Australian Binders used for the Stabilisation and Road Recycling Industry

Today various manufacturers are producing specific binders to meet an optimum balance between long-term performance, flexibility in the construction process and types of pavement materials (see Table 1).

This guideline is to assist pavement engineers establish appropriate classifications for binders used in soil stabilisation and road recycling contracts. Please note that in all cases a qualified pavement engineer should select the appropriate binder for the pavement soil.

Many of the binders sold by AustStab members are given trade names. To assist pavement engineers identify these binders in terms of their performance and content, AustStab has classified binders as:

A. GP cement to AS 3972
B. GB cement to AS 3972
C. Cementitious blends with combinations of fly ash, GP cement, ground granulated blast furnace slag and lime
D. Lime - hydrated or quicklime
E. Bitumen to AS 2008
F. Bitumen / Cement blends
G. Insoluble Polymers

In this document ground granulated blast furnace slag is referred to as slag and fly ash as FA.

The availability of binder types B to D varies around Australia and typically, they are sold and used in road recycling in one or two regions of Australia. Table 3 has listed all the powder binders available from AustStab members in terms of their classification and a brief note of their performance. The binder manufacturer has prepared the performance description.

GP cement and bitumen is available in all regions of Australia and therefore, are not included in the table.

Class 170 bitumen is typically used for stabilisation works. Bitumen can be either in emulsion form (complying with AS 1160) or foamed. Additives, such as cement and lime, are typically used in combinations with bitumen emulsion.

Table 1 Suitability of additive to soil type.
[Note: * Depends upon grading. Single size sands require higher additive contents]

Key: Usually very suitable, Usually satisfactory & Usually not suitable.

Binder Classification	Crushed rock	well graded gravel	silty/ clayey gravel	sand*	Sandy / silty clays	heavy clays
GP Cement						
GB Cement						
Cementitious blends						
Lime						
Lime & cement						
Lime & fly ash						
Bitumen						
Bitumen/Cement						
Insoluble polymer						

Table 2 Company details for binders listed in Table 3.

Company	Abbreviation
Adelaide Brighton Cement	ABC
Australian Cement Limited	ACL
Blue Circle Southern Cement	BCSC
David Mitchell Limited	DML
Independent Cement and Lime	ICL
Polyroad Stabilising	PR
Queensland Cement	QCL
Rocla Pozzanlic	RP
Sunstate Cement	SUN
Swan Cement	SWAN

Powder and bitumen-based binders are generally sold by weight calculated from the required spread rate and coverage (refer to AustStab Guideline on Verification of Binder Spread Rate).

Bitumen for stabilisation may be obtained from Mobil Bitumen and Shell Bitumen in all regions of Australia.

Insoluble polymers act to both internally waterproof the soil and protect the pavement from external ingress of water. Commercially known as Polyroad the product comes as a fine powder and is applied through a conventional spreader.

For more details on company names and phone numbers, please refer to the AustStab Web site or contact you nearest company office in your region.

Table 3 The availability of various powder binders from AustStab members in each region of Australia with their typical properties. Refer to Table 2 for full name of company.

Binder Name	Class.	Source	Company	Brief description of performance
Queensland				
Type GB 70-30	B	Brisbane	SUN	Slow reacting binder, reduces PI, enhances CBR ratio
GB-BFC	B	Brisbane	QCL	Suits most soil types. Slower reaction than GP - longer working times.
GB-FAB	B	Brisbane, Gladstone, Townsville	QCL	Suits most soil types. Slower reaction than GP - longer working times.
Roadblend 60-40	C	Brisbane	SUN	Slow reacting binder, reduces PI, enhances CBR ratio
Fly Ash Blend 78-22	C	Brisbane	SUN	Slow reacting binder & reduces PI
Triple Blends	C	Brisbane	QCL	Suits most soil types. Working time may vary depending on proportion of blend.
Fly Ash Blends	C	Brisbane, Townsville	QCL	Suits most soil types. Working time may vary depending on proportion of blend.
Lime/Ash Blends	C	} } }Rockhampton	QCL	Suitable for soils containing clays and granular materials - blend ratio depends on proportion of soil components.
Hydrated Lime and Quicklime	D	}	QCL	Effective with clayey soil. Relatively slow reaction - long working times
Hydrated Lime and Quicklime	D	Tamaree & Woodstock	DML	Effective on clay soils, extended working time.
NSW				
Pozzoment	B	Kooragang	BCSC	Primarily used with granular materials, up to 3 hours working time.
Slagment	B	Maldon	BCSC	Primarily used with granular materials, up to 3 hours working time.
Fly Ash Blends	B	Clyde	ACL	} Working time up to 8 hours
GB	B	Newcastle	ACL	} Reduces plasticity index
Triple Blend series (GP cement /FA/Slag)	B	Newcastle	ACL	} Enhances CBR Ratio } Greater density therefore causing less dust } Less effected by rain during construction } Greater resistance to erosion
SSC40	C	Maldon	BCSC	Primarily for granular materials but can be used with some plastic materials. Working time up to 4 hours.
Stabilment	C	Villawood	BCSC	Slow reacting binder. Working time up to 8 hours, reworkability of 3 days after initial compaction with minimal strength loss, (< 2%).

Table 3 (Continued) The availability of various powder binders from AustStab members in each region of Australia with their typical properties. Refer to Table 2 for full name of company.

Binder Name	Class.	Source	Company	Brief description of performance
NSW Continued				
70/30 (Slag/Lime)	C	Villawood	BCSC	Similar properties to Stabilment, but better strengths and longer working time in clay soils.
Steelpave (Slag/lime)	C	Newcastle	ICL	Slow reaction high strength binder with a approved working time of 8 hours
Steelpave Triple Blend (Slag/Lime FA)	C	Newcastle	ICL	Slow reacting binder with a working time of at least 8 hours
RBSL Series (Slag /Lime/FA)	C	} }	RP	Suitable for most granular to sandy materials. Long working time.
RBCS Series (GP cement/Slag/FA)	C	Vales Point, Canberra,	RP	Slower reacting binder and increased working time.
RBCL Series (GP cement/Lime/FA)	C	Dubbo }	RP	Slow reacting binder with a working time of at least 8 hours
RBL series (lime/FA)	C	} }	RP	Effective with plastic materials.
Hydrated Lime	D	Marulan	BCSC	High Calcium (typically 94%). Ideal for PI modification and stabilisation of plastic materials. Extended working times up to 1 week.
Quicklime	D	Marulan	BCSC	High Calcium (typically 92%). Highly reactive, soft burnt lime. Contains approximately 25% w/w, more available reactive material than hydrated lime.
Hydrated Lime and Quicklime	D	Attunga	DML	Effective on clay soils, extended working time.
Polyroad PR21L	G	Albury/ Wodonga	PR	Mixture of 67% polymer coated fly ash & 33% hydrated lime.
Polyroad PR11L	G	Albury/ Wodonga	PR	Mixture of 50% polymer coated fly ash & 50% hydrated lime for high plasticity gravels or soils.
Victoria				
Steel Cement	B	Pt Melbourne	ICL	Similar to Type GP binders, but with reduced likelihood of cracking due to slower setting, and higher eventual strength
GP/slag blend	B	} } }	BCSC	Can be used with a wide range of materials, but primarily used with granular materials. 3 to 5 hours working time, depending on ambient conditions.
GP/FA blend	B	} Somerton }	BCSC	Similar to Slagment. 3 to 5 hours working time, depending on ambient conditions.
Triple blends (GP/slag/FA)	B	} } }	BCSC	Application to a wide range of materials. Blends can be produced to control working times but generally 3-5 hours.
Fly Ash Blend	C	Pt Melbourne	ICL	Slower setting time & increased working time.
Steelpave (Slag/lime)	C	Pt Melbourne	ICL	Slow reaction high strength binder with a approved working time of 8 hours
Steelpave Triple Blend (Slag/Lime FA)	C	Pt Melbourne	ICL	Slow reacting binder with a working time of at least 8 hours
85/15 Slag/Lime blend	C	} }	BCSC	Slow-setting binder suitable to a range of materials. Working time 8-12 hours.
70/30 Slag/lime blend	C	} } Somerton	BCSC	Similar to 85/15 S/L but more effective in material with higher clay content.
Quicklime	D	} } } }	BCSC	Most effective with clay soil. High Calcium (typically 92%, CaO). Highly reactive, soft burnt lime. Contains approximately 25% more reactive Calcium, by weight, than Hydrated Lime. Long working times.
Hydrated Lime and Quicklime	D	Lillydale	DML	Effective on clay soils, extended working time.
Hydrated Lime	D	Marulan	BCSC	High Calcium (typically 94%). Ideal for PI modification and stabilisation of plastic materials. Extended working times up to 1 week.

Table 3 (Continued) The availability of various powder binders from AustStab members in each region of Australia with their typical properties. Refer to Table 2 for full name of company.

Binder Name	Class.	Source	Company	Brief description of performance
Vict. (continued)				
Polyroad PR21L	G	Wodonga/ Albury	PR	Mixture of 67% polymer coated fly ash & 33% hydrated lime.
Polyroad PR11L	G	Wodonga/ Albury	PR	Mixture of 50% polymer coated fly ash & 50% hydrated lime for high plasticity gravels or soils.
South Australia				
GP/Fly Ash Blend	B	Islington	BCSC	Up to 50% fly ash. Slower setting time than GP cement. Generally >3-5 hours working time.
SR Cement	C	Angaston	ABC	Similar to GP cement but with a slightly slower setting time
Premium Blend (with Fly Ash)	C	Birkenhead	ABC	Slower reacting binder than GP or SR cement, and longer working time
Hydrated Lime	D	Angaston	ABC	
Quicklime	D	Angaston	ABC	
Western Australia				
Stabilbase	C	} }	SWAN	Slow setting binder and working time up to 8 hours with reworkability of 2 days after compaction
LH Cement	C	} } Perth	SWAN	Slow reacting binder, reduces Pi and enhances CBR ratio
Milled Quicklime	D	} }	SWAN	Effective with clay soils, very high CaO content, reduces PI, relative slow reaction time.
Hydrated Lime	D	} }	SWAN	Effective with clay soils, very high $Ca(OH)^2$ content, reduces PI, relative slow reaction time.

For further information, please contact the Secretary, AustStab, PO Box 797, Artarmon 2064 or Email: vorobief@auststab.com.au
Other National AustStab Guidelines are available from AustStab members or visit our web site.
Internet: http:\\www.auststab.com.au