.

Table 421.102 Proportions of Aggregate, Added Filler, Crumb Rubber and Bitumen

Sieve Size (mm)	Percentage Passing (by Mass) Mix Sizes 10, 14 and 20 mm
Aggregate	86 – 89
Added Filler	1.0 - 2.0
Crumb Rubber	2.5 - 3.0
Bitumen	7.5 - 9.0

(c) Volumetric Test Properties

The volumetric test properties of the mix shall comply with Table 421.103

Table 421.103 Volumetric Test Properties (Mix Sizes 10, 14 and 20 mm)

Air Voids (%)	Voids in Mineral Aggregates (Minimum %)	Binder Film Thickness (microns)
5.0 - 6.5	23	19 - 25

Notes: 1. For purposes of calculation of Voids in Mineral Aggregates, the crumb rubber is to be considered as part of the binder.

2. Binder film thickness shall be calculated as bitumen distributed over the surface of the aggregates including crumb rubber.

(d) Performance Test Properties

The following performance test properties shall be submitted for information only.

Table 421.104 Performance Test Properties

Performance Test	Mix Size		
	10 mm	14 mm	20 mm
Mean Indirect Tensile Modulus @ 25^C (MPa)	For information only		
Min Wet Tensile Strength (kPa)			
Min Wet to Dry Tensile Strength (%)			
Max Wheel Tracking Depth @ 60^C (mm)			

Notes: 1. All testing shall be undertaken in accordance with RC 500.16

2. Modulus test limits apply to gyratory compacted specimens compacted to 5% air voids within a tolerance of ± 0.5% air voids.

3. Wet tensile strength and tensile strength ratio test specimens shall be prepared using gyratory compaction to 8% air voids ± 1% air voids.

4. Wheel track test specimens shall be compacted to 5% air voids ± 1% air voids.

421.11 MIXING AND MIXING TEMPERATURES

The temperature limits shall be in accordance with clause 407.08.

Following discharge of aggregate and filler into the mixer, the required quantity of crumb rubber shall be added and dry mixed for a minimum period of 10 seconds.

Following the addition of bitumen, the whole mixture shall be mixed for a minimum of 60 seconds or until the whole of the mix is homogeneous and proper digestion of the crumb rubber into the bitumen has occurred.

421.12 AMBIENT CONDITIONS FOR PLACING

The asphalt mix shall not be placed when the majority of the area to be paved has a surface temperature less than 15°C.