

TENTATIVE SPECIFICATION FOR BUILT-UP SPRAY GROUT



THE INDIAN ROADS CONGRESS



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TENTATIVE SPECIFICATION FOR BUILT-UP SPRAY GROUT

1. INTRODUCTION

This standard was prepared by the Bituminous Pavements Committee in their meeting held on the 8th September 1971. Later it was approved by the Specifications and Standards Committee and then by the Executive Committee. Finally it was approved by the Council in their 79th meeting held at Gandhinagar on the 25th November, 1972. Para 5.10 has, however, been modified to bring in conformity with IRC Special Publication 11 "Handbook of Quality Control for Construction of Roads & Runways" (First Revision).

2. SCOPE

This specification is intended as an alternative to conventional water bound macadam, where water may be scarce or construction may otherwise be difficult such as when strengthening of an existing road is involved which cannot be closed to traffic. Built-up spray grout could also be adopted when machinery is not available for bituminous macadam, though it will not be as strong as the latter.

3. DESCRIPTION

Built-up spray grout shall consist of a two-layer composite construction of compacted crushed coarse aggregates with application of bituminous binder after each layer for bonding, finishing with key aggregates at the top of second layer so as to yield a thickness not exceeding 75 mm. Construction in more than two layers is not recommended.

It is an open-graded construction suitable as base or binder course but should not be utilised as a wearing course.

4. MATERIALS

4.1. Binder

4.1.1. The binder shall be one of the following:

- (i) a straight-run bitumen of suitable penetration grade complying with IS: 73;

- (ii) a road tar of suitable grade conforming to IS: 215; or
- (iii) an approved cutback.

4.1.2. The grades of binder to be used would depend on climatic conditions. The suggested binders, apart from approved cutback, are straight-run bitumen 80/100, 60/70 or 30/40; and road tar R.T. 4 or R.T. 5.

4.2. Aggregates

4.2.1. **General requirements:** The aggregates shall consist of crushed stone, crushed slag, crushed gravel (shingle) or other aggregate as specified having clean, strong, durable and fairly cubical fragments, free from disintegrated pieces, salt, alkali, vegetable matter, dust and adherent coatings.

4.2.2. **Physical requirements:** The coarse and key aggregates shall satisfy the requirements given in Table 1.

TABLE 1

Property	Value		Method of Test
	Base course	Binder course	
(1) Abrasion value, using Los Angeles machine or Aggregate impact value	Max. 50% Max. 40%	Max. 40% Max. 30%	IS: 2386 (Part IV) —do—
(2) Flakiness index	Max. 25%		IS: 2386 (Part I)
(3) Stripping Value	Max. 25%		IS: 6241
(4) Water absorption (except in case of slag)	Max. 1%		IS: 2386 (Part III)
(5) Soundness: Loss with sodium sulphate—5 cycles (in case of slag only)	Max. 12%		IS: 2386 (Part V)
(6) Unit weight of bulk density (in case of slag only)	Min. 1120 Kg per m ³		IS: 2386 (Part III)

4.2.3. **Grading of aggregates:** The coarse and key aggregates for built-up spray grout shall conform to the gradings given in Table 2.

TABLE 2

Per cent Passing, Sieve Size (IS:460)	Coarse Aggregate	Key Aggregate
50 mm	100	
25 mm	35—70	
20 mm	—	100
12.5 mm	0—15	35—70
4.75 mm	—	0—15
2.36 mm	0—5	0—5

5. CONSTRUCTION

5.1. Weather and Seasonal Limitations

Built-up spray grout shall not be constructed when the atmospheric temperature in shade is below 16°C nor when the pavement is damp, or the weather is foggy or rainy or a dust storm is on.

5.2. Equipment

All equipment necessary for proper construction shall be on the site of work in good condition.

5.3. Preparation of Base

The underlying course on which built-up spray grout is to be laid shall be prepared, shaped and conditioned to a uniform grade and section as specified. Any depressions or pot-holes shall be properly made up and thoroughly compacted sufficiently in advance.

It is important that the surface be dry and thoroughly cleaned before start of construction. As such the surface shall be swept free of caked earth and other foreign matter, cleaned with hard brushes, then with softer brushes and finally by blowing with sacks or gunny bags to remove the fine dust.

If the base to be covered is an old black top surface, it shall be swept clean and free of sand, dirt, dust and other loose deleterious foreign matter and be dry.

If the base to be treated consists of stabilised soil or porous aggregates, a suitable bituminous primer, vide IRC : 16—1965 "Tentative Specification for Priming of Base Course with Bituminous Primes" shall be applied and cured before the construction commences.

5.4. Tack Coat

The binder shall be heated to the appropriate temperature as specified and applied uniformly to the base at the rate specified in Table 3 preferably with a sprayer. The tack coat shall be applied just ahead of the spreading of coarse aggregates.

TABLE 3

Type of base	Quantity per 10 m ² of road surface
a. On a water bound macadam surface	7.5 kg.—10 kg.
b. On an existing black top surface	6 kg.— 8 kg.

5.5. Spreading and Compacting the First Layer of Coarse Aggregates

5.5.1. Spreading: The coarse aggregates shall be spread and hand packed (with suitable edge protection) at the rate of 0.5 m³ per 10 m² to a uniform depth true to the required alignment and profile. A testing template cut to the camber of the finished pavement shall be used to obtain uniformity of the crown.

The spreading shall be carried no further in advance of the rolling and other operations that can be completed in one average day's work. Segregated aggregates or aggregates mixed with earth or other foreign substances shall be removed and replaced with clean graded aggregates.

5.5.2. Rolling: After spreading, the coarse aggregates shall be compacted to full width by rolling with either three wheel power roller of 8 to 10 tonnes capacity or an equivalent vibratory roller. The rolling shall begin from edges progressing gradually towards the centre parallel to the centre line of the road, uniformly lapping each preceding rear wheel track by one third width. On superelevated portions, rolling shall commence from the lower edge of the pavement progressing gradually towards the upper edge.

After the roller has passed once over the whole area, the surface shall be checked with a camber template and a 3 metre straight edge.

The surface shall not vary more than 12 mm from the template or straight edge. All surface irregularities exceeding the above limit shall be corrected by removing or adding aggregates as required.

Rolling shall be discontinued before the voids are closed to such an extent as to prevent free and uniform penetration of the bitumen.

5.6. First Application of Binder

After the first layer of coarse aggregates has been rolled and checked, the binder heated to a temperature appropriate to its type and grade shall be applied uniformly over the surface preferably with the help of mechanical sprayers. The quantity of binder shall be 12.5 kg. to 15.0 kg. per 10 m^2 . Before applying the binder, the aggregates in the spread layer shall be surface dry to full depth.

5.7. Spreading and Compacting Second Layer of Coarse Aggregates

Immediately, after application of binder on first layer as per para 5.6, coarse aggregates at the rate of 0.5 m^3 per 10 m^2 shall be spread for the second layer and compacted as described in para 5.5.

5.8. Second Application of Binder

After compacting the second layer of coarse aggregates, the binder shall be applied at the rate of 12.5 kg. to 15.0 kg. per 10 m^2 as detailed in para 5.6.

5.9. Application of Key Aggregate

Immediately, after the second application of binder, key aggregates at the rate of 0.13 m^3 per 10 m^2 shall be spread uniformly by approved manual means or preferably with the help of mechanical gritters so as to cover the surface completely.

As soon as the key aggregates are spread, these shall be rolled fully in accordance with para 5.5.2. While rolling is in progress, additional key aggregates may be spread by hand as necessary to make up irregularities. Rolling shall continue until all aggregate particles are firmly embedded in the binder and present a uniform closed surface.

5.10. Surface Finish

The surface evenness of the completed course in longitudinal

and transverse directions shall be within the following tolerances:

- | | |
|---|---|
| (a) Longitudinal profile when tested with a 3-metre straight edge | } Max. permissible variation:
 12 mm and maximum
 number of undulations
 exceeding 10 mm in any
 300 metre length not to
} exceed 30 |
| (b) Cross profile when checked with a camber template | } Max. permissible variation: 8 mm |

The longitudinal profile shall be checked with a 3 metre long straight edge at the middle of each traffic lane along a line parallel to the centre line of the road. The transverse profile shall be checked with a series of three camber boards at intervals of 10 metre. For detailed guidance in this respect, reference may be made to IRC Special Publication 11 "Handbook of Quality Control for Construction of Roads and Runways" (First Revision).

5.11. Opening to Traffic

As the built-up spray grout is an open-graded construction, the wearing course must be applied before opening it to traffic. In special circumstances, however, the Engineer-in-charge may open the road to limited traffic provided the speed of vehicles is restricted to 16 km per hour.
