Bitumen Penetration

Penetration grade bitumen is a standard bitumen which is unique for road construction in various environmental conditions. These grades of bitumen are named due to their level of hardness and consistency of bituminous materials, which leads to the classification of bitumen in a range of grades from 30 to 120.

The main goal for grading bitumen based on penetration value is to determine their suitability for use in various construction methods and under different climatic conditions. Known also as paving grade bitumen, PEN grades are classified based on the depth into which a certain laboratory needle penetrates them.

The penetration grades offered by Infinity Galaxy have a thermoplastic property which causes bitumen to get soft at high temperature and hard at low temperature. Bitumen 40/50, 60/70, 80/100, 85/100 are black, semi-solid and heavy hydrocarbons which are the final output of extract tower.

On the next pages, you can find a detailed guide on various grades of bitumen and their specification, based on a penetration value test.

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Bitumen 40/50

What is 40/50 penetration grade? This grade of bitumen is produced to meet the demands of road constructors in tropical areas.
Uses: 40/50 penetration grade bitumen is used as a binder for base courses and wearing courses in hot temperature.
Properties: 40/50 penetration grade bitumen is softened gradually once being heated and hardens as it is cooled. This special physical property
enhances the binder performance in higher temperatures.
Packing: 150/180/210 Kg New Steel Drums with 0.6, 0.7, 1 mm thickness.

CHARACTERISTICS	TEST METHOD	UNIT	MIN	MAX
Specific Gravity at 25°C	ASTM D70	°C	1.01	1.05
Penetration at 25°C, 100g, 5s	ASTM D5	mm	40	50
Softening Point	ASTM D36	°C	52	60
Ductility at 25°C	ASTM D113	Cm	100	
Loss on heating	ASTM D6	%		0.5
Drop in penetration after heating	ASTM D5	%		20
Flash point	ASTM D92	°C	250	
Solubility in Trichloroethylene	ASTM D2042	%	100	

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Bitumen 50/70

What is 50/70 penetration grade? This grade of bitumen is a semi hard type of bitumen which is mostly applied in construction and asphalt repair.

Uses: 50/70 penetration grade bitumen is similar to 60/70 grade, but the testing method is different. This grade of bitumen is tested according to European EN standard.

Properties: 50/70 penetration grade bitumen is softened gradually once being heated and hardens as it is cooled. This grade of bitumen is the only penetration grade that its viscosity is evaluated and reported to the buyers.

Packing: 150/180/210 Kg New Steel Drums with 0.6, 0.7, 1 mm thickness.

CHARACTERISTICS	TEST METHOD	UNIT	MIN	MAX
Penetration at 25°C, 100g, 5s	EN 1426	mm	50	70
Softening Point (Ring&Ball)	EN 1427	°C	46	54
Kinematic Viscosity@135 C	EN 12595	mm/S	295	
Penetration Index	EN 12591	_	– 1.5	0.7
Flash point (Cleveland Open)	EN ISO 2595	°C	230	
Solubility in Toluene or Xylene	EN 12592	%	99	

Bitumen 60/70

What is 60/70 penetration grade? This grade of bitumen is produced to meet the demands of road constructors in tropical areas. As the hot weather of these regions can be a challenge for asphalt binders, bitumen 60/70 is offered due to its low penetration value.
Uses: 60/70 penetration grade bitumen is recommended for road construction and asphalt pavements repairs in hot temperature.
Properties: 60/70 penetration grade bitumen is softened gradually once being heated and hardens as it is cooled. This special physical property enhances the binder performance in higher temperature.
Packing: 150/180/210 Kg New Steel Drums with 0.6, 0.7, 1 mm thickness.

CHARACTERISTICS	TEST METHOD	UNIT	MIN	MAX
Specific Gravity at 25°C	ASTM D70	°C	1.01	1.05
Penetration at 25°C, 100g, 5s	ASTM D5	mm	60	70
Softening Point	ASTM D36	°C	49	56
Ductility at 25°C	ASTM D113	Cm	100	
Loss on heating	ASTM D6	%		0.2
Drop in penetration after heating	ASTM D5	%		20
Flash point	ASTM D92	°C	250	
Solubility in Trichloroethylene	ASTM D2042	%	99	

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Bitumen 80/100

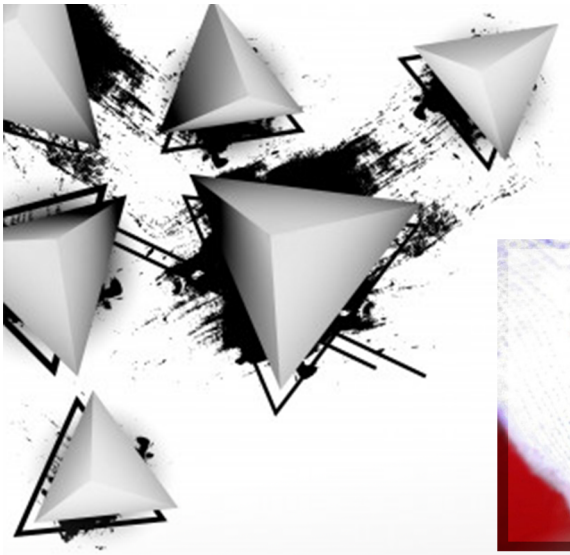
What is 80/100 penetration grade? This grade of bitumen is semi-soft and suit the demands of road construction in cold regions.
Uses: 80/100 penetration grade bitumen is suitable for road construction and asphalt pavement in Northern African countries such as Kenya and Tanzania.
Properties: 80/100 penetration grade bitumen is specifically used in cold temperatures; As the penetration value of this grade is high, there are lower risks of cracking after the construction.
Packing: 150/180/210 Kg New Steel Drums with 0.6, 0.7, 1 mm thickness.
Note: Bitumen 85/100 penetration grade is similar to 80/100 grade and is suitable for African countries.

CHARACTERISTICS	TEST METHOD	UNIT	MIN	MAX
Specific Gravity at 25°C	ASTM D70	°C	1.01	1.05
Penetration at 25°C, 100g, 5s	ASTM D5	mm	80	100
Softening Point	ASTM D36	°C	42	52
Ductility at 25°C	ASTM D113	Cm	100	
Loss on heating	ASTM D6	%		0.5
Flash point	ASTM D92	°C	225	
Solubility in Trichloroethylene	ASTM D2042	%	99	

Bitumen 100/120

What is 100/120 penetration grade? This grade of bitumen has a high flash point and adhesion properties to aggregates.
Uses: 100/120 penetration grade bitumen is suitable for road construction and asphalt pavement in cold temperature.
Properties: 100/120 penetration grade bitumen is specifically used in cold temperatures; According to ASTM standard, in a mean annual temperature of 7°C or lower, using this grade of bitumen guarantees the resistance of constructed road after 5-10 years.
Packing: 150/180/210 Kg New Steel Drums with 0.6, 0.7, 1 mm thickness.

CHARACTERISTICS	TEST METHOD	UNIT	MIN	MAX
Specific Gravity at 25°C	ASTM D70	°C	1.01	1.05
Penetration at 25°C, 100g, 5s	ASTM D5	mm	100	120
Softening Point	ASTM D36	°C	42	49
Ductility at 25°C	ASTM D113	Cm	100	
Loss on heating	ASTM D6	%		0.2
Flash point	ASTM D92	°C		250
Solubility in Trichloroethylene	ASTM D2042	%		99.5



Emulsion Bitumen

Bitumen Emulsion came to the industry to avoid the environmental damages of cutback bitumen. Since cutback bitumen includes volatile solvents, it is toxic to the nature, human and the environment.
However, bitumen emulsion is a chemical combination of bitumen and water which is highly used as a waterproofing material.
This product is beneficiary to waterproofing and coating in road construction. Convenient transportation, economic efficiency, and being safe, are the main advantages of this product when it comes to asphalt specialists. This grade of bitumen is particularly suitable for humid and rainy weather.
The emulsion grades of bitumen are offered by Infinity Galaxy in two categories of **Anionic and Cationic**, and **Rapid Setting Time (RS)**, **Medium Setting Time (MS)**, and **Slow Setting Time (SS)**.

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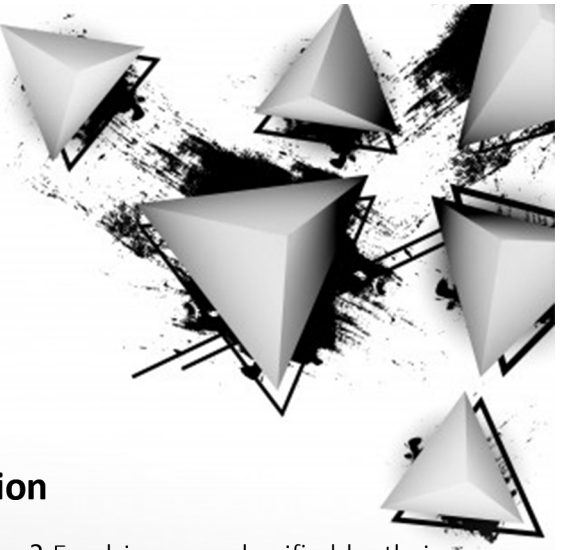


Anionic Bitumen Emulsion

What is anionic bitumen emulsion? Emulsions are classified by their electrochemical specification. Droplets in anionic bitumen emulsion carry a negative charge.

Uses: Waterproofing and coating in road construction, surface dressing, and slurry seals.

Categories: Anionic bitumen emulsions are classified based on the amount of time is needed for the emulsion to cure and the amount of mixing that can be performed before the emulsion breaks. These categories are **Slow Setting, Medium Setting, and Rapid Setting**.

SS-1

Property	Min	Max	Test Method
Viscosity SSF, 25 °C (s)	20	100	ASTM D244
Viscosity SSF, 50 °C (s)	_	_	ASTM D244
Storage stability, 24 h (%)	_	1	ASTM D6930
Demulcibility , 0.02 N CaCl2 (%)	_	_	
Cement mixing (%)	_	2	
Sieve (%)	_	0.1	ASTM D6933
Residue (%)	57	_	ASTM-D244
Solubility in trichloroethylene %	97.5		ASTM D2042
Penetration 77°F (25°C) 100g,5s mm	100	200	ASTM D5
ductility, 77°F (25 °C), 5cm/min (cm)	40	_	ASTM D113

SS-1H

Property	Min	Max	Test Method
Viscosity SSF, 25 °C (s)	20	100	ASTM D244
Viscosity SSF, 50 °C (s)	_	_	ASTM D244
Storage stability, 24 h (%)	_	1	ASTM D6930
Cement mixing (%)	_	2	
Sieve (%)	_	0.1	ASTM D6933
Residue (%)	57	_	ASTM-D244
Solubility in trichloroethylene %	97.5		ASTM D2042
Penetration 77°F (25°C) 100g,5s mm	40	90	ASTM D5
ductility, 77°F (25 °C), 5cm/min (cm)	40	_	ASTM D113

RS-1

Property	Min	Max	Test Method
Viscosity SSF, 25 °C (s)	20	100	ASTM D244
Storage stability, 24 h (%)	_	1	ASTM D6930
Demulcibility , 35ml, 8% dioctyl sodium sulfosuccinate, %	60	_	ASTM D6936
Particle charge test	Minus		ASTM D244
Sieve (%)	_	_	ASTM D6933
Residue by distillation (%)	55		ASTM D244
Residue penetration, 25 °C	100	90	ASTM D5
Solubility in trichloroethylene %	97.5	_	ASTM D2042
Residue ductility, 25 °C, 5cm/min (cm)	40	_	ASTM D113

RS-2

Property	Min	Max	Test Method
Viscosity SSF, 25 °C (s)	20	100	ASTM D244
Storage stability, 24 h (%)	_	1	ASTM D6930
Demulcibility , 35ml, 8% dioctyl sodium sulfosuccinate, %	60	_	ASTM D6936
Particle charge test	Minus		ASTM D244
Sieve (%)	_	0.1	ASTM D6933
Residue by distillation (%)	63		ASTM D244
Residue penetration, 25 °C	100	200	ASTM D5
Solubility in trichloroethylene %	97.5	_	ASTM D2042
Residue ductility, 25 °C, 5cm/min (cm)	40	_	ASTM D113

MS2

Property	Min	Max	Test Method
Viscosity SSF, 25 °C (s)	20	100	ASTM D244
Storage stability, 24 h (%)	_	1	ASTM D6930
Particle charge test	Minus		ASTM D244
Sieve (%)	_	0.1	ASTM D6933
Residue by distillation (%)	65		ASTM D244
Residue penetration, 25 °C	100	200	ASTM D5
Solubility in trichloroethylene %	97.5	_	ASTM D2042
Residue ductility, 25 °C, 5cm/min (cm)	40	_	ASTM D113

MS2H

Property	Min	Max	Test Method
Viscosity SSF, 25 °C (s)	20	100	ASTM D244
Storage stability, 24 h (%)	_	1	ASTM D6930
Particle charge test	Minus		ASTM D244
Sieve (%)	_	0.1	ASTM D6933
Residue by distillation (%)	65		ASTM D244
Residue penetration, 25 °C	40	90	ASTM D5
Solubility in trichloroethylene %	97.5	_	ASTM D2042
Residue ductility, 25 °C, 5cm/min (cm)	40	_	ASTM D113

HFMS1

Property	Min	Max	Test Method
Viscosity, Saybolt Furol at 25 °C, SFS	20	100	ASTM D244
Storage stability, 24h (%)	_	1	ASTM D6930
Particle charge test	Minus		ASTM D6936
Sieve (%)	_	0.1	ASTM D6933
Residue by distillation (%)	55	_	ASTM D244
Residue penetration, 25 °C	100	200	ASTM D5
Residue ductility, 25 °C, 5cm/min (cm)	40	_	ASTM D113
Solubility in trichloroethylene %	97.5	_	ASTM D2042
Float of residue. 60 °C (s)	1200		ASTM D139

HFMS2

Property	Min	Max	Test Method
Viscosity, Saybolt Furol at 25 °C, SFS	100	_	ASTM D244
Storage stability, 24h (%)	_	1	ASTM D6930
Particle charge test	Minus		ASTM D6936
Sieve (%)	_	0.1	ASTM D6933
Residue by distillation (%)	65	_	ASTM D244
Residue penetration, 25 °C	100	200	ASTM D5
Residue ductility, 25 °C, 5cm/min (cm)	40	_	ASTM D113
Solubility in trichloroethylene %)	97.5	_	ASTM D2042
Float of residue. 60 °C (s)	1200		ASTM D139

HFMS2S

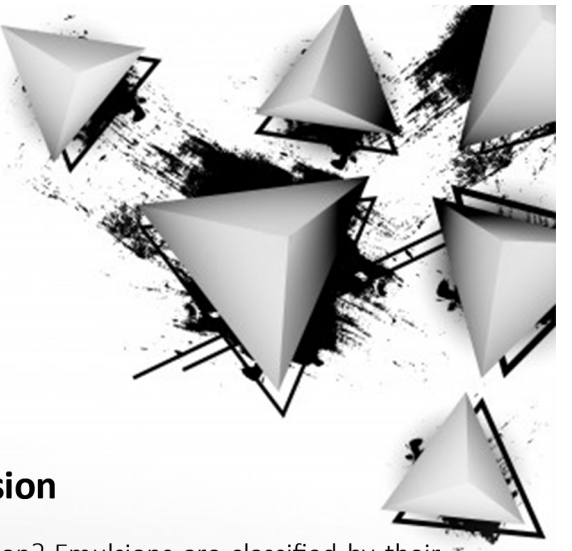
Property	Min	Max	Test Method
Viscosity, Saybolt Furol at 25 °C, SFS	50	_	ASTM D244
Storage stability, 24h (%)	_	1	ASTM D6930
Particle charge test	Minus		ASTM D6936
Sieve (%)	_	0.1	ASTM D6933
Residue by distillation (%)	65	_	ASTM D244
Residue penetration, 25 °C	1	7	ASTM D5
Residue ductility, 25 °C, 5cm/min (cm)	40	_	ASTM D113
Solubility in trichloroethylene %)	97.5	_	ASTM D2042
Float of residue. 60 °C (s)	1200		ASTM D139

HFMS2H

Property	Min	Max	Test Method
Viscosity, Saybolt Furol at 25 °C, SFS	100	_	ASTM D244
Storage stability, 24h (%)	_	1	ASTM D6930
Particle charge test	Minus		ASTM D6936
Sieve (%)	_	0.1	ASTM D6933
Residue by distillation (%)	65	_	ASTM D244
Residue penetration, 25 °C	40	90	ASTM D5
Residue ductility, 25 °C, 5cm/min (cm)	40	_	ASTM D113
Solubility in trichloroethylene %)	97.5	_	ASTM D2042
Float of residue. 60 °C (s)	1200		ASTM D139

HFRS2

Property	Min	Max	Test Method
Viscosity, Saybolt Furol at 25 °C, SFS	20	100	ASTM D244
Storage stability, 24h (%)	_	1	ASTM D6930
Particle charge test	Minus		ASTM D6936
Sieve (%)	_	0.1	ASTM D6933
Residue by distillation (%)	60	_	ASTM D244
Residue penetration, 25 °C	63	_	ASTM D5
Residue ductility, 25 °C, 5cm/min (cm)	100	200	ASTM D113
Solubility in trichloroethylene %)	40	_	ASTM D2042
Float of residue. 60 °C (s)	1200		ASTM D139



Cationic Bitumen Emulsion

What is cationic bitumen emulsion? Emulsions are classified by their electrochemical specification. The chemical charge of cationic emulsions is positive. Generally, cationic emulsions show better adhesion than anionic emulsions.
Uses: Waterproofing and coating in road construction, surface dressing and stabilizing the pavement.
Categories: Cationic bitumen emulsions are classified based on the amount of time is needed for the emulsion to cure and the amount of mixing that can be performed before the emulsion breaks. These categories are slow setting, medium setting, and rapid setting.

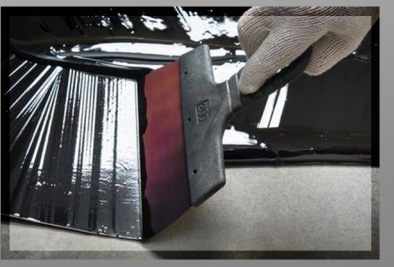
Note:
CRS-2 is rapid setting cationic emulsions of high viscosity,
CSS-1h would be a slow setting emulsion with a hard bitumen residue.

CSS-1

Property	Min	Max	Test Method
Viscosity, Saybolt Furol at 25 °C, SFS	20	100	ASTM D244
Storage stability test, 24-h, %	_	1	ASTM D6930
Particle charge test	positive		ASTM D244
Sieve test, %	_	0.1	ASTM D6933
Cement mixing test, %		2	ASTM D6935
Distillation:			
Residue,%	57	_	ASTM D244
Tests on residue from distillation test:			
Penetration, 25°C (77°F), 100 g, 5 s	100	250	ASTM D5
Ductility, 25°C (77°F), 5 cm/min, cm	40	_	ASTM D113
Solubility in trichloroethylene, %	97.5	_	ASTM D2042

CSS-1H

Property	Min	Max	Test Method
Viscosity, Saybolt Furol at 25 °C, SFS	20	100	ASTM D244
Storage stability test, 24-h, %	_	1	ASTM D6930
Particle charge test	positive		ASTM D244
Sieve test, %	_	0.1	ASTM D6933
Cement mixing test, %		2	ASTM D6935
Distillation:			
Residue,%	57	_	ASTM D244
Tests on residue from distillation test:			
Penetration, 25°C (77°F), 100 g, 5 s	40	90	ASTM D5
Ductility, 25°C (77°F), 5 cm/min, cm	40	_	ASTM D113
Solubility in trichloroethylene, %	97.5	_	ASTM D2042



CMS2

Property	Min	Max	Test Method
Viscosity, Saybolt Furol at 25 °C, SFS	50	450	ASTM D244
Storage stability test, 24-h, %	_	1	ASTM D6930
Coating ability and water resistance:			
Coating, dry aggregate	Good		ASTM D244
Coating, after spraying	Fair		ASTM D244
Coating, wet aggregate	Fair		ASTM D244
Coating, after spraying	Fair		ASTM D244
Particle charge test	Positive		ASTM D244
Sieve test, %	_	0.1	ASTM D6933
Distillation:			
Oil distillate, by volume of emulsion, %	_	12	ASTM D6997
Residue, %	65	_	ASTM D244
Tests on residue from distillation test:			
Penetration, 25°C (77°F), 100 g, 5 s	100	250	ASTM D5
Ductility, 25°C (77°F), 5 cm/min, cm	40	_	ASTM D113
Solubility in trichloroethylene, %	97.5	_	ASTM D2042

CMS2h

Property	Min	Max	Test Method
Viscosity, Saybolt Furol at 25 °C, SFS	40	450	ASTM D244
Storage stability test, 24-h, %	_	1	ASTM D6930
Coating ability and water resistance:			
Coating, dry aggregate	Good		ASTM D244
Coating, after spraying	Fair		ASTM D244
Coating, wet aggregate	Fair		ASTM D244
Coating, after spraying	Fair		ASTM D244
Particle charge test	Positive		ASTM D244
Sieve test, %	_	0.1	ASTM D6933
Distillation:			
Oil distillate, by volume of emulsion, %	_	12	ASTM D6997
Residue, %	65	_	ASTM D244
Tests on residue from distillation test:			
Penetration, 25°C (77°F), 100 g, 5 s	40	90	ASTM D5
Ductility, 25°C (77°F), 5 cm/min, cm	40	_	ASTM D113
Solubility in trichloroethylene, %	97.5	_	ASTM D2042

CRS1

Property	Min	Max	Test Method
Viscosity, Saybolt Furol at 25 °C, SFS	50	450	ASTM D244
Storage stability test, 24-h, %	_	1	ASTM D6930
Coating ability and water resistance:			
Coating, dry aggregate	Good		ASTM D244
Coating, after spraying	Fair		ASTM D244
Coating, wet aggregate	Fair		ASTM D244
Coating, after spraying	Fair		ASTM D244
Particle charge test	Positive		ASTM D244
Sieve test, %	_	0.1	ASTM D6933
Distillation:			
Oil distillate, by volume of emulsion, %	_	12	ASTM D6997
Residue, %	65	_	ASTM D244
Tests on residue from distillation test:			
Penetration, 25°C (77°F), 100 g, 5 s	100	250	ASTM D5
Ductility, 25°C (77°F), 5 cm/min, cm	40	_	ASTM D113
Solubility in trichloroethylene, %	97.5	_	ASTM D2042

CRS2

Property	Min	Max	Test Method
Viscosity, Saybolt Furol at 25 °C, SFS	100	400	ASTM D244
Storage stability test, 24-h, %	_	1	ASTM D6930
Demulsibility, 35 mL, 0.8 % dioctyl sodium sulfosuccinate, %	40	_	ASTM D6936
Coating ability and water resistance:			
Particle charge test	Positive		ASTM D244
Sieve test, %	_	0.1	ASTM D6933
Distillation :			
Oil distillate, by volume of emulsion, %	_	3	ASTM D6997
Residue, %	65	_	ASTM D244
Tests on residue from distillation test:			
Penetration, 25°C (77°F), 100 g, 5 s	100	250	ASTM D5
Ductility, 25°C (77°F), 5 cm/min, cm	40	_	ASTM D113
Solubility in trichloroethylene, %	97.5	_	ASTM D2042

K1-60

Property	Result
Particle charge	Pos.
Residue on 710 um KS sieve (%)(m/m), maximum	0.05
Residue on 150 um KS sieve (g per 100 mL), maximum	0.15
Binder content (%)(m/m), minimum	57
Viscosity (°E) at 20°C	43625
Viscosity redwood No. II (s at 85°C)	–
Storage stability (long period test) % water content difference, maximum	2