

Tack Coat

Problems and Solutions





110 Years



Oregon, Illinois





Asphalt Distributors



Asphalt Transports



Live Bottom Trailers



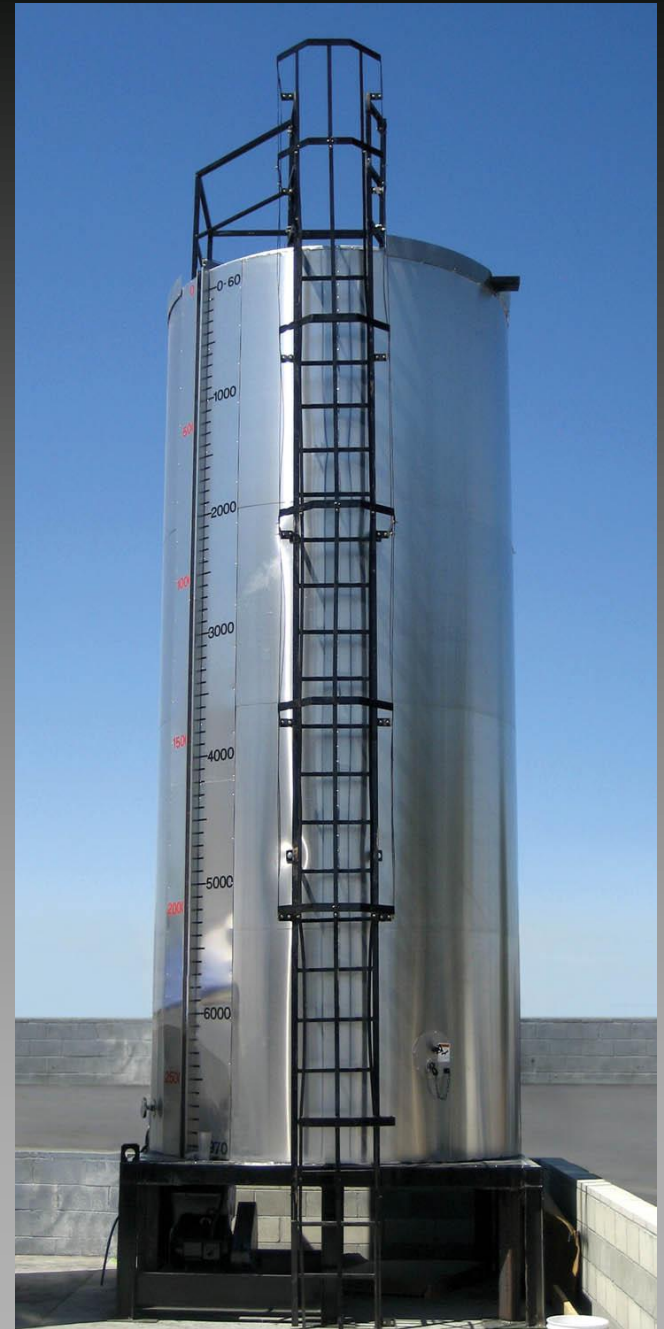
Chip Spreaders



Heavy Duty Trailers

E. D. Etnyre & Co. www.etnyre.com 800-995-2116 email: sales@etnyre.com

Asphalt Storage Tanks





TACK





FRESH
OIL

Successful Tack Coat

The Ultimate Goal:

Uniform, complete, and adequate coverage



Slippage Failure



Types of Tack Coat Failures

Delamination of overlay from underlying pavement



Construction Issues

Uniformity of the Tack Coat Application

Non-uniform Application



Proper Application



ASPHALT CEMENT

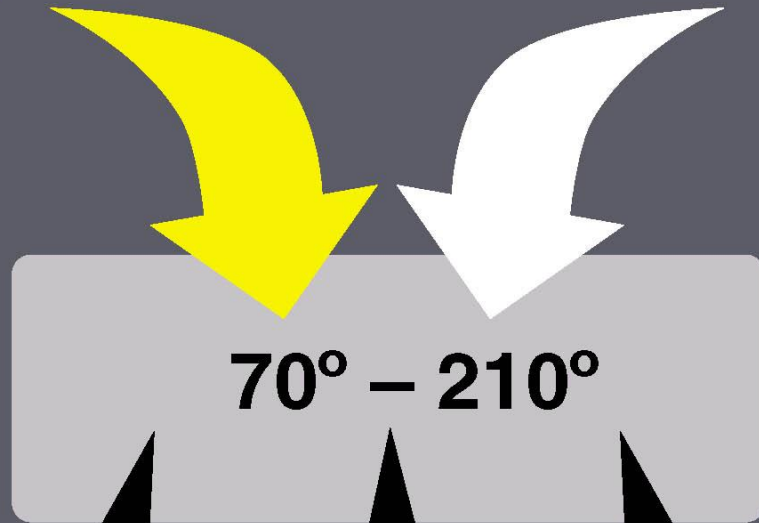
AC

325° – 400°

Multiple Grades

CUT BACKS

AC



FUEL

- DIESEL
- BENZENE
- NAPHTHA

SC, MC, RC

EMULSIONS

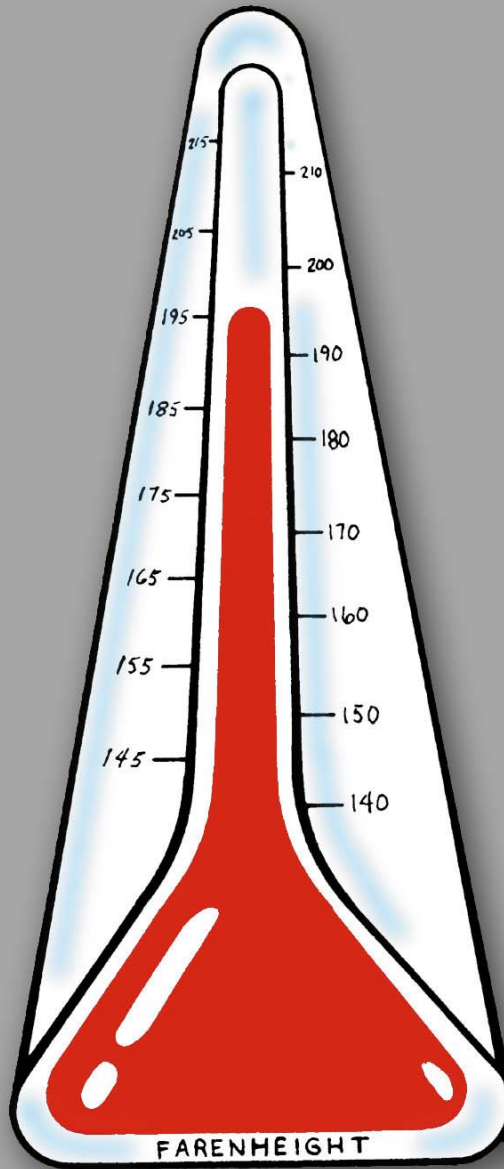
AC

WATER
SOAP



ANIONIC

CATIONIC



Residual Asphalt Binder in Emulsion

- Slow set emulsion = typically $\sim 2/3$ asphalt + $1/3$ water
- For tack coat – 67% asphalt + 33% water
- Generally, use this ratio for the majority of asphalt emulsions used as tack coat to result in a calculation of residual asphalt tack coat that is “close enough”
- Residual asphalt is critical: It is the amount of actual tack coat that remains on the pavement after water or solvents have evaporated

Calculation of Application Rate for Emulsion

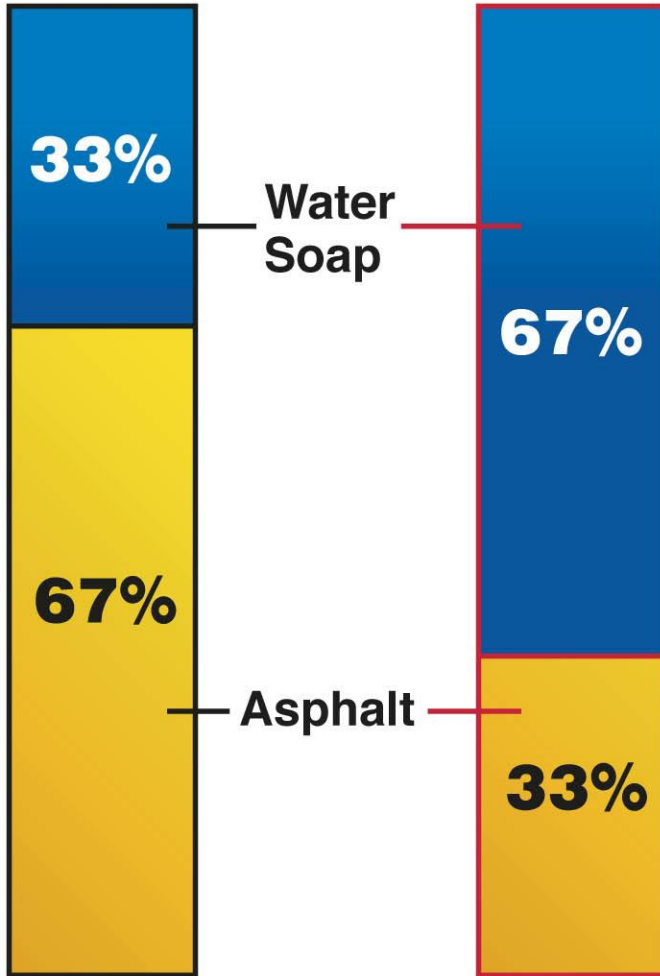
- Based on a ratio of 2/3 asphalt and 1/3 water, the required application amount of asphalt binder in an asphalt emulsion will be 1.5 times greater than the residual amount.
- Application Rate = 1.5 x Desire Residual Asphalt

Application Rate for Diluted Emulsion

- Based on a ratio of 1 part asphalt emulsion and 1 part additional water, a diluted asphalt emulsion will have a residual binder content of only $\frac{1}{3}$ of the weight of the emulsion
- So, you must apply three times (3x) more diluted emulsion than the desired residual tack coat rate

EMULSION

50/50



**SHOT
RATE**

RESIDUAL

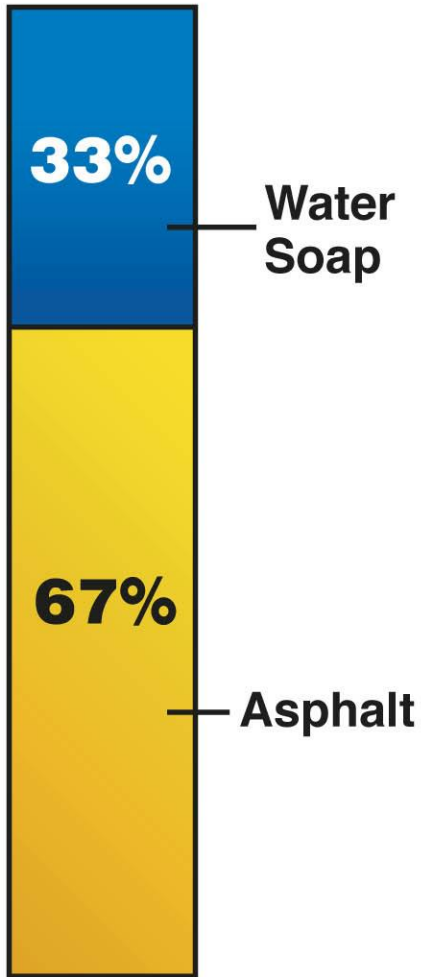
$$0.05 = 0.034$$

$$0.075 = 0.05$$

$$0.05 = 0.017$$

$$0.15 = 0.05$$

EMULSION



<u>SHOT RATE</u>		<u>RESIDUAL</u>
0.05	=	0.034
0.075	=	0.05

Example of Emulsion Break

Unbroken Emulsion After Breaking















Basic Functions

1. Fill the tank.
 2. Heat material in tank.
 3. Circulate material in tank.
 4. Circulate material in spray bar.
 5. Spray a metered amount of material.
 6. Handspray.
 7. Suck-back material from spray bar.
 8. Wash out.
 9. Transfer / unload.
-
-

Metering System

Four important features need to be considered:

- 1) Desired Application Rate - Gallon/Yard
 - 2) Forward Ground Speed - Feet Per Minute
 - 3) Asphalt Pump Output - Gallons Per Minute
 - 4) Width of Spray - Feet
-
-





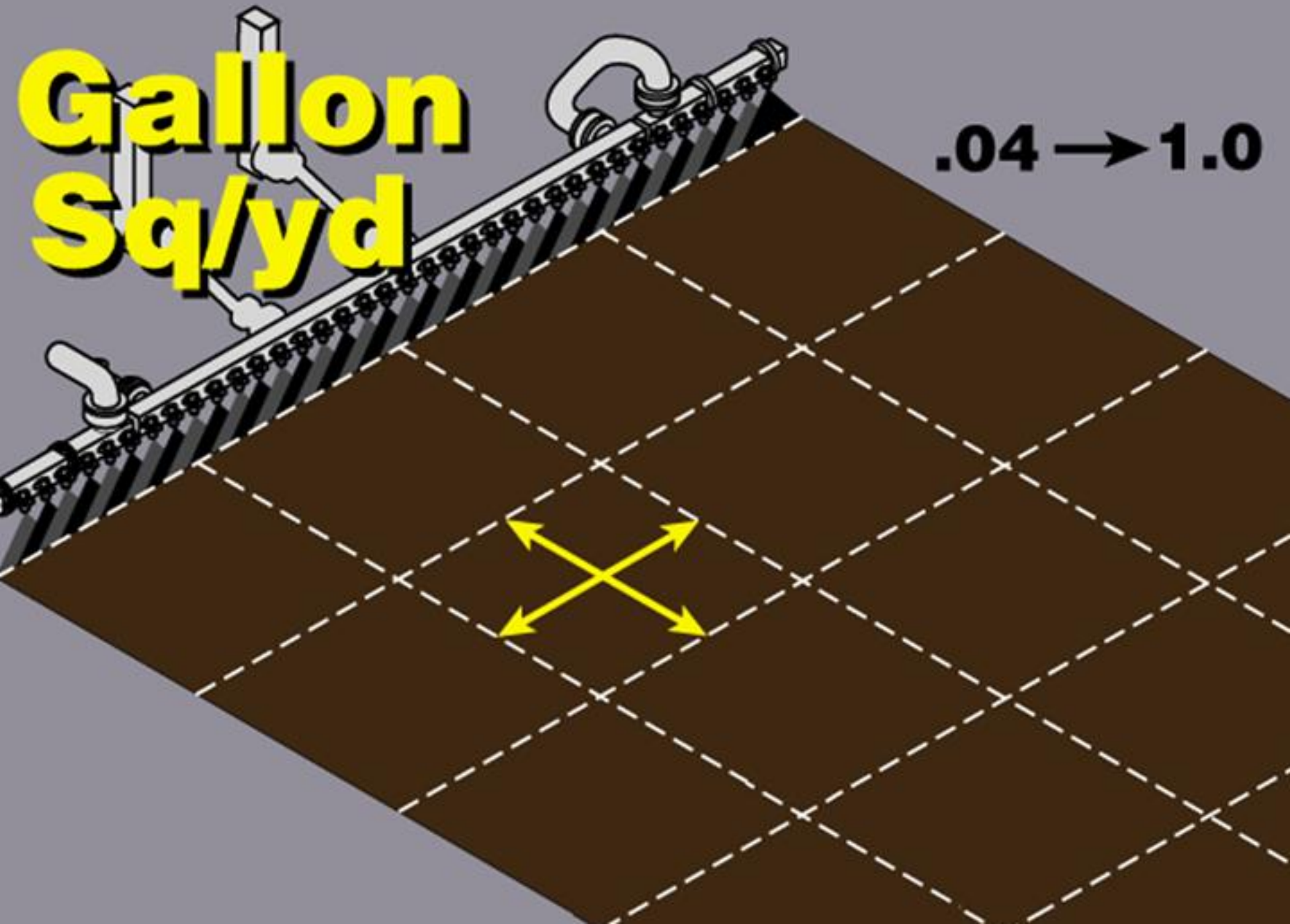
Calculated Eye

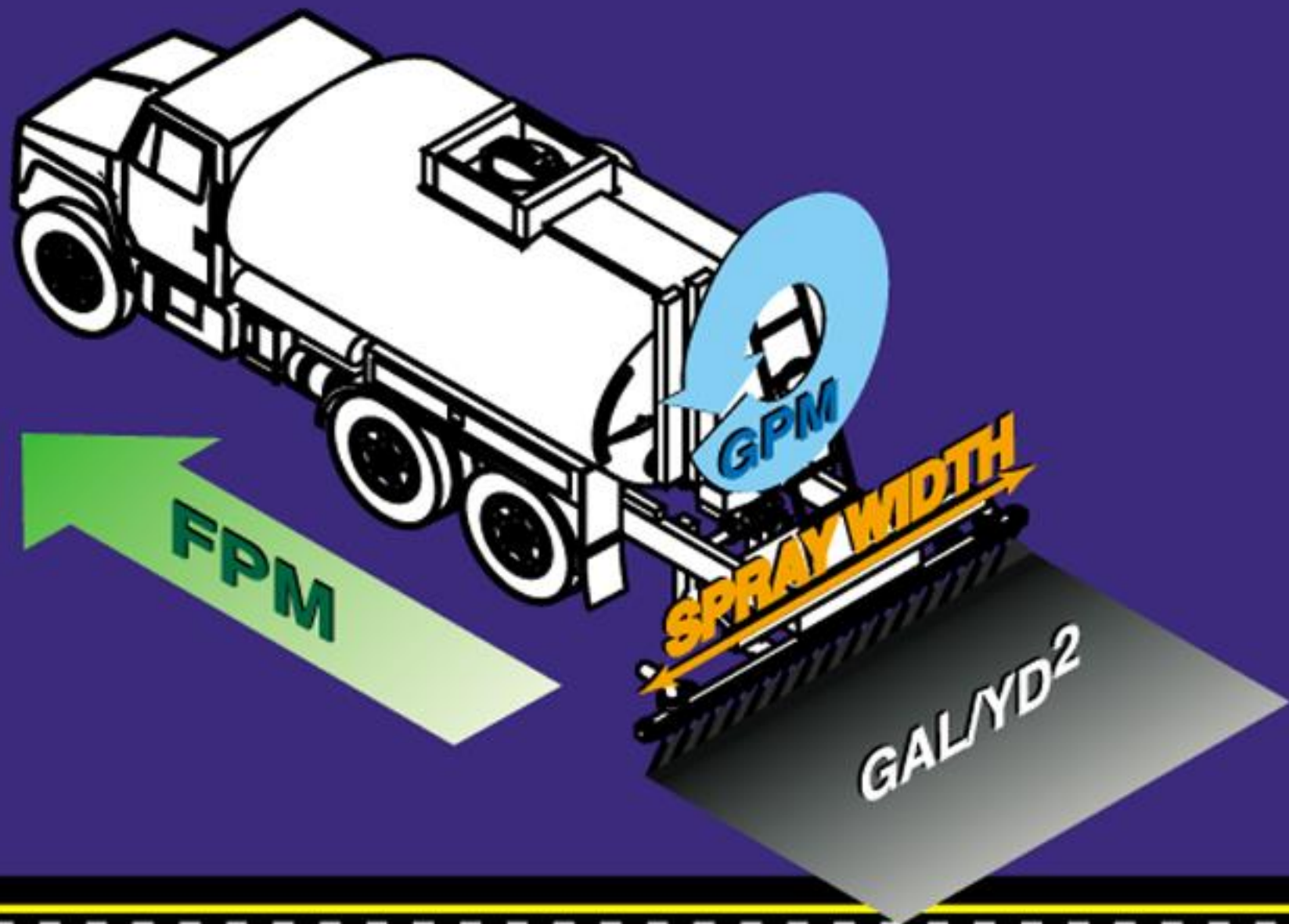




**Gallon
Sq/yd**

.04 → 1.0





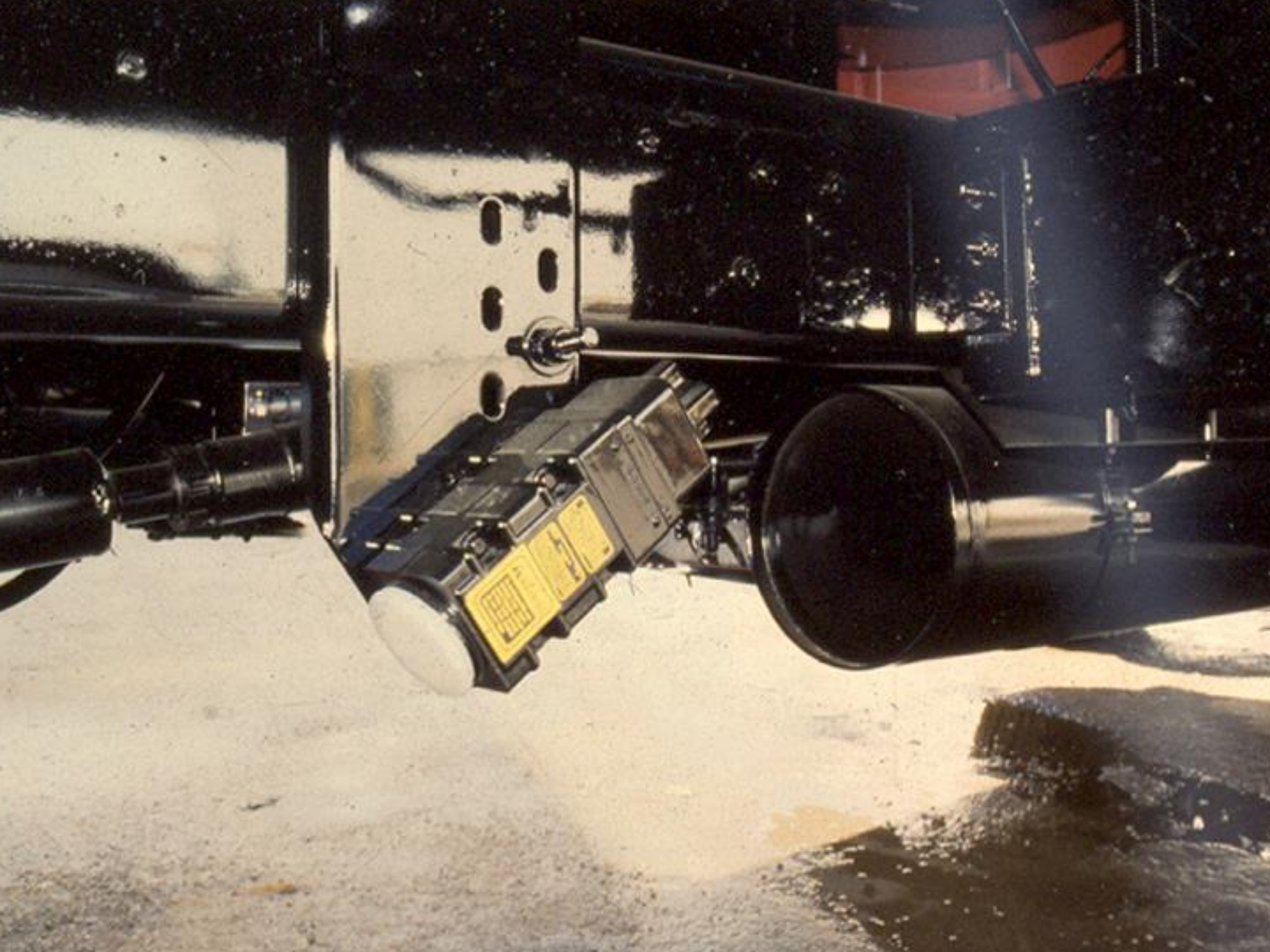
34-17



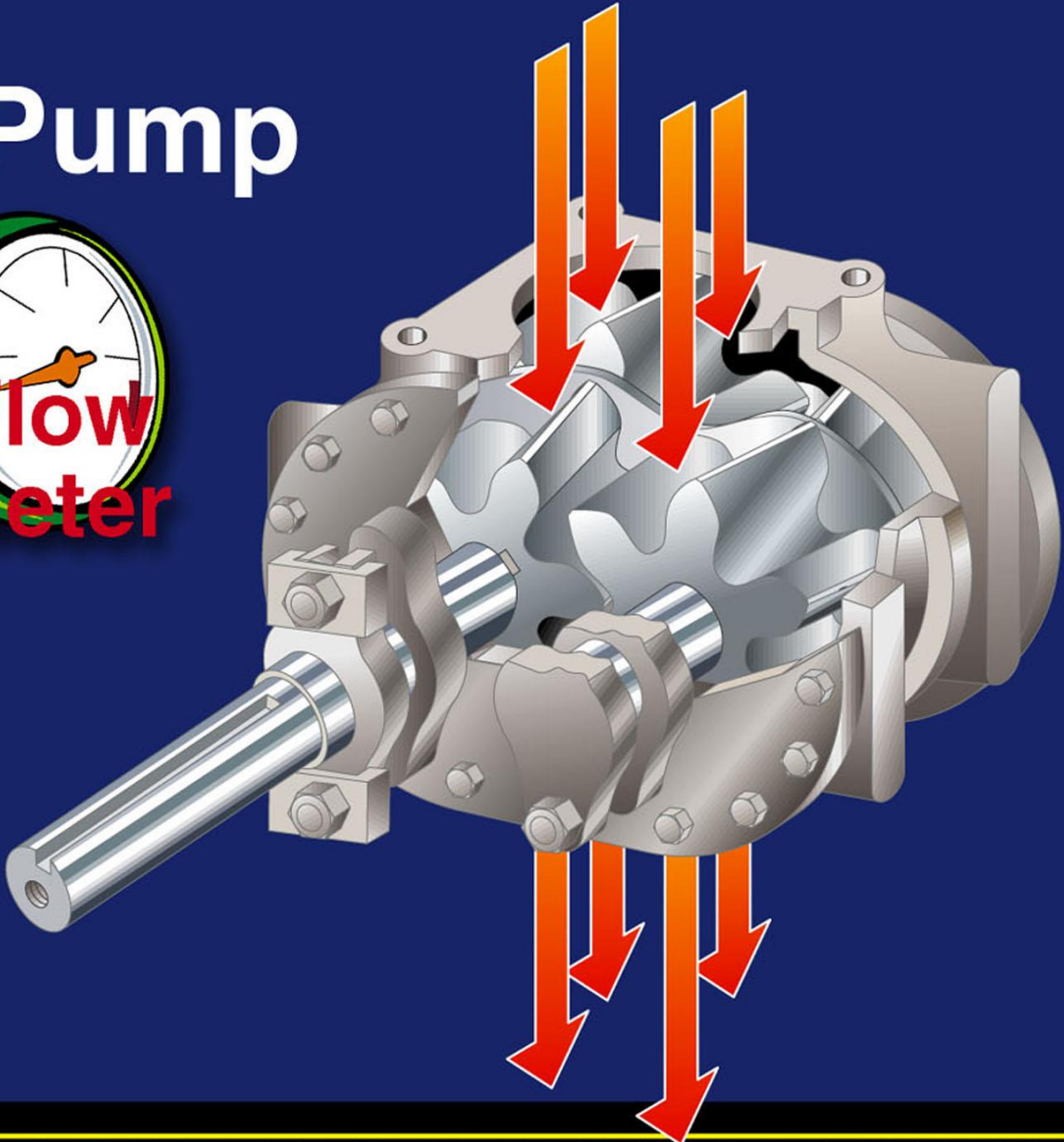
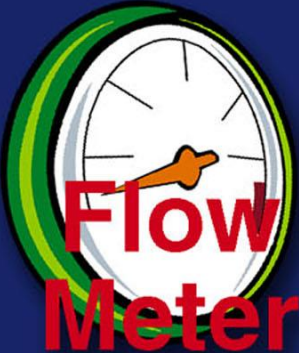
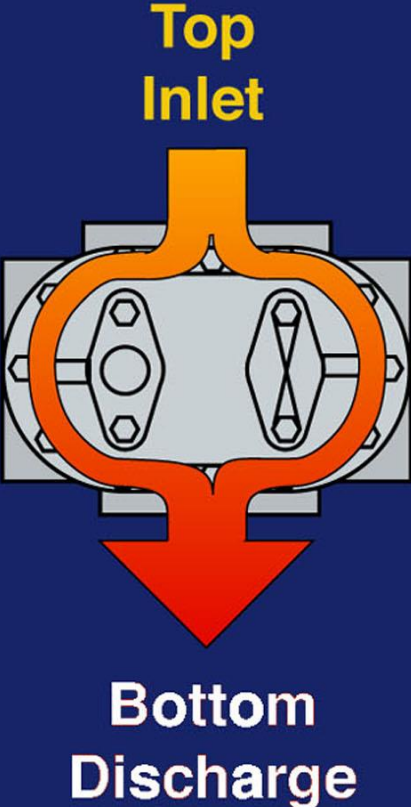
Small yellow and black label on the black control panel.

Red warning label with white text and symbols on the black control panel.





Asphalt Pump



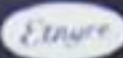


FPM

GPM







SPRAYBAR



POWER



.300 GAL/YD2
300 FPM 120 GPM

CIRCULATION RATE



CHANGE DISPLAY

MEMORY



RESET FEET METRES

RESET GALLONS LITRES

APPLICATION RATE



HYD OIL



BAR



MAIN BAR



TEMP

CENTERED

PTO

LOW TANK LEVEL



LEFT WING

RIGHT WING



WING FOLD



LIFT

FRONT

REAR SECTION



OFF BAR LATCH

LOW IN BAR



LOAD SUCK BACK



SUCKBACK



LOW HYD MOTOR



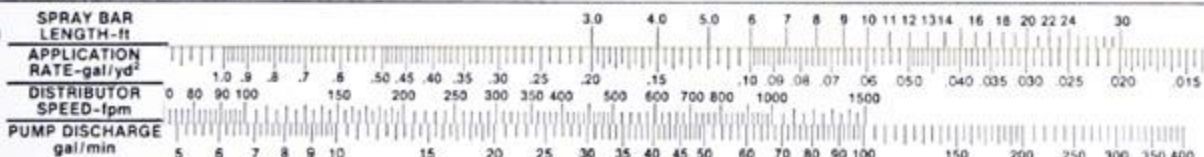
BT1 CONTROLS FRONT PANEL



BT1 CONTROLS REAR PANEL

DISTRIBUTOR SPEED

1. Set APPLICATION RATE at SPRAY BAR LENGTH.
2. Read DISTRIBUTOR SPEED at PUMP DISCHARGE.



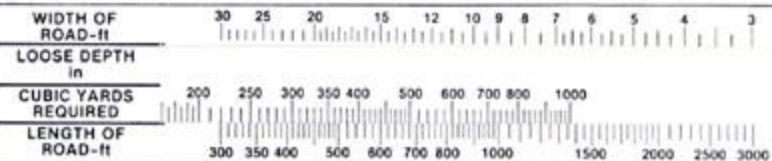
“Black-Topper” Computator

English

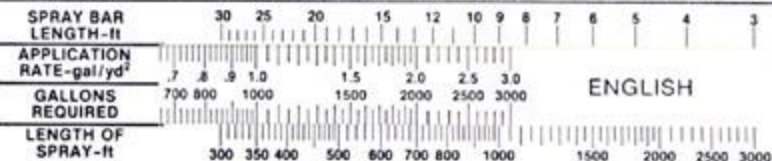
E.D. ETNYRE & CO.
Oregon Illinois 61061-9778
Phone: 800-995-2116 or 815-732-2116

AGGREGATE REQ'D

1. Set LOOSE DEPTH at WIDTH OF ROAD.
2. Read CUBIC YARDS REQUIRED at LENGTH OF ROAD.

**BINDER REQ'D**

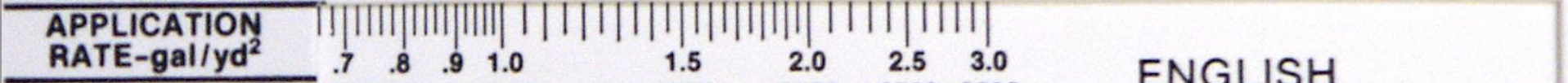
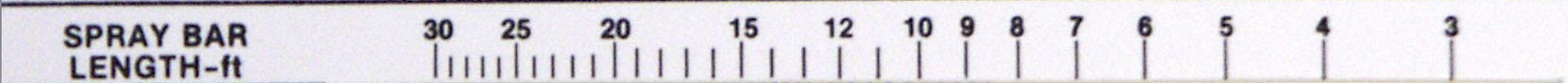
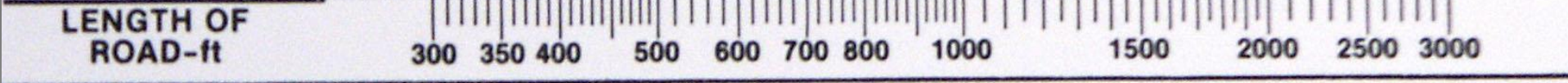
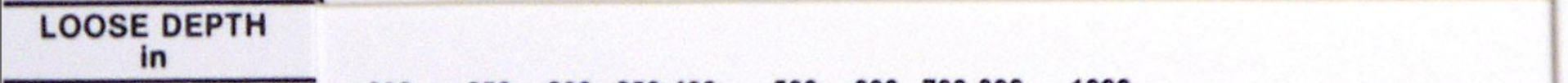
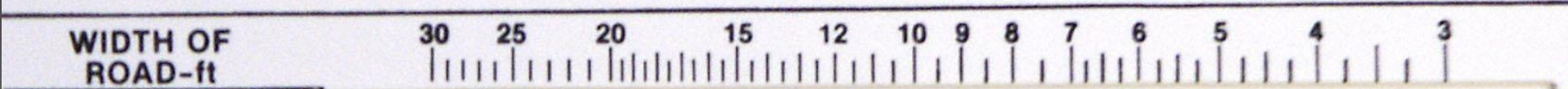
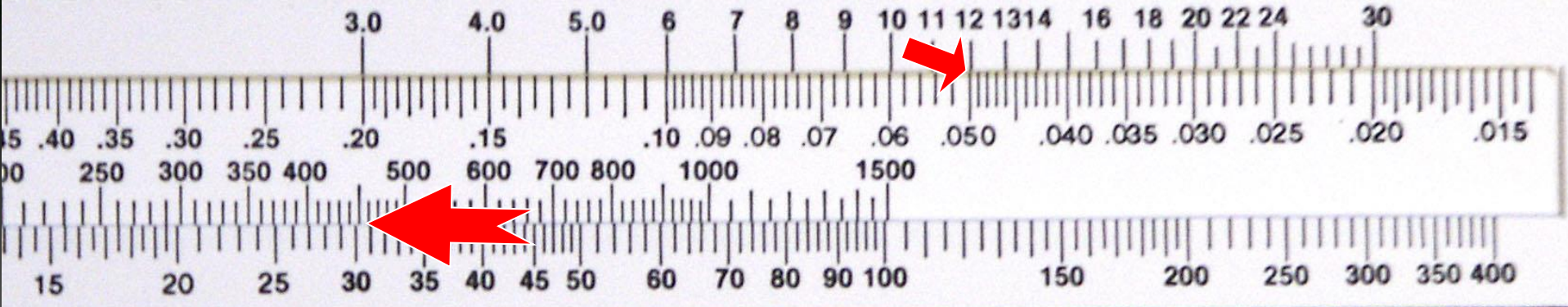
1. Set APPLICATION RATE at SPRAY BAR LENGTH.
2. Read GALLONS REQUIRED at LENGTH OF SPRAY.



ENGLISH

33904.08

A-1113-94

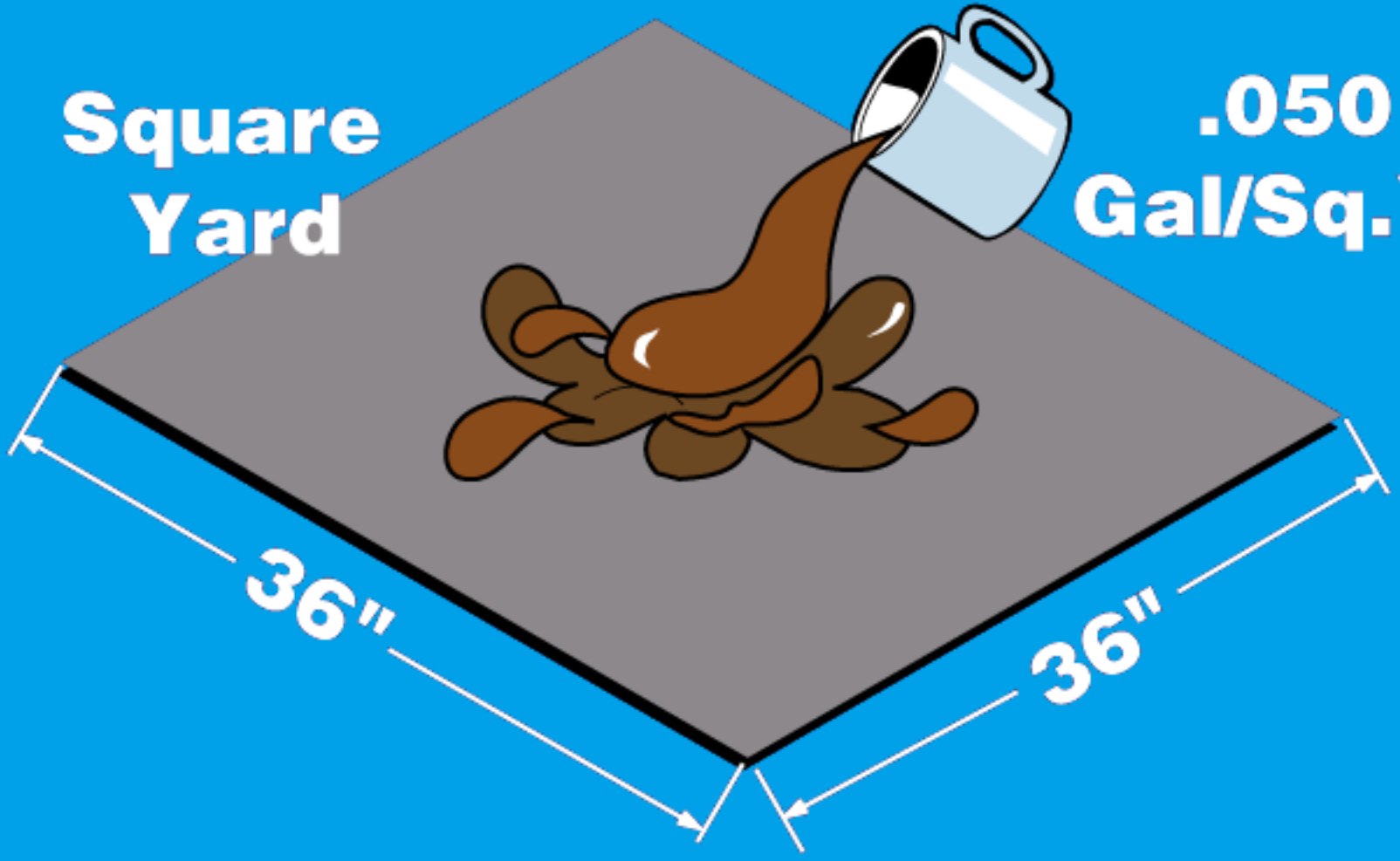


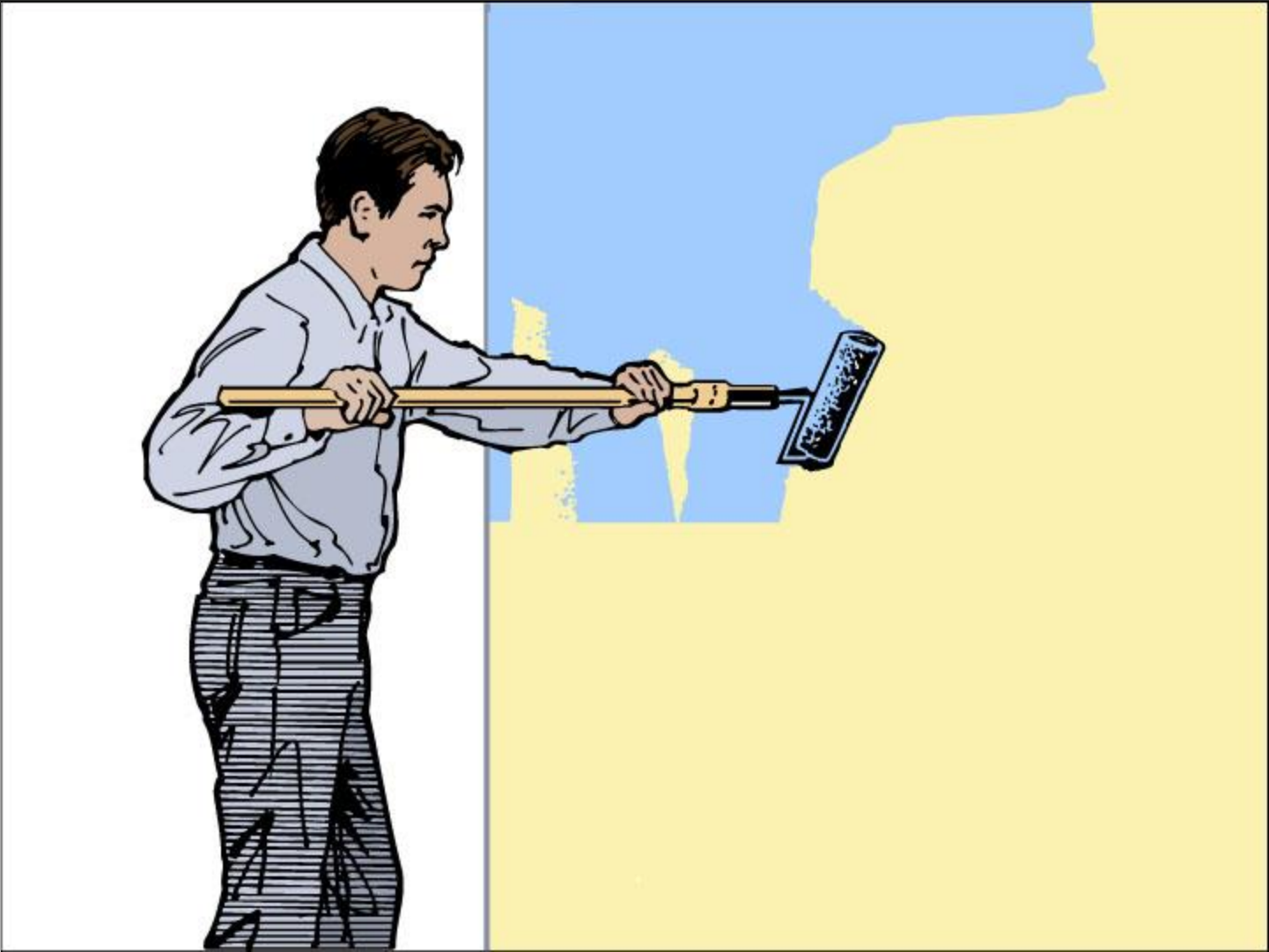
ENGLISH

**6.4
Ounces**

**Square
Yard**

**.050
Gal/Sq.Yd.**





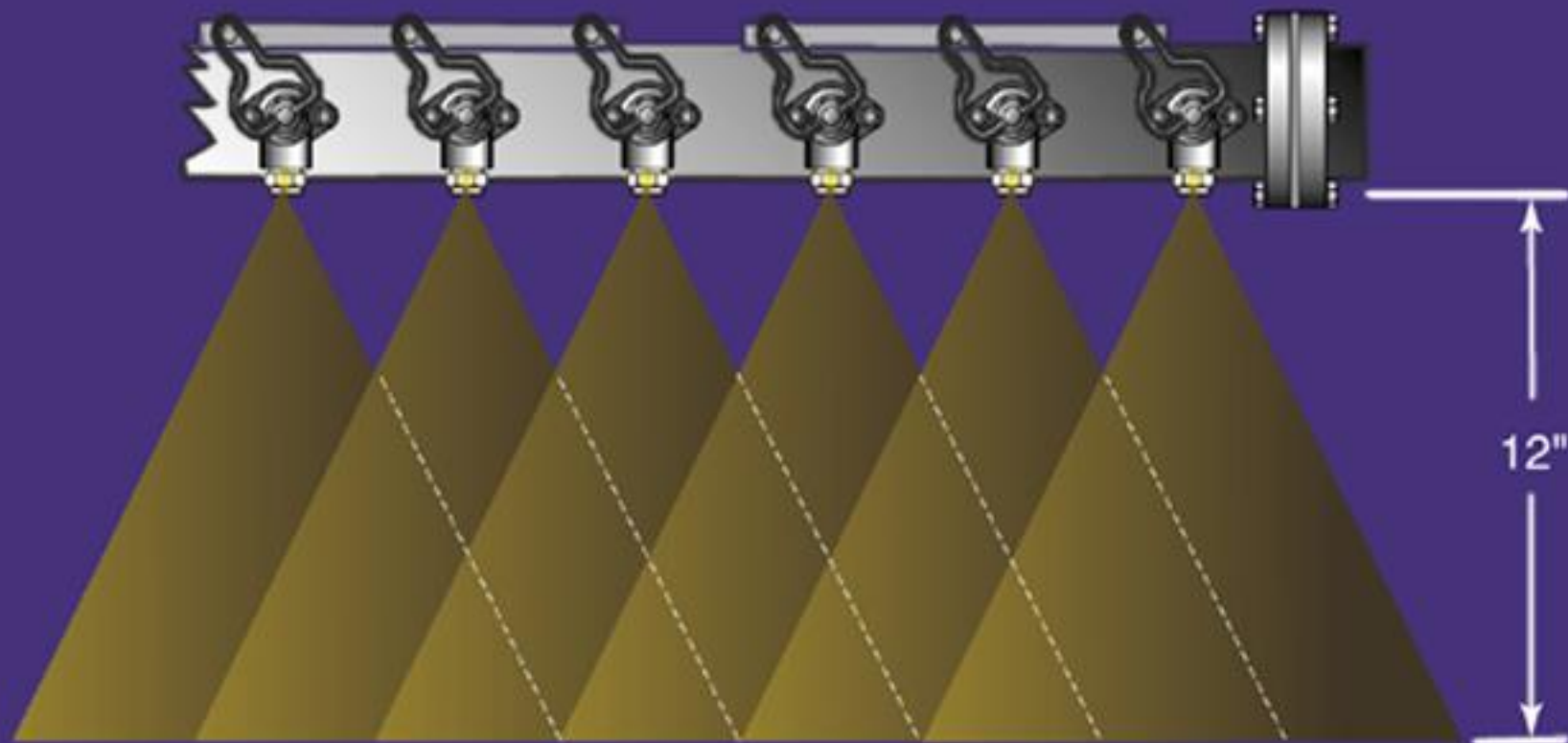


ETNYRE
NON-DRIP
SPRAY-BAR

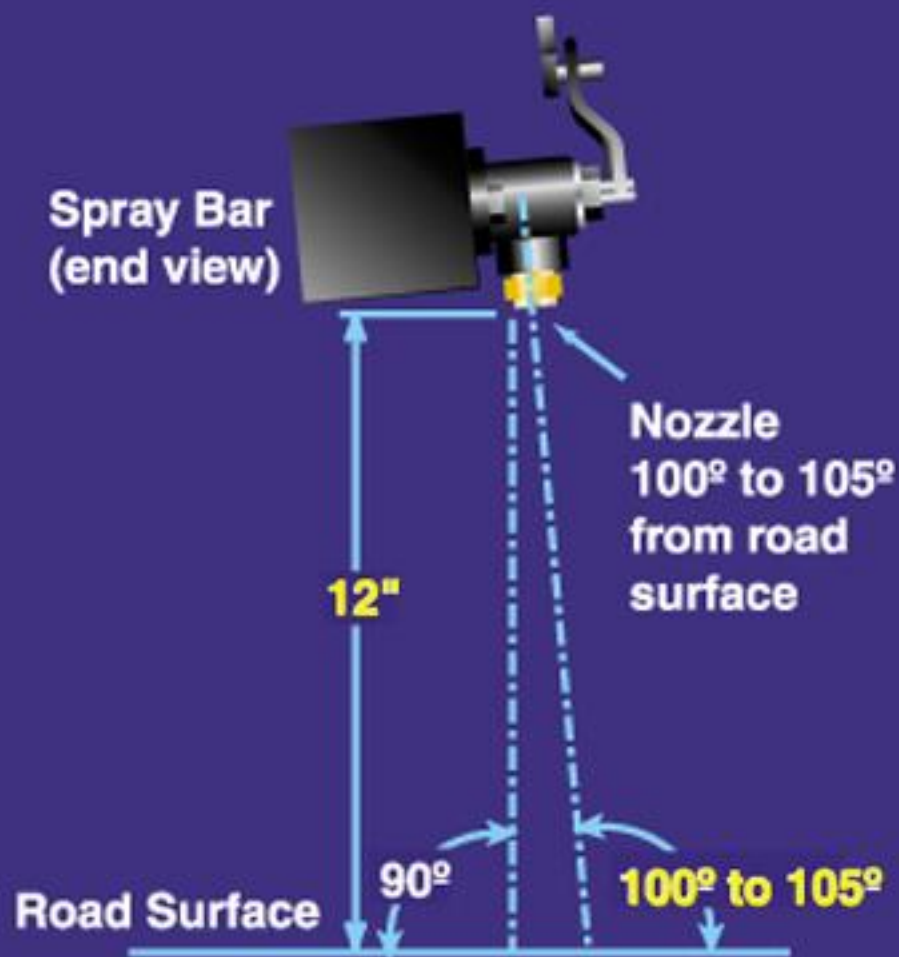
SPRAY BAR



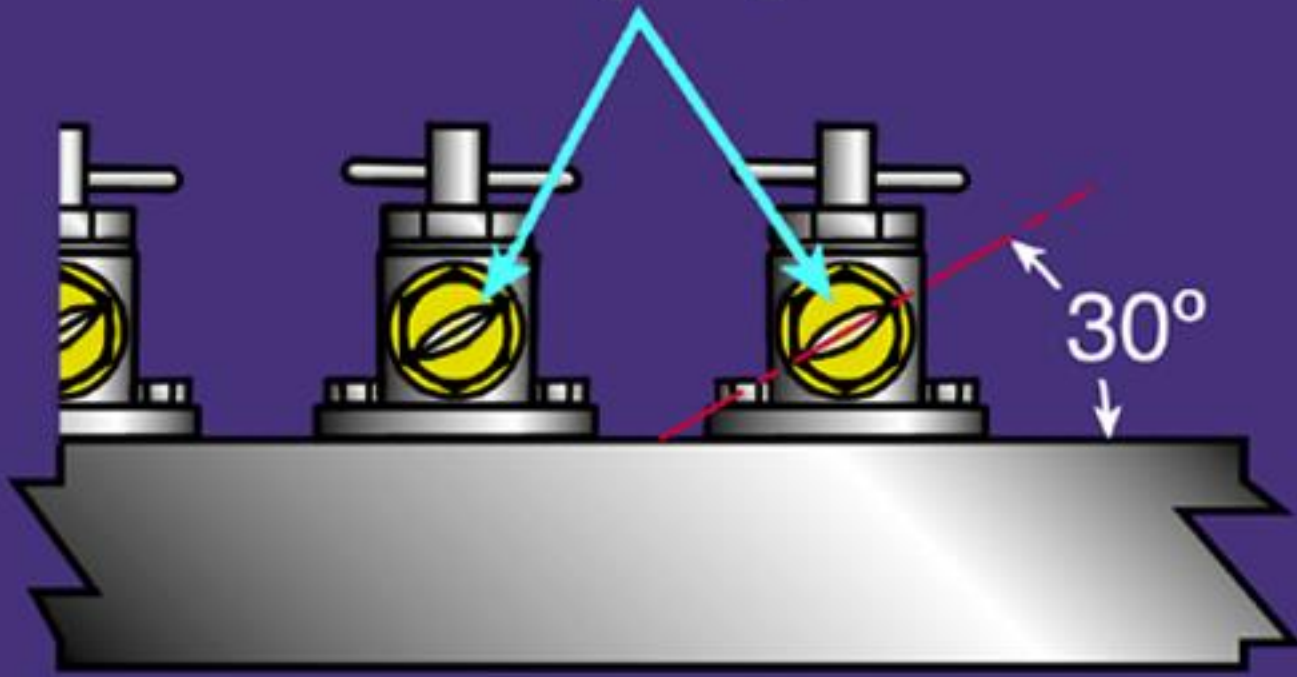
Triple Lap Coverage



Nozzle Height

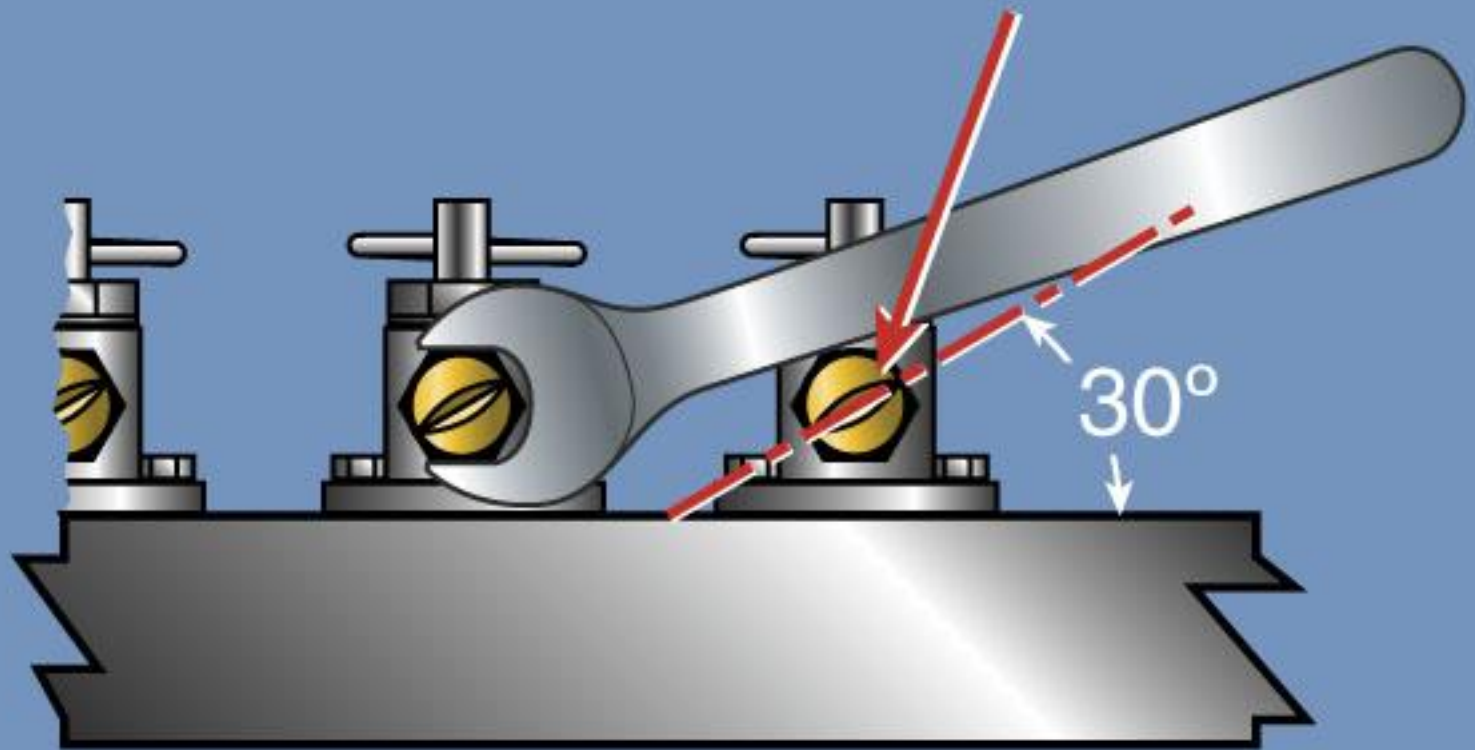


**Nozzle Slot 30°
from Spray Bar**



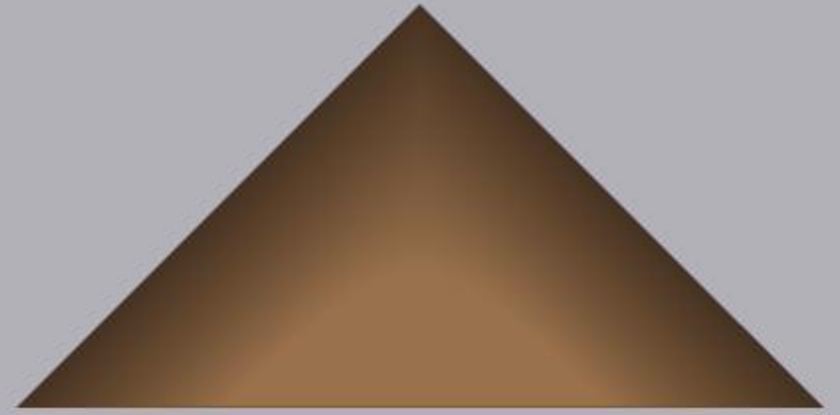
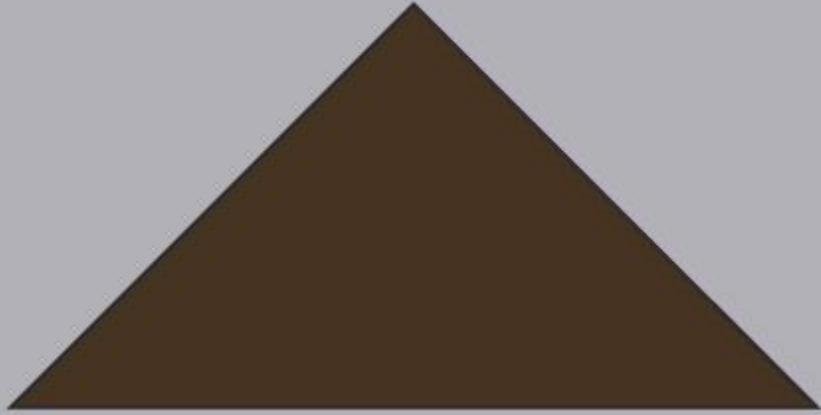
Spray Bar (bottom view)

Nozzle Slot 30° from Spray Bar



Spray Bar (bottom view)





SPRAY BAR NOZZLES



1
3353788



2
3351008



3
3351009



4
3352368



5
3351015



6
3352204



7
3352205



8
3352210



9
3351014



10
3351010


Ref.	Part No.	Description	Application Per Square Yard	Application (Metric) Liters Per Square Meter	Flow Gallons Per Minute Per Foot
1	3353788	V Slot Tack Nozzle	.05 - .20	.19 - .75	3.0 to 4.5
2	3351008	S36-4 V Slot	.10 - .35	.38 - 1.30	4.0 to 7.5
3	3351009	S36-5 V Slot	.18 - .45		7.0 to 10.0
4	3352368	Multi-Material V Slot	.15 - .40	.57 - 1.50	6.0 to 9.0
5	3351015	3/32" Coin Slot	.15 - .40	.57 - 1.50	6.0 to 9.0
6	3352204	Multi-Material V Slot	.35 - .95	1.30 - 3.60	12.0 to 21.0
7	3352205	Multi-Material V Slot	.20 - .55	.75 - 2.08	7.5 to 12.0
8	3352210	End Nozzle (3352205)	.20 - .55	.75 - 2.08	7.5 to 12.0
9	3351014	3/16" Coin Slot	.35 - .95	1.30 - 3.60	12.0 to 21.0
10	3351010	1/4" Coin Slot	.40 - 1.10	1.50 - 4.16	15.0 to 24.0

Nozzle Range GPM

Min X Ft. Bar = Minimum GPM

Max X Ft Bar = Maximum GPM

Nozzle Application Charts



Ref.	Part No.	Description	Application Gallons Per Square Yard	Application (Metric) Liters Per Square Meter	US Flow Gallons Per Minute Per Foot
1	3353788	V Slot Tack Nozzle	.05 - .20	.23 - .91	3.0 to 4.5
2	3351008	S36-4 V Slot	.10 - .35	.45 - 1.58	4.0 to 7.5
3	3351009	S36-5 V Slot	.18 - .45	.81 - 2.04	7.0 to 10.0
4	3352368	Multi-Material V Slot	.15 - .40	.68 - 1.81	6.0 to 9.0
5	3351015	3/32" Coin Slot	.15 - .40	.68 - 1.81	6.0 to 9.0
6	3352204	Multi-Material V Slot	.35 - .95	1.58 - 4.30	12.0 to 21.0
7	3352205	Multi-Material V Slot	.20 - .55	.91 - 2.49	7.5 to 12.0
8	3352210	End Nozzle (3352205)	.20 - .55	.91 - 2.49	7.5 to 12.0
9	3351014	3/16" Coin Slot	.35 - .95	1.58 - 4.30	12.0 to 21.0
10	3351010	1/4" Coin Slot	.40 - 1.10	1.81 - 4.98	15.0 to 24.0

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3353788 Etnyre V Slot Tack Nozzle

App Rate .05 - .20

Drive Distributor to achieve GPM between Min and Max for Application accuracy

# of Feet	Min GPM	Max GPM	# of Feet	Min GPM	Max GPM
1	3	4.5	13	39	58
2	6	9	14	42	63
3	9	13	15	45	67
4	12	18	16	48	72
5	15	22	17	51	76
6	18	27	18	54	81
7	21	31	19	57	85
8	24	36	20	60	90
9	27	40	21	63	94
10	30	45	22	66	99
11	33	49	23	69	103
12	36	54	24	72	108

Sizing Your Nozzle

What do we Know?

A. Bar Length Example: 12 Ft

B. Application Rate Example; .300 gal/yd²

Use Slide Rule Computator

1. Place Application Rate desired under Bar Length

2. Pick a Speed (FPM) -

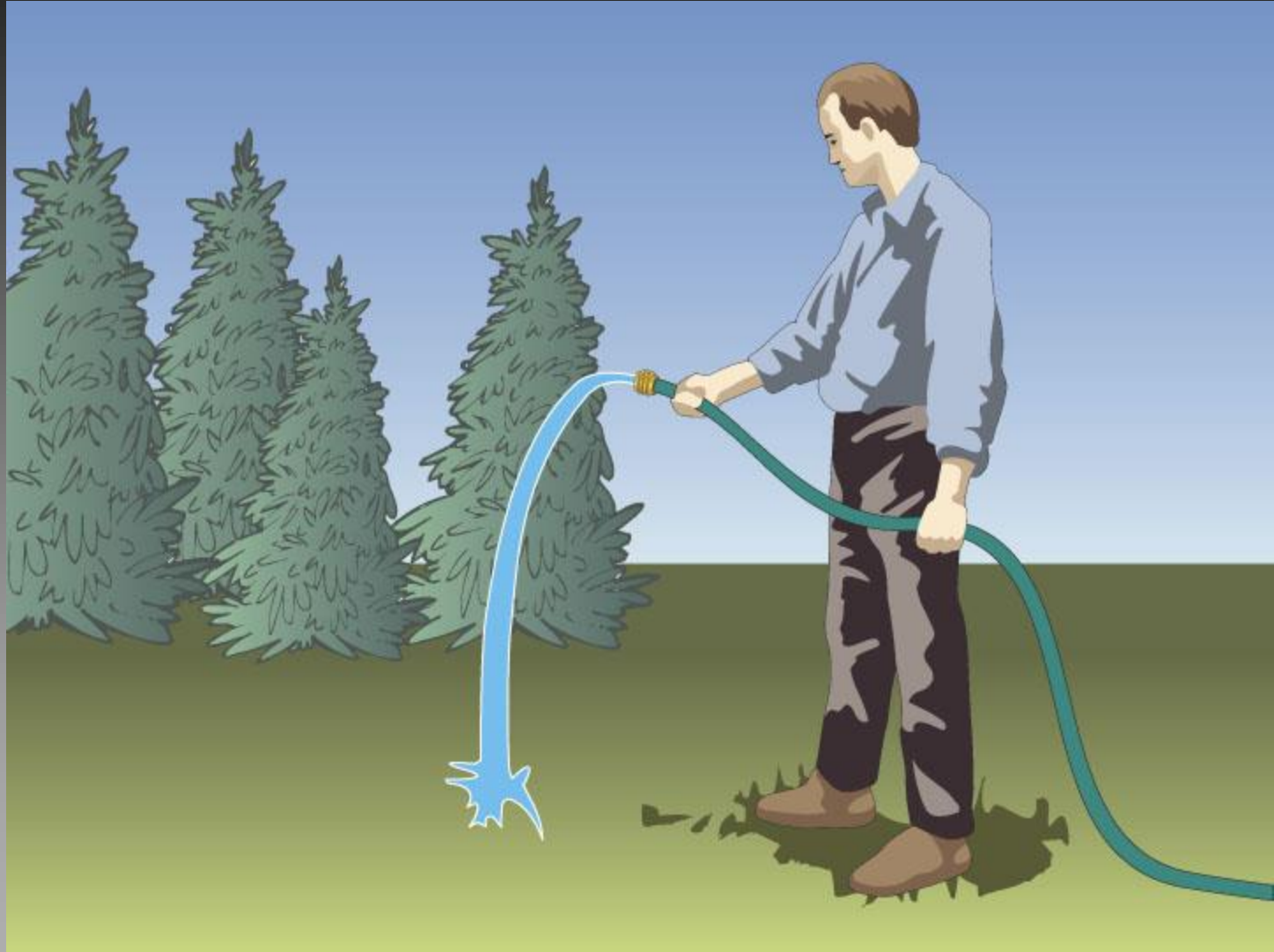
3. GPM will be directly below speed (FPM)

4. Divide GPM by Bar Length

5. Answer = gal/Ft Bar

Example: .300 gal/yd² @ 12 Ft @ 400 FPM = 160 GPM

$$\frac{160}{12} = 13.33 \text{ gal/Ft}$$





Construction Issues

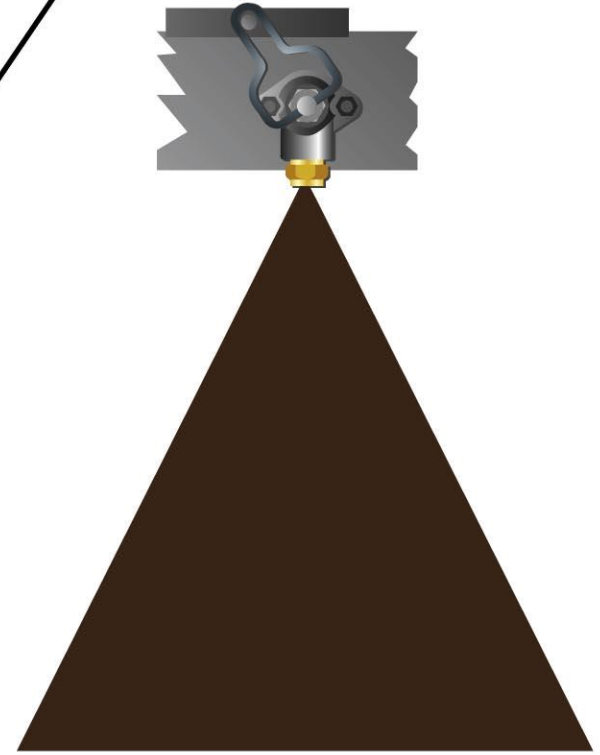
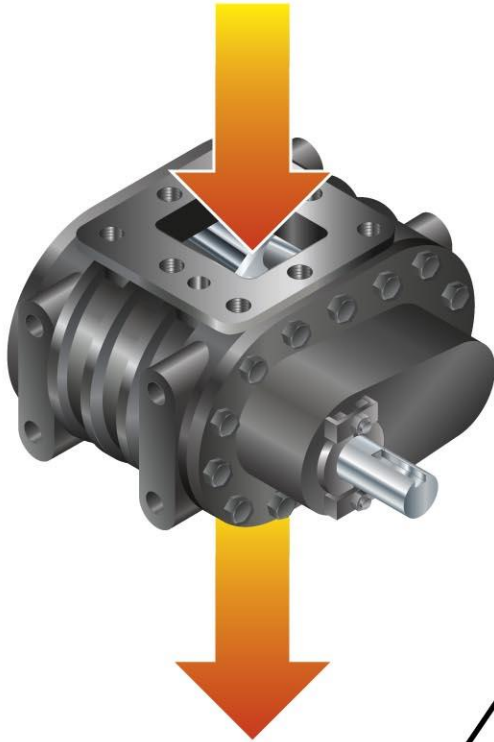
Uniformity of the Tack Coat Application

Tack application with blocked nozzles AND no overlap of nozzle spray fan

Nozzles may be too large

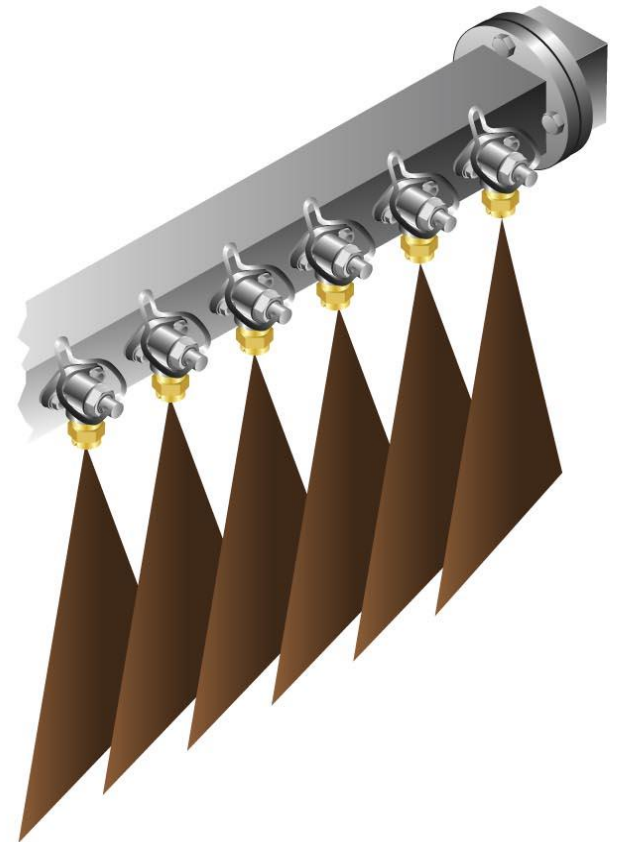
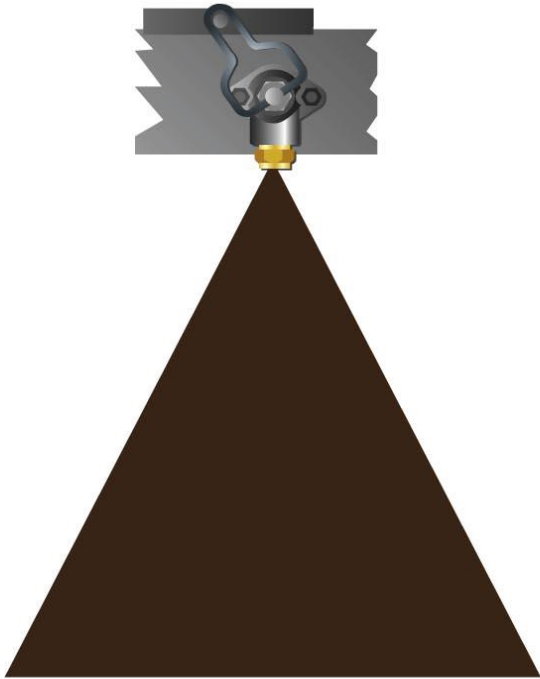


Pump Meter – Volume



Spray – Pressure

Flat Fan

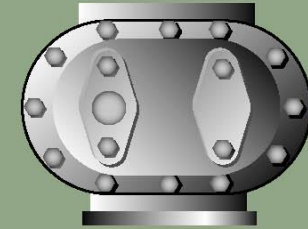
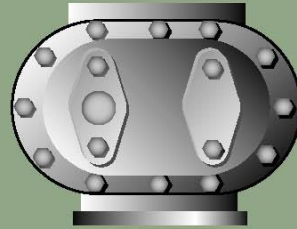
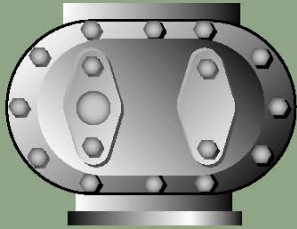


50 GPM

50 GPM

50 GPM

Asphalt
Pump



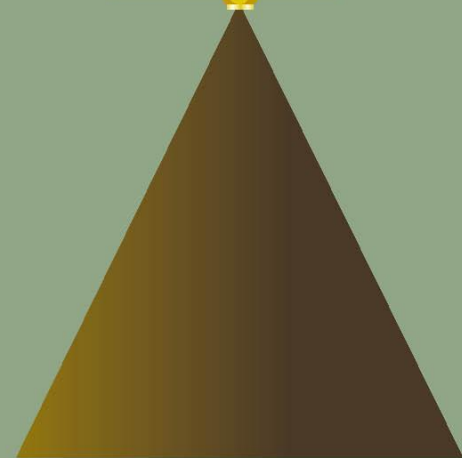
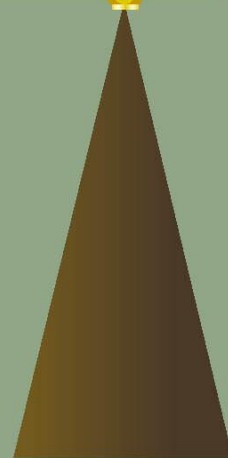
3/16"



1/8"



1/16"



Nozzle Size

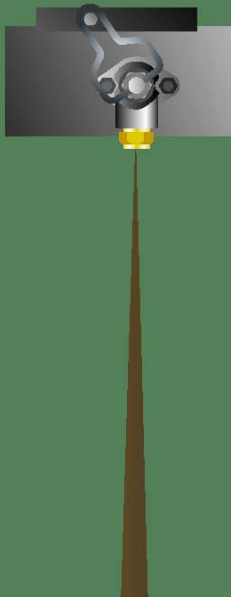
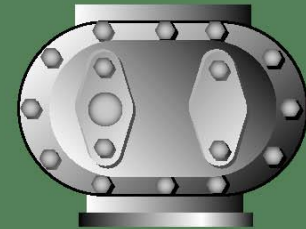
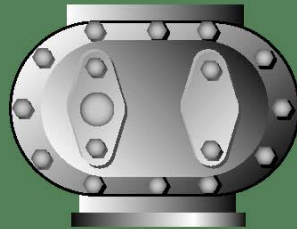
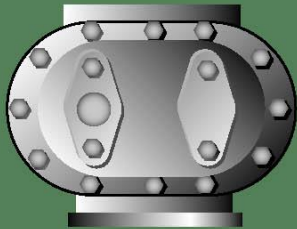
↑ FPM

50 GPM

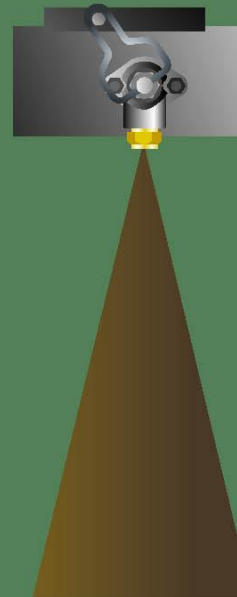
100 GPM

150 GPM

Asphalt
Pump



1/8"



1/8"



1/8"

600 FPM



.05 G/Y²

300 FPM

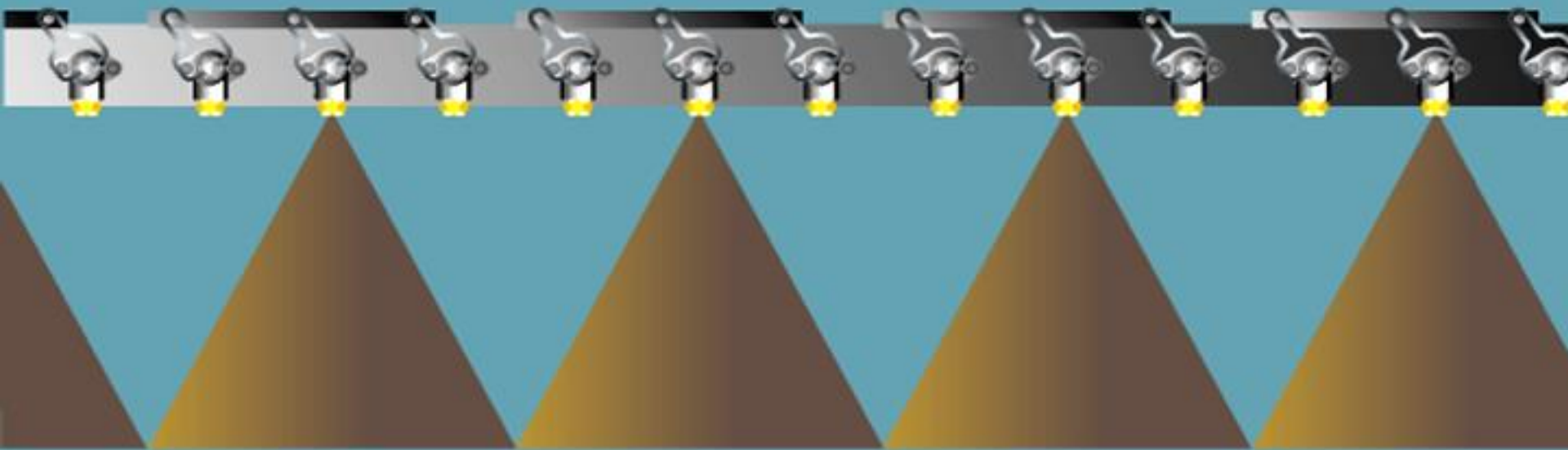


.05 G/Y²



LETS CHEAT

1 NOZZLE PER FOOT











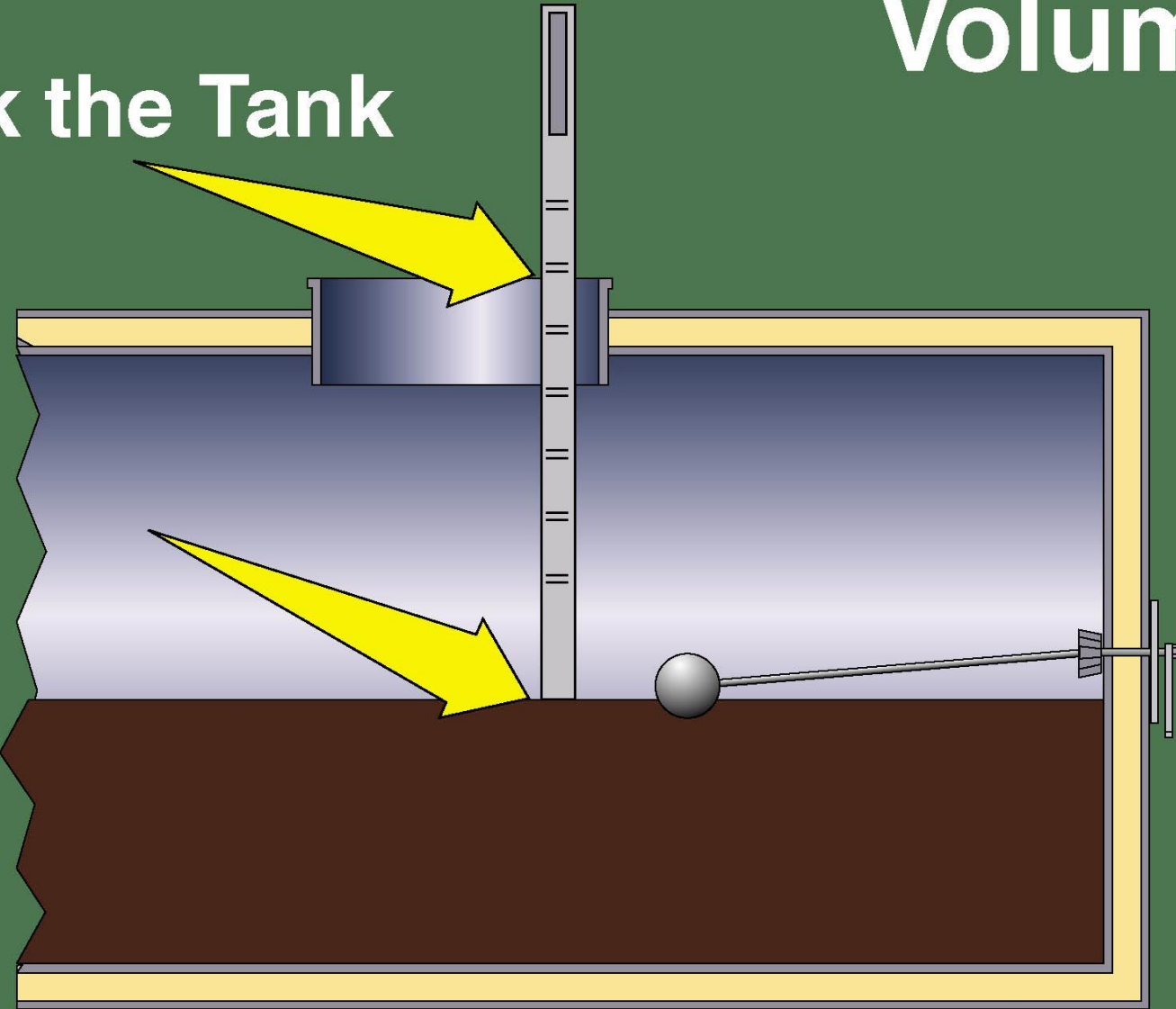
FRESH
OIL

CALIBRATING YOUR DISTRIBUTOR TRUCK

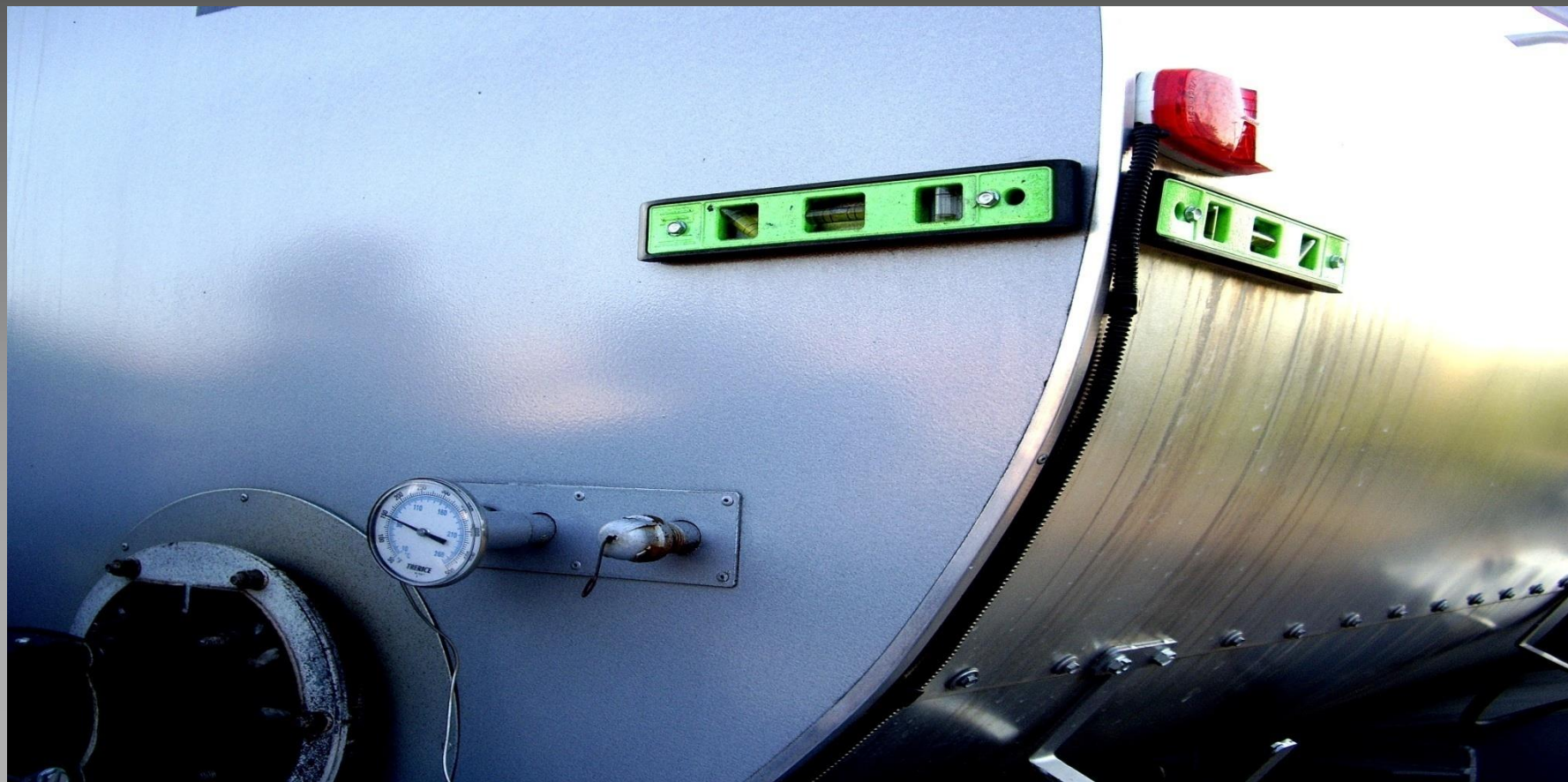
- What do we mean when we say calibrating your distributor?
- Why should you check your distributors calibration?
- How do you check your distributor calibration?
- What component are involved in calibrating your distributor truck?

Volume

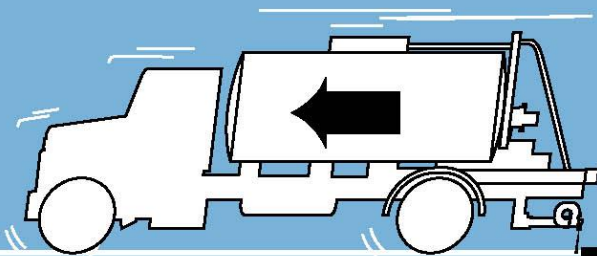
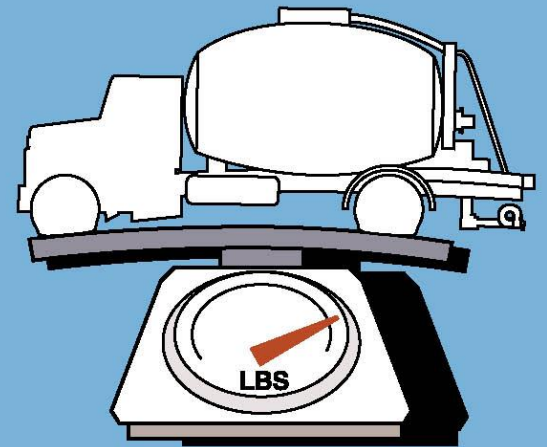
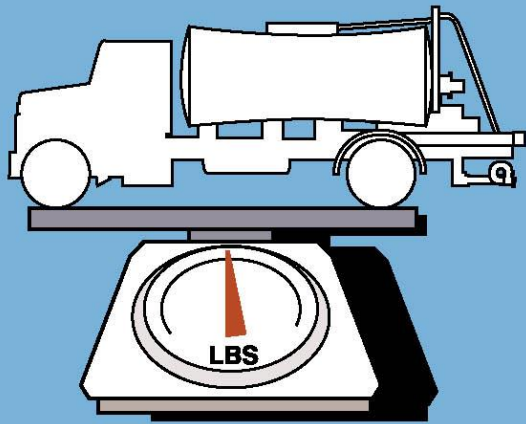
Stick the Tank



Before checking your volume by sticking the tank , make sure Distributor is level



Weight



(g/y)

← # (Feet) →

Calibration

- Distributor



WHAT ARE WAYS TO CHECK YOUR DISTRIBUTOR CALIBRATION?

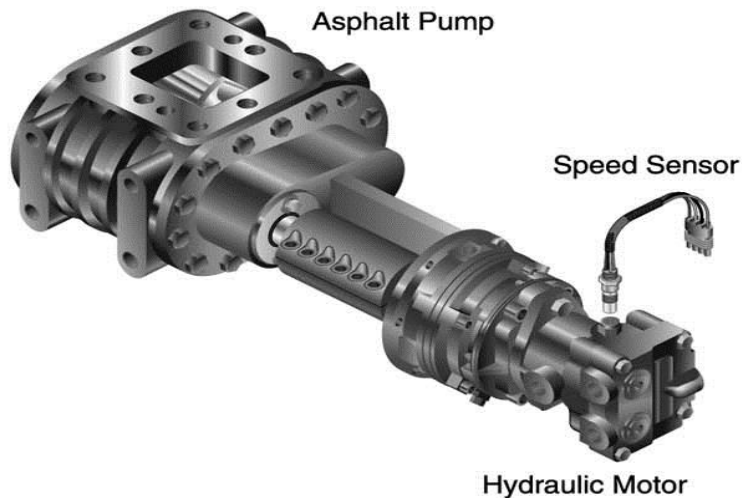


PUMP AND RADAR

34

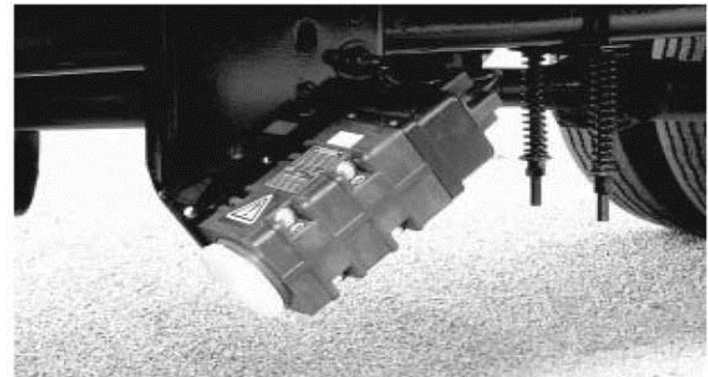
Metering and Control System continued

Magnetic Pump Speed Sensing



- Speed sensor pick-up counts the revolutions of the asphalt pump.
- Speed sensor is internal to the hydraulic motor.
- Pump output is displayed on an analog gage or sent directly to computer.
- Pump output is measured with Gallons Per Minute (GPM)

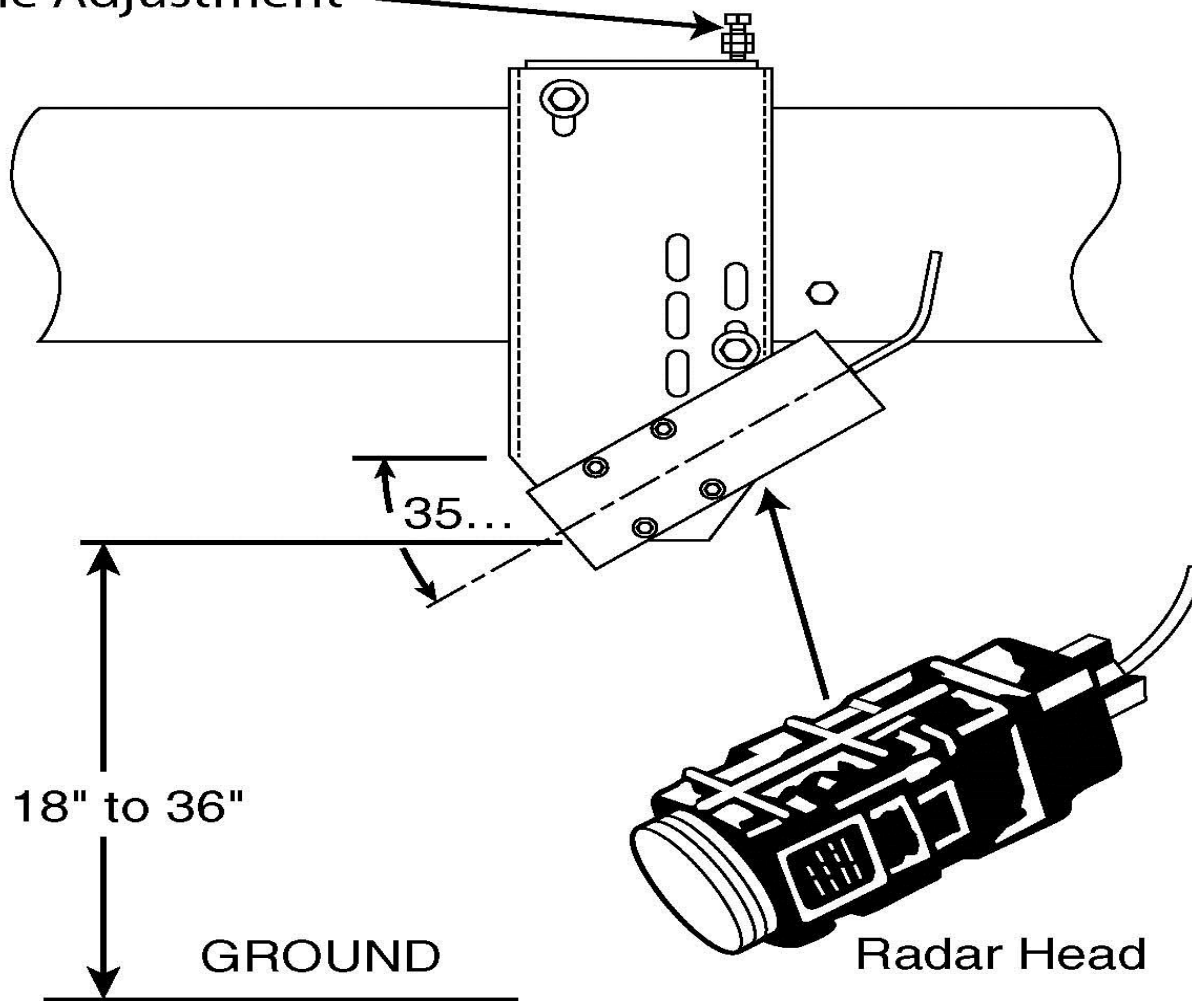
Radar Ground Speed Sensing



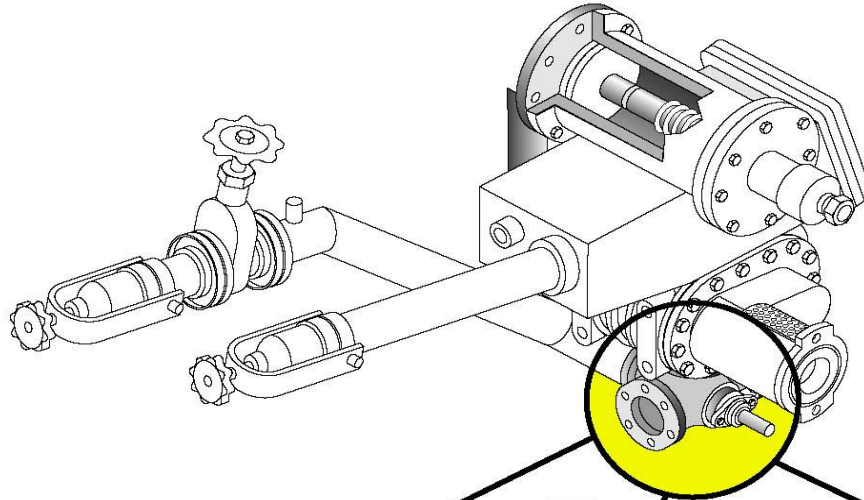
- Radar Speed sensing is **standard equipment**.
- Vehicle speed displayed on analog gauge or sent to computer.
- Precise measurement of ground speed and distance.
- No moving parts to wear out, less maintenance, and less chance of damage.
- Ground speed is measured in Feet Per Minute (FPM).

RADAR ADJUSTMENT

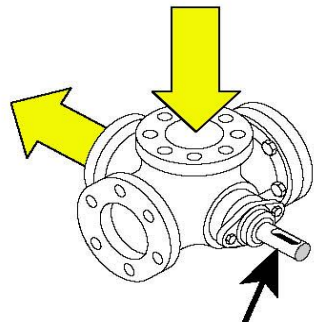
Angle Adjustment



CONTROL VALVE TIMING

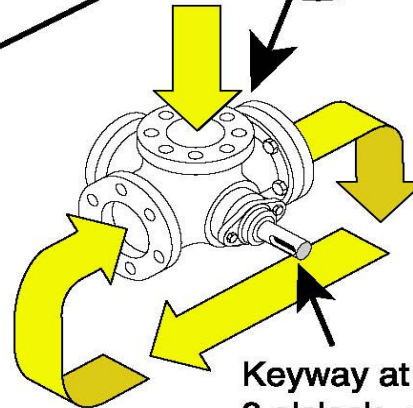


Control Valve



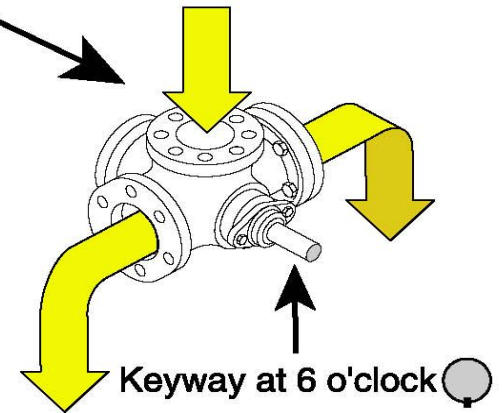
Keyway at 12 o'clock

Circulate In Tank



Keyway at 9 o'clock

Circulate In Bar



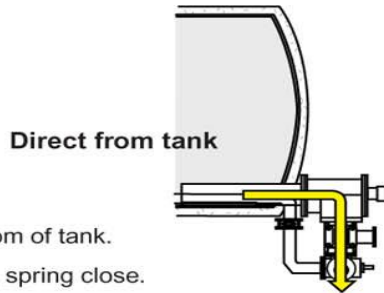
Keyway at 6 o'clock

Spray

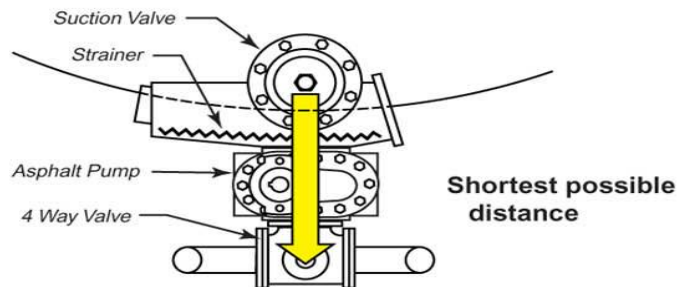
STRAINER

Circulating System continued

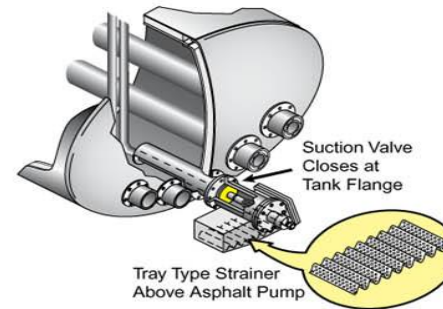
Tank Suction Valve



- Located at bottom of tank.
- Air control open, spring close.
- No sump to trap liquid asphalt in the tank.
- Disc valve closes at tank flange. Always in contact with hot asphalt.
- No external line between valve and tank to freeze up with cold asphalt.

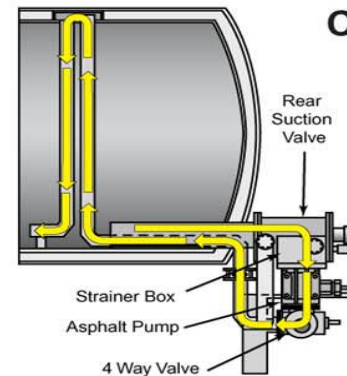


Strainer



- Strainers, one tray type between tank and asphalt pump and between fill line and asphalt pump.
- All liquid asphalt goes through a strainer before it gets to the asphalt pump.

Circulating In Tank



NOZZLES



1
3353788



2
3351008



3
3351009



4
3352368



5
3351015



6
3352204



7
3352205



8
3352210



9
3351014



10
3351010

Ref.	Part No.	Description	Application Per Square Yard	Application (Metric) Liters Per Square Meter	Flow Gallons Per Minute Per Foot
1	3353788	V Slot Tack Nozzle	.05 - .20	.19 - .75	3.0 to 4.5
2	3351008	S36-4 V Slot	.10 - .35	.38 - 1.30	4.0 to 7.5
3	3351009	S36-5 V Slot	.18 - .45		7.0 to 10.0
4	3352368	Multi-Material V Slot	.15 - .40	.57 - 1.50	6.0 to 9.0
5	3351015	3/32" Coin Slot	.15 - .40	.57 - 1.50	6.0 to 9.0
6	3352204	Multi-Material V Slot	.35 - .95	1.30 - 3.60	12.0 to 21.0
7	3352205	Multi-Material V Slot	.20 - .55	.75 - 2.08	7.5 to 12.0
8	3352210	End Nozzle (3352205)	.20 - .55	.75 - 2.08	7.5 to 12.0
9	3351014	3/16" Coin Slot	.35 - .95	1.30 - 3.60	12.0 to 21.0
10	3351010	1/4" Coin Slot	.40 - 1.10	1.50 - 4.16	15.0 to 24.0

Distributor

- What Happened Here?



**Safe Operation
Results From
Knowledge of
Materials and
Equipment**



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With Teamwork!

Teamwork Is the Difference
Between Success and Failure

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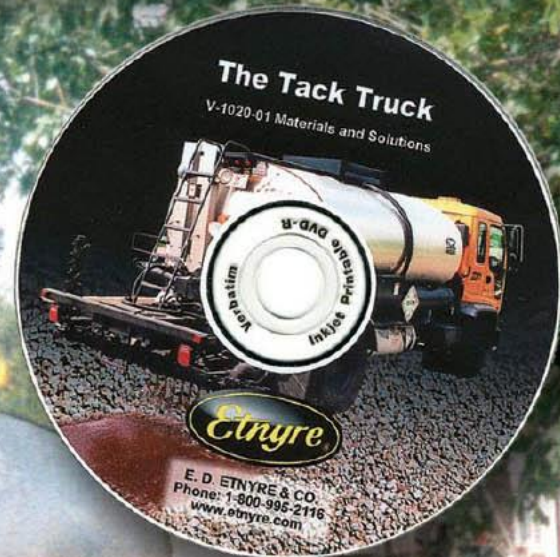
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