

ALDOT-320-79
IN-LINE BLENDING OF ANTI-STRIP AGENT AT BITUMINOUS PLANT MIX
MANUFACTURING SITE

1. Scope

- 1.1. This procedure establishes the method and control of in-line blending of asphalt cement and anti-strip agent when the additive is introduced during the manufacture of bituminous plant mix.

2. Apparatus

- 2.1. Balance - The balance shall have a capacity of 5 kg or more and conform to AASHTO M-231, Class F.
- 2.2. Stop Watch - Graduated in seconds and accurate to ± 0.1 percent when checked over a 15 minute period.
- 2.3. Sample Container - Any open top, leak proof container with a minimum capacity of 2 gal (8 L).

3. In-Line Blending System

- 3.1. The position for the introduction of the anti-strip agent to the asphalt cement may be at any accessible point between A-A' shown in Figure I.

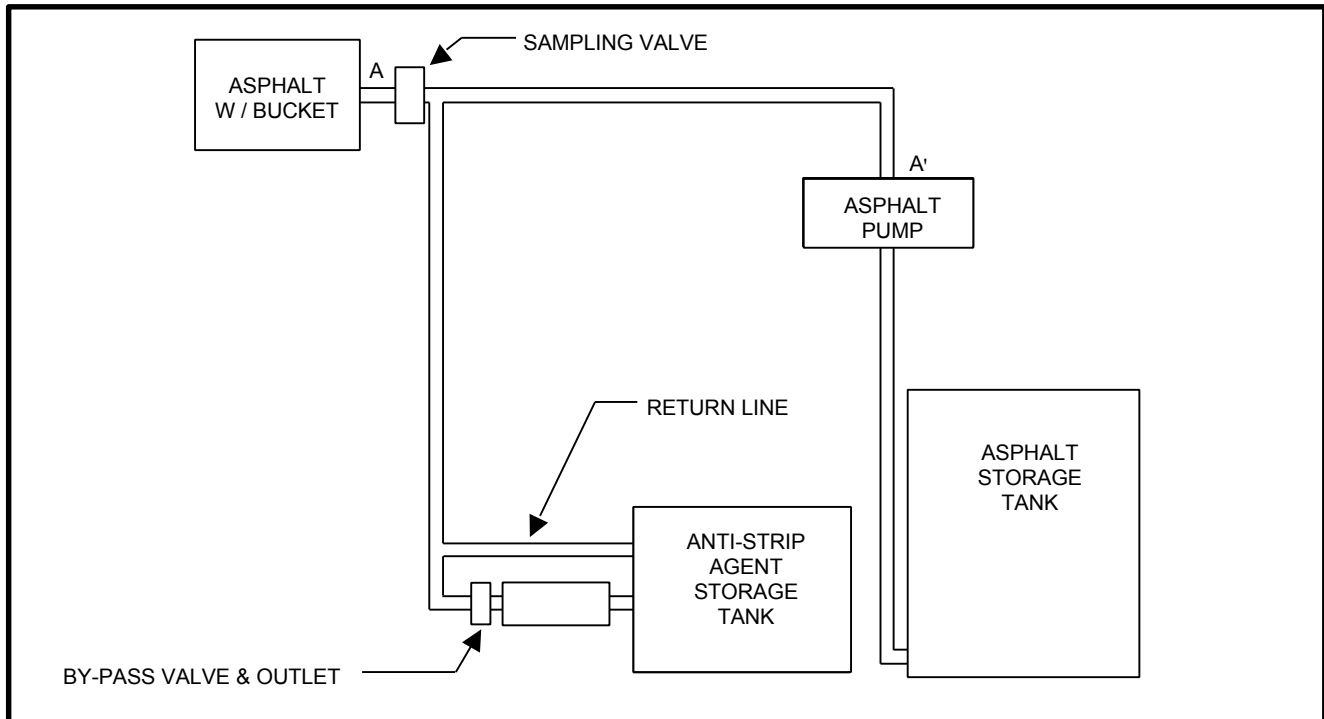


Figure I

Note 1: It may be advisable to install a check valve at the discharge end of the anti-strip agent line to prevent clogging of the line with asphalt cement when antistrip agent is not used in certain mixes.

- 3.2. The anti-strip agent pump must be interlocked with the asphalt cement controls in such manner that both start discharge simultaneously.

Note 2: For batch plants, the anti-strip agent must discharge at least 80 percent of the asphalt cement draw down operation time, but will not exceed the asphalt cement draw down time. For dryer drum and continuous mix plants, the anti-strip agent pump must be completely synchronized with the asphalt pump.

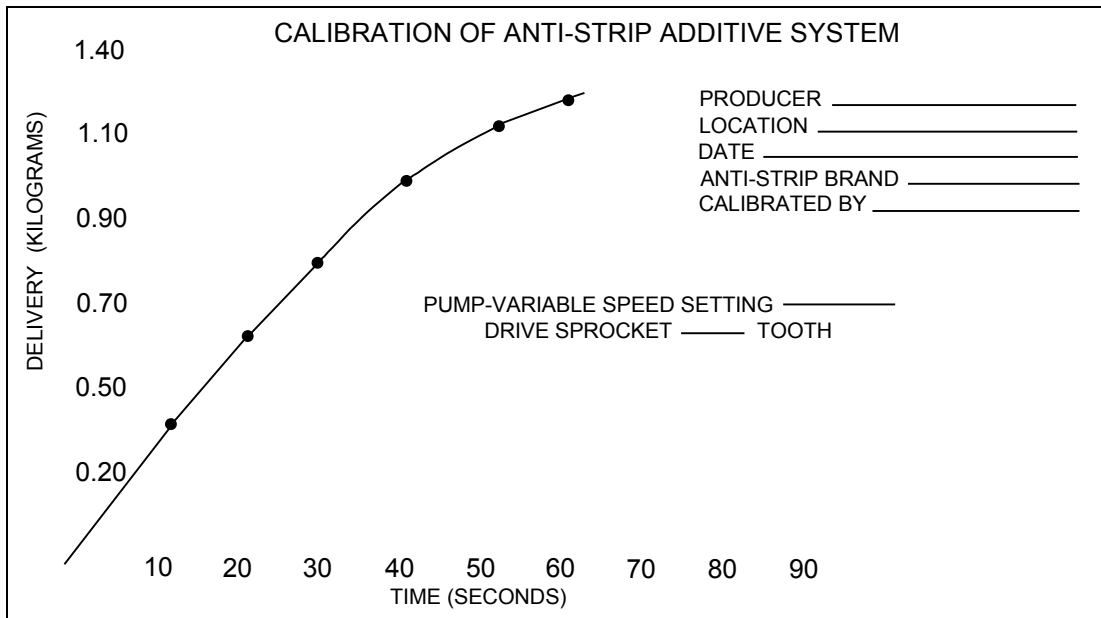


Figure II

4. Calibration Of Anti-Strip Agent - Pumping Time

Note 3: A bypass outlet must be installed on the anti-strip agent line for the purpose of collecting and measuring the flow of the anti-strip agent. (Figure I)

- 4.1. If the anti-strip agent pump has more than one speed setting such as variable speed selectors or drive tooth sprockets, determine speed setting or number of teeth on drive sprocket and record.
- 4.2. Position sample container under the anti-strip agent bypass valve outlet.
- 4.3. Open bypass outlet valve.
- 4.4. Start anti-strip agent pump and stop watch simultaneously.
- 4.5. Run anti-strip agent pump for the smallest time interval selected and record time.
- 4.6. Allow all of the anti-strip agent to drain into the sample container, weigh the container and record the net weight collected.
- 4.7. Repeat steps 4.2 - 4.6 for at least three or more time intervals; for batch plants suggested time intervals 5 seconds, 10 seconds, 20 seconds, 60 seconds; for continuous mix and dryer drum plants 0.5 min., 1 min., 3 min., 5 min., 10 min.
- 4.8. Prepare calibration curve(s) with delivery rate plotted on vertical axis and time on horizontal axis. Example Figure II.

5. Control of Anti-Strip Agent

- 5.1. Specifications require the addition of 0.5 to 1.0 percent of an approved anti-strip agent by weight of the asphalt cement when certain types of coarse aggregates are being used.
- 5.2. The specified concentration rate of the anti-strip agent may vary ± 10 percent by weight.

Note 4: Consult the approved job-mix formula for the brand and concentration percent of the anti-strip agent.

6. Calculations

- 6.1. Determine amount of asphalt cement in lbs required per batch or per minute.
- 6.2. For batch plants the asphalt cement pumping time to nearest second will be required.
- 6.3. For dryer drum and continuous mix plants the weight in lbs of asphalt cement per minute will be required.
- 6.4. Multiply the determined amount of asphalt cement by the appropriate agent percent expressed as a decimal, to obtain the required amount of the anti-strip agent in lbs.
- 6.5. Multiply the product obtained in step 6.2 by the ± 10 percent tolerance expressed as a decimal.
- 6.6. From calibration curve, Figure II, determine if the required amount of anti-strip agent can be obtained during the required time period.
- 6.7. **Note 5:** If the required amount of anti-strip agent cannot be obtained, it will be necessary to adjust anti-strip pump in the direction required and repeat steps 4.1 - 4.8.
- 6.8. Example of calculations:

For batch plant - required 130 kg PG 67-22 / 15 seconds pumping time. Then add 0.5% by wt. Tyfo A-40 (anti-strip)

$$\begin{aligned}130 \times 0.005 &= 0.65 \text{ kg} \\0.65 \times 0.90 &= 0.585 \text{ kg} \\0.65 \times 1.10 &= 0.715 \text{ kg} \\0.80 \times 15 &= 12 \text{ Seconds}\end{aligned}$$

Range = 0.585- 0.715 kg / 15 seconds

Required at least 0.585 kg in 15 seconds and not more than 0.715 kg in 12 seconds.

For dryer drum or continuous mix plants required 275 kg AC-20 / min., $275 \times 0.005 = 1.375$ kg anti-strip agent / min., required tolerance = $1.375 \times .90 = 1.2375$, $1.375 \times 1.10 = 1.4027$ kg

Required anti-strip agent / minute = 1.2 - 1.5 kg

7. Reporting

- 7.1. Report results of step 6.5 on form BMT-16.
- 7.2. Attach work sheet(s) to Project Engineer's copy of BMT-16 for master files.