

INTERIM

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~~No. 920(I)~~

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SPECIFICATIONS FOR AGGREGATE FOR BITUMINOUS PAVEMENT

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920. 1 SCOPE

These Specifications govern all operations necessary for and pertaining to the production of aggregate for hot mixed bituminous pavement.

920. 3 MATERIALS

3.1 Source of Supply

The Contractor shall provide the Engineer with at least six days advance notice of;

- ~~a)~~ his intention to commence the production of aggregates,
- ~~b)~~ the source of all aggregates to be used on the project including supplementary granular material and V.M.A. additive.

At the request of the Contractor, the Department will test representative aggregate samples obtained from the source of supply. Each sample shall contain not less than ~~45 kg~~ **45kg** and the Contractor shall assume all costs incurred in obtaining and transporting the samples to the Department's Testing Laboratory.

Test results for gradation and physical properties will be provided but will not constitute acceptance of material in the source of supply.

Prior to the production of aggregates, the source of supply shall be cleared, grubbed and stripped of overburden to an extent and in a manner satisfactory to the Engineer.

3.2 Aggregate Requirements

Aggregates, supplementary material and V.M.A. additive material shall consist of sound, durable particles of crushed rock, gravel, stone, sand and fines, free from organic material.

The crush count is the percentage by weight of the blended aggregate particles retained on a ~~4.75 mm~~ **75mm** sieve which are not shale or ironstone and have at least one freshly fractured face.

The Los Angeles Abrasion Loss on quarried limestone aggregate will be based on any ~~hand picked~~ **handpicked** portion of the total sample submitted.

The shale content is the percent by weight of the particles retained on a ~~4.75 mm~~ **75mm** sieve that are shale particles.

The ironstone content is the percent by weight of the particles retained on a ~~4.75 mm~~ **75mm** sieve that are ironstone particles.

Voids in the Mineral Aggregate (V.M.A.) are spaces between the aggregate particles in a compacted pavement which contain either air or asphalt.

The gradation of the final blended aggregate for bituminous pavement will be based on the field adjusted mix design.

920. 3.2 Aggregate Requirements ~~(Cont'd)~~

The requirements for each Class will be as follows:

Passing Standard Sieve	Bituminous Pavement			
	Class "A"	Class "B"	Class "C"	Class "D"
19 mm 19mm sieve		100-%	100%	
16 mm 16mm sieve	100-%	90 – 100-%		
12.5 mm 5mm sieve	78 – 98-%	75 – 95-%		100-%
9.5 mm 5mm sieve	70 – 90-%	70 – 90-%		70 – 90-%
4.75 mm 75mm sieve	55 – 70-%	55 – 70-%	60 – 85-%	55 – 70-%
2.0 mm 0mm sieve	35 – 55-%	35 – 55-%	35 – 80-%	35 – 55-%
425 um 425um sieve	17 – 32-%	17 – 32-%	20 – 50-%	17 – 32-%
180 um 180um sieve	4 – 12-%	4 – 12-%		4 – 12-%
75 um 75um sieve	3 – 7-%	3 – 7-%	2 - 9-%	2 – 6-%
Minimum Crush Count	50-%	50-%	25-%	50-%
Maximum Los Angeles Abrasion Loss	35-%	35-%	35-%	35-%
Maximum Shale Content:				
Final Lift	3-%	3-%	7-%	3-%
Other Lifts	7-%	7-%	7-%	7-%
Maximum Ironstone Content:				
Final Lift	11-%	11-%	11-%	11-%
Voids in Mineral Aggregate:				
Final Lift	14 – 16-%	14 – 16-%		14 - 16-%
Other Lifts	13.5 – 16.5-%	13.5 – 16.5-%		13.5 – 16.5-%

3.3 Mix Design

Before the preparation of the mix design, the Department will prepare a mix combination establishing the percentages of each constituent of the mix (coarse fraction, fine fraction, supplementary and V.M.A. material).

The mix combination will not be undertaken until the production of each constituent of the mix has progressed sufficiently for acceptable gradation ranges to be established.

Supplementary and V.M.A. material, when required, shall be tested and stockpiled at the plant site prior to mixing operations.

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~~920. 3.3 Mix Design (Cont'd)~~

Samples consisting of ~~50 kg~~**50kg** of each aggregate constituent of the mix shall be supplied by the Contractor, under the direction of the Engineer, and delivered to the Department's Testing Laboratory at least five working days prior to the commencement of mixing operations.

920. 3.3 Mix Design

The Department will then provide a mix design to ensure that the bituminous mixture has the required asphalt content and mix properties. The Marshall Mix design method will be used.

Any change in the gradation range or source of aggregate during the crushing operation may necessitate a new mix design prior to the use of the aggregate in the mixing operation.

For small projects, the Department may accept a mix design provided by the Contractor from an independent qualified laboratory. The mix design will be confirmed with a trial mix sample prior to placing the mix on the road.

3.4 Supplementary Material

Supplementary material is any approved material which when combined with the aggregate satisfies the crush count and the gradation requirements of this Specification. When supplementary material is required it shall be stockpiled separately. Processing by conveyor and screen may be required prior to stockpiling to improve its gradation and to facilitate testing.

Supplementary material shall be added uniformly and fed separately, immediately prior to the aggregate entering either the mixing plant or the crusher.

Supplementary material will be considered an incidental operation to Bituminous Pavement.

3.5 V.M.A. Additive Material

V.M.A. Additive Material is:

- ~~a)~~—any approved material, having a minimum of 50% passing a ~~425 um~~**425um** sieve, which improves the V.M.A. of either **a gravel or limestone mixture**;
- ~~b)~~—any approved limestone dust, having a minimum of 80% passing a ~~4.75 mm~~**75mm** sieve, which reduces the V.M.A. when added to **a gravel mixture**.

V.M.A. additive material for other than the final lift will be approved on the basis of the mix design. V.M.A. additive material for final lift will be approved on the basis of tests of top lift bituminous mix placed in lower lifts for test sections of approximately one kilometer.

Other than V.M.A. additive material required for trials, V.M.A. additive material shall not be hauled to the plant site until tested in the mix and approved for use.

Screening, if required, and testing of V.M.A. additive material will be undertaken at the source prior to hauling. The Contractor shall pass the V.M.A. additive material uniformly via a conveyor belt so as to provide representative samples for testing.

V.M.A. additive material shall be added uniformly and fed separately at the mixing plant.

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~~920. 3.5 V.M.A. Additive Material (Cont'd)~~

The supply of V.M.A. additive material will be considered as an incidental operation to Bituminous Pavement.

3.6 Virgin Aggregate for Recycled Bituminous Material

The gradation of the blended virgin aggregate used in recycled bituminous material will be as specified by the Engineer, based on the mix design. The gradation shall fall within the ranges for the Class of bituminous pavement specified, except that the percentage passing the ~~75-um~~**75um** sieve shall not exceed 5%.

920. 3.7 Aggregate from Reclaimed Asphalt Pavement (R.A.P.)

Reclaimed asphalt pavement aggregate for recycled bituminous material may be produced by milling or crushing. When crushed, the maximum particle size shall be as specified in the Special Provisions.

920. 5 PRODUCTION METHODS

5.1 General

When differently graded aggregates obtained from one or more sources are to be blended to form one aggregate, they shall be added uniformly and fed separately to the crusher using controlled belt feeders.

The Contractor shall split Class "A", Class "B" and Class "D" aggregate for bituminous pavement into a coarse fraction and a fine fraction. The split shall occur at the time of production unless a delayed split is authorized in writing by the Engineer.

When producing a split aggregate, up to 50% of the fine fraction may be screened. The balance of the fine fraction must be produced by a crushing operation. The crushed fines shall not have more than 90% passing the ~~4.75-mm~~**75mm** sieve and a minimum crush count of 15%. (One freshly fractured face).

Bituminous fines will be defined as the percentage of material in the coarse and fine fractions of the split aggregate which will pass the ~~4.75-mm~~**75mm** sieve.

The requirement for split aggregate may be waived when;

- ~~a)~~ Class "C" bituminous aggregate is produced;
- ~~b)~~ The contract quantity of bituminous aggregate to be produced by a batch plant or a continuous mix plant is less than 4 000 tonnes.

5.2 Split Aggregate

The method and the screen size used to split the aggregate shall be as approved by the Engineer. Samples of coarse aggregate taken at the time of production shall contain not more than 40-percent% passing a 4.75-mm75mm sieve.

Prior to the stockpiling of the coarse and fine fractions, the Engineer will approve the gradation of each fraction, specify the need for supplementary material and V.M.A. additive material and advise the Contractor as to the estimated proportions of each to be used in the final blended aggregate.

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~~920. 5.2 Split Aggregate (Cont'd)~~

The Engineer will establish gradation ranges to govern the production of both the coarse and fine fractions. The gradation ranges will apply to each sieve size and will in general be determined by applying the following limits to the average gradation:

Percent passing 16-mm 16mm, 12.5-mm 5mm, 9.5-mm 5mm & 4.75-mm 75mm sieve	± 6
Percent passing a 2-mm & 425-um 2mm & 425um sieve	± 5
Percent passing a 180-um 180um sieve	± 3
Percent passing a 75-um 75um sieve	± 2

The coarse and fine fractions will be tested and approved prior to stockpiling.

920. 5.2 Split Aggregate

The Contractor shall construct new stockpiles if:

- ~~————~~Changes in the method or equipment used to process and separate the aggregate alter the established ranges,
- ~~————~~The nature of the aggregate source changes and new crushing or screening ranges are established,
- ~~————~~Any change in the aggregate source affects gradation or specific gravity.

5.3 Single Aggregate

This Section will apply when the requirements for split aggregate are waived.

Single aggregate material for bituminous pavement shall be crushed in one operation.

Prior to the stockpiling of single aggregate, the Engineer will approve the gradation of the crushed material, specify the need for supplementary material and V.M.A. additive material and advise the Contractor as to the estimated proportions of each to be used in the final blended aggregate. V.M.A. additive material, if required, shall be stockpiled separately at the plant site.

There will be no requirement for V.M.A. in bituminous aggregate being produced for maintenance patching.

The Engineer will establish gradation ranges to govern the production of single aggregate material. The gradation ranges will apply to each sieve size and will be determined by applying the following limits to the average gradation:

Percent passing 16 mm 16mm , 12.5 mm 5mm , 9.5 mm 5mm & 4.75 7.5 mm sieve	± 6
Percent passing a 2 mm & 425 um 2mm & 425um sieve	± 5
Percent passing a 180 um 180um sieve	± 3
Percent passing a 75 um 75um sieve	± 2

Material will be tested and approved prior to stockpiling.

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The Contractor shall construct a new stockpile if:

- ~~•~~ Changes in the method or equipment used to process the aggregate alter the established ranges,
- ~~•~~ The nature of the aggregate source changes and a new crushing range is established,
- ~~•~~ Any change in the aggregate source affects gradation or specific gravity.

920. 6 BLENDED

Notwithstanding proportions estimated during production;

- ~~(a)~~ the final proportions for blending coarse and fine aggregate, supplementary material and V.M.A. additive will be based on the mix design, as adjusted during field paving operations.
- ~~(b)~~ the final proportions for blending single aggregate, supplementary material and V.M.A. additive will be based on the mix design, as adjusted during field paving operations.

920. 7 STOCKPILING AGGREGATE

The Specifications for Stockpiling Aggregate will be applicable in the construction of split or single aggregate stockpiles.

920. 8 TESTING

Aggregate for bituminous pavement will be subject to testing by the Engineer at the time the material is being produced and at the plant site. Before hauling, the Contractor shall place the processed aggregate in a stockpile separate from the surge pile until satisfactory production tests

have been completed. Rejected material shall be immediately moved either to the vicinity of the feed end of the crusher for reprocessing or to an area completely removed from any approved aggregate.

8.1 Testing Previously Prepared Aggregate

The Contractor may use aggregate for bituminous pavement that was prepared and stockpiled not under the terms of the Contract. In this event, the Contractor shall, unless otherwise permitted, pass material uniformly over a belt to provide representative samples for testing. On the basis of the tests, the Engineer may permit the Contractor to use the aggregate.

8.2 Sampling Device

Crushers shall be equipped with an approved mechanical sampling device for obtaining samples off the main delivery belt. **Crushers operating secondary delivery belts feeding in excess of 150 tonnes per hour shall require a second approved mechanical sampling device. Secondary delivery belts feeding less than 150 tonnes per hour will require the Contractor to supply either a "V" board or a second approved mechanical sampling device.**

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920. 9 METHOD OF MEASUREMENT

9.1 V.M.A. Additive Material

The quantity of V.M.A. additive material will be the number of tonnes used or the number of tonnes ordered by the Engineer, whichever is greater. If the Contractor elects not to weigh the material, the quantity will be the weight of V.M.A. additive material computed from the field adjusted mix design, corrected to include moisture as determined by plant checks.

Measured distances will be based on the shortest possible route as determined by the Engineer using Provincial Roads and Provincial Trunk Highways where practical. Distances will be measured to the nearest ~~0.4 km~~ **1 km**.

9.2 V.M.A. Additive Material Haul

The quantity of V.M.A. Additive Material Haul in tonne kilometres will be the quantity of V.M.A. Additive Material, in tonnes, multiplied by the distance in kilometres from the source of supply to the location of the mixing plant where the V.M.A. additive material will be added.

920. 11 BASIS OF PAYMENT

11.1 V.M.A. Additive Material

V.M.A. additive material supplied will be considered as an incidental operation to Bituminous Pavement. In the event V.M.A. additive material is initially approved, processed and subsequently found to be unsuitable, the Contractor will be compensated for his processing cost through the applicable payment rate detailed under the Provisions for Interim Payments No. 140.

920. 11.2 V.M.A. Additive Material Haul

The Contractor will be partially compensated for V.M.A. Additive Material Haul based on **the hauling rates posted in the most current edition of the Manitoba Heavy Construction Association equipment rental rate guide.**

Sixty-five percent of the calculated total haul cost, (Base Rate plus hauling costs) will be paid to the Contractor by progress payment, which amount will be payment in full for hauling the V.M.A. Additive Material to the plant site and performing all operations pertaining or incidental thereto.

A premium will be paid for material from a new V.M.A. source located within 40 kilometres of the plant site. The premium will be paid based on a proportional sliding scale starting at \$2.50/tonne at 0 kilometre haul and ending at \$0.50/tonne at 40 kilometres haul. A new source will be defined as any source located outside a 5 km radius of a known source.

On projects where the quantity of bituminous pavement is less than ~~10 000~~ **10000t**, V.M.A. haul will not be paid for directly as it will be considered incidental to unit price for bituminous pavement.