

Estimated Emissions from Gasoline Dispenser Hose Permeation

(distributed at November 13, 2003 Workshop in Sacramento)

Assumptions:

11,300	Total number of service stations in CA
12	Average number of gasoline dispenser hoses per station
10	Average length of gasoline dispenser hoses, feet
0.875	Typical product hose OD (coax hose), inches
1.125	Typical product hose OD (inv coax), inches
1.5	Typical vapor hose OD (coax), inches
0.375	Typical vapor hose OD (inv coax), inches
0.25	Product hose thickness, inches
0.125	Vapor hose thickness, inches
8.4	Vapor density of HC emissions (lbs/1000 gallons)
1728	Cubic inches in one cubic foot
7.481	Gallons in one cubic foot
50%	% of balance hoses (coax)
50%	% of assist hoses (inv coax)
0.0254	meters/in
	Assume hoses emit at maximum permeation limit
	Assume hose life of one year

UL330 Standard of Safety for Hose and Hose Assemblies for Dispensing Flammable Liquids

Allows 30% loss of product in full hose over six days of flex testing

1. Calculate total product volume in full hose

A. Standard Coax (inner product, outer vapor) ID = OD-(2*hose thickness) = 0.375

Total product volume = volume of inner hose = (pi) (ID/2)² (12*L)

= 13.253594 cubic inches
= 0.0076699 cubic feet
= 0.0573786 gallons

B. Inverted Coax (inner vapor, outer product) ID = OD-(2*hose thickness) = 0.625

Total product volume = volume of outer hose - volume of inner hose

= 36.815539 - 1.4726216
= 35.342917 cubic inches
= 0.0204531 cubic feet
= 0.1530095 gallons

2. Calculate allowable product loss per day 30% of total volume/6 days

Std Coax = 0.0028689 gallons/day
Inv Coax = 0.0076505 gallons/day

3. Calculate estimated tons/day (# stations)(#hoses/station)(emissions/1000 gal)(allowable loss in gallons)(1 ton/2000lb)(% hose type)

Std Coax = 0.8169558
Inv Coax = 2.1785488
TOTAL 3.00 tons/day

SAE J1527 Marine Fuel Hoses

100 g/m2/day for ASTM Fuel C
 300 g/m2/day for 85% ASTM Fuel C and 15% Methanol

1. Calculate total surface area of hoses in CA $(\#stations)(\#hoses)(hose\ diameter)(\pi)(hose\ length)(\%hose\ type)$

Std Coax	=	266250 square in	=	6763 m2
Inv Coax	=	199687 square in	=	5072 m2
TOTAL	=	465937 square in	=	11835 m2

2. Calculate estimated tons/day $(m2)(perm\ limit)(0.0022lb/g)(1\ ton/2000lb)$

TOTAL = 1.30 tons/day

Estimated Emission Reductions if Require Gasoline Dispenser Hoses to meet SAE J1527

Emission reductions = current permeation emissions allowed by UL330 - emissions allowed by SAE J1527

= 3.00 - 1.30
 = **1.69 tons/day emissions reductions**

Cost analysis

50 Assumed cost increase per hose to meet SAE J1527 (dollars)

Cost = $(\#stations)(\#hoses)(cost\ increase/hose)$

total cost = \$6,780,000 per year

Cost-Effectiveness (\$/lb) = 5.483737496