



Minimum Tack Coat Spray Rates (Gallons per Square Yard) under Hot Mix Asphalt (Type A) and RHMA-G lifts

Caltrans Standard Specification Section 39-2.01A(3)(j) "Tack Coat" requires contractor submit minimum spray rate calculations required to achieve minimum residual rate requirements shown in Section 39-2.01C(3)(f) "Tack Coat". Contractor may use this table with chosen rate circled.

Emulsion types: SS1, SS1h, CSS1, CSS1h, QS1h, CQS1h, QS1 and CQS1 (see note 3)

HMA (Type A) or RHMA-G Over	Undiluted Original Emulsion	Diluted Emulsion 90/10 (1 to 9)	Diluted Emulsion 80/20 (1 to 4)	Diluted Emulsion 70/30 (1 to 2.33)	Diluted Emulsion 60/40 (1 to 1.5)	Diluted Emulsion 50/50 (1 to 1)
New HMA (between layers)	0.04 (see notes 1 and 4a)	0.04 (see notes 1 and 4b)	0.05 (see notes 1 and 4b)	0.06 (see notes 1 and 4b)	0.06 (see notes 1 and 4c)	0.08 (see note 4c)
Concrete pavement and existing asphalt concrete surfacing	0.06 (see notes 1 and 4a)	0.06 (see notes 1 and 4b)	0.07 (see note 4b)	0.08 (see note 4c)	0.09 (see note 4c)	0.11 (see note 4d)
Planed pavement	0.09 (see note 4a)	0.10 (see note 4b)	0.11 (see note 4c)	0.13 (see note 4c)	0.15 (see notes 2 and 4c)	0.18 (see notes 2 and 4d)

Note 1. Spray nozzles limit minimum application rates to approximately 0.05 gallons per square yard. Spray application rates closer to 0.10 gallons per square yard are recommended as they promote more even coverage. Dilution may be necessary to achieve even coverage.

Note 2. Use caution when the tack coat spray rate is above 0.15 gallons per square yard because of the possibility for tack coat puddling and tack coat runoff.

Note 3. As spray rates are "minimum", they are rounded up to the nearest 0.01 gallon per square yard. Calculated rates are based on volume at 60 degrees Fahrenheit and 57% binder residue. Any theoretical adjustment needed for a higher temperature is deemed negligible when determining minimum spray rates.

Note 4a. For QS1 and CQS1 type emulsions, add 0.01 gallons per square yard to the rate shown.

Note 4b. For QS1 and CQS1 type emulsions, add 0.02 gallons per square yard to the rate shown.

Note 4c. For QS1 and CQS1 type emulsions, add 0.03 gallons per square yard to the rate shown.

Note 4d. For QS1 and CQS1 type emulsions, add 0.04 gallons per square yard to the rate shown.



Minimum Tack Coat Spray Rates (Gallons per Square Yard) under Open Graded Friction Courses (OGFC) lifts

Caltrans Standard Specification Section 39-2.01A(3)(j) "Tack Coat" requires contractor submit minimum spray rate calculations required to achieve minimum residual rate requirements shown in Section 39-2.01C(3)(f) "Tack Coat". Contractor may use this table with chosen rate circled.

Emulsion types: SS1, SS1h, CSS1, CSS1h, QS1h, CQS1h, QS1 and CQS1(see note 3)

OGFC Over	Undiluted Original Emulsion	Diluted Emulsion 90/10 (1 to 9)	Diluted Emulsion 80/20 (1 to 4)	Diluted Emulsion 70/30 (1 to 2.33)	Diluted Emulsion 60/40 (1 to 1.5)	Diluted Emulsion 50/50 (1 to 1)
New HMA (between layers)	0.06 (see notes 1 and 4a)	0.06 (see notes 1 and 4b)	0.07 (see notes 1 and 4b)	0.08 (see note 4c)	0.09 (see note 4c)	0.11 (see note 4d)
Concrete pavement and existing asphalt concrete surfacing	0.09 (see note 4a)	0.10 (see note 4b)	0.11 (see note 4c)	0.13 (see note 4c)	0.15 (see notes 2 and 4c)	0.18 (see notes and 4d)
Planned pavement	0.11 (see note 4a)	0.12 (see note 4b)	0.14 (see note 4b)	0.16 (see notes and 4b)	0.18 (see notes 2 and 4c)	0.22 (see notes 2 and 4c)

Note 1. Spray nozzles limit minimum application rates to approximately 0.05 gallons per square yard. Spray application rates closer to 0.10 gallons per square yard are recommended as they promote more even coverage. Dilution may be necessary to achieve even coverage.

Note 2. Use caution when the tack coat spray rate is above 0.15 gallons per square yard because of the possibility for tack coat puddling and tack coat runoff.

Note 3. As spray rates are "minimum", they are rounded up to the nearest 0.01 gallon per square yard. Calculated rates are based on volume at 60 degrees Fahrenheit and 57% binder residue. Any theoretical adjustment needed for a higher temperature is deemed negligible when determining minimum spray rates.

Note 4a. For QS1 and CQS1 type emulsions, add 0.01 gallons per square yard to the rate shown.

Note 4b. For QS1 and CQS1 type emulsions, add 0.02 gallons per square yard to the rate shown.

Note 4c. For QS1 and CQS1 type emulsions, add 0.03 gallons per square yard to the rate shown.

Note 4d. For QS1 and CQS1 type emulsions, add 0.04 gallons per square yard to the rate shown.



Minimum Tack Coat Spray Rates (Gallons per Square Yard)

For Undiluted Rapid Setting (RS) Emulsions

Placed under Hot Mix Asphalt (Type A) or RHMA-G (see note 1)

Caltrans Standard Specification Section 39-2.01A(3)(j) "Tack Coat" requires contractor submit minimum spray rate calculations required to achieve minimum residual rate requirements shown in Section 39-2.01C(3)(f) "Tack Coat". Contractor may use this table with chosen rate circled.

Undiluted Rapid Setting Emulsion types:

RS1, CRS1, RS2, CRS2, PMRS2, PMCRS2, PMRS2h and PMCRS2h

HMA (Type A) or RHMA-G Over	RS1 (55% minimum residue)	CRS1 (60% minimum residue)	RS2 (63% minimum residue)	CRS2 (65% minimum residue)	PMRS2, PMCRS2, PMRS2h or PMCRS2h (65% minimum residue)
New HMA (between layers)	0.06	0.05	0.05	0.05	0.04
Concrete pavement and existing asphalt concrete surfacing	0.08	0.07	0.07	0.07	0.05
Planned pavement	0.11	0.10	0.10	0.10	0.07

Note 1. As spray rates are "minimum", they are rounded up to the nearest 0.01 gallon per square yard. Calculated rates are based on volume at 60 degrees Fahrenheit and the minimum binder residue shown for each type of rapid setting binder. Any theoretical adjustment needed for a higher temperature is deemed negligible when determining minimum spray rates.



Minimum Tack Coat Spray Rates (Gallons per Square Yard)
For Undiluted Rapid Setting (RS) Emulsions
Placed under Open Graded Friction Courses (OGFC) (see note 1)

Caltrans Standard Specification Section 39-2.01A(3)(j) "Tack Coat" requires contractor submit minimum spray rate calculations required to achieve minimum residual rate requirements shown in Section 39-2.01C(3)(f) "Tack Coat". Contractor may use this table with chosen rate circled.

Undiluted Rapid Setting Emulsion types:
RS1, CRS1, RS2, CRS2, PMRS2, PMCRS2, PMRS2h and PMCRS2h

OGFC Over	RS1 (55% minimum residue)	CRS1 (60% minimum residue)	RS2 (63% minimum residue)	CRS2 (65% minimum residue)	PMRS2, PMCRS2, PMRS2h or PMCRS2h (65% minimum residue)
New HMA (between layers)	0.08	0.07	0.07	0.07	0.05
Concrete pavement and existing asphalt concrete surfacing	0.11	0.10	0.10	0.10	0.07
Planned pavement	0.13	0.12	0.12	0.11	0.08

Note 1. As spray rates are "minimum", they are rounded up to the nearest 0.01 gallon per square yard. Calculated rates are based on volume at 60 degrees Fahrenheit and the minimum binder residue shown for each type of rapid setting binder. Any theoretical adjustment needed for a higher temperature is deemed negligible when determining minimum spray rates.



Example Calculation for Engineers Estimate of Tack Coat, Item Code 397005 (tons)

- Determine total gallons of “undiluted emulsion” required.
 - Assume HMA layers of a single type of HMA of 0.30-foot-thick or greater will be placed in lifts no less than 0.15 foot thick.
- Divide total gallons of “undiluted emulsion” by 240 gallons per ton
- Add 10% to account for potential increases above minimum application rates and vertical faces.

Example: Determine tons of Tack Coat required for Engineers Estimate.

Assumptions:

- 1) 10 miles of 40' wide highway (2 each 12-foot lanes, 2 each 8-foot shoulders),
- 2) Cold plane existing OGFC. Existing OGFC extends 1-foot past edge of traveled way (ETW).
- 3) Place a 0.30-foot thick layer of HMA (Type A) and a 0.15-foot thick layer of RHMA-G over the full width. Place a 0.10-foot thick layer of OGFC 1' past ETW. Per directions above, assume the contractor will break the 0.30-foot layer of HMA (Type A) into two each 0.15-foot thick lifts, and that each will require a tack coat.

Surface Tack Coat to be applied to.	(A) Length (feet)	(B) Width (feet)	(C) = (A x B) ÷ 9 Area (square yards)	(D) Required minimum application rate of undiluted emulsion	(E) = C x D Gallons of undiluted emulsion (gallons)	(F) = (D x E) ÷ 240 Tons of undiluted emulsion @ 240 gallons per ton of emulsion
Cold planing existing OGFC, 1 + 12 + 12 + 1 = 26 feet	52,800	26	152,533	0.09	13,728	57.2
Existing outside shoulders, no planing, 40 – 26 = 14 feet	52,800	14	82,133	0.06	4,928	20.5
On first 0.15-foot lift of HMA (Type A). Note: HMA (Type A) layer is 0.30 feet. Standard Specifications allow layers 0.30-foot-thick or greater to be broken into lifts not less than 0.15 foot thick.	52,800	40	234,667	0.04	9,387	39.1
On second 0.15- foot lift of HMA (Type A)/under RHMA-G	52,800	40	234,667	0.04	9,387	39.1
On RHMA-G under OGFC (from OGFC table)	52,800	26	152,533	0.06	9,152	38.1
Add 10% for potential increase in spray rates above minimum application rates						19.4

Total Estimate (Example), Item Code 397005 Tack Coat = 213 tons

For questions, contact Pete Spector, Caltrans, HQ Division of Construction 916-227-7306