

Addendum to Publication 2517— Evaporative Loss From External Floating-Roof Tanks

**ADDENDUM TO API PUBLICATION 2517 (THIRD EDITION)
MAY 1994**

American Petroleum Institute
1220 L Street, Northwest
Washington, D.C. 20005



Addendum to Publication 2517— Evaporative Loss From External Floating-Roof Tanks

Measurement Coordination

ADDENDUM TO API PUBLICATION 2517 (THIRD EDITION)
MAY 1994

American
Petroleum
Institute



SPECIAL NOTES

1. API PUBLICATIONS NECESSARILY ADDRESS PROBLEMS OF A GENERAL NATURE. WITH RESPECT TO PARTICULAR CIRCUMSTANCES, LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS SHOULD BE REVIEWED.
2. API IS NOT UNDERTAKING TO MEET THE DUTIES OF EMPLOYERS, MANUFACTURERS, OR SUPPLIERS TO WARN AND PROPERLY TRAIN AND EQUIP THEIR EMPLOYEES, AND OTHERS EXPOSED, CONCERNING HEALTH AND SAFETY RISKS AND PRECAUTIONS, NOR UNDERTAKING THEIR OBLIGATIONS UNDER LOCAL, STATE, OR FEDERAL LAWS.
3. INFORMATION CONCERNING SAFETY AND HEALTH RISKS AND PROPER PRECAUTIONS WITH RESPECT TO PARTICULAR MATERIALS AND CONDITIONS SHOULD BE OBTAINED FROM THE EMPLOYER, THE MANUFACTURER OR SUPPLIER OF THAT MATERIAL, OR THE MATERIAL SAFETY DATA SHEET.
4. NOTHING CONTAINED IN ANY API PUBLICATION IS TO BE CONSTRUED AS GRANTING ANY RIGHT, BY IMPLICATION OR OTHERWISE, FOR THE MANUFACTURE, SALE, OR USE OF ANY METHOD, APPARATUS, OR PRODUCT COVERED BY LETTERS PATENT. NEITHER SHOULD ANYTHING CONTAINED IN THE PUBLICATION BE CONSTRUED AS INSURING ANYONE AGAINST LIABILITY FOR INFRINGEMENT OF LETTERS PATENT.
5. GENERALLY, API STANDARDS ARE REVIEWED AND REVISED, REAFFIRMED, OR WITHDRAWN AT LEAST EVERY FIVE YEARS. SOMETIMES A ONE-TIME EXTENSION OF UP TO TWO YEARS WILL BE ADDED TO THIS REVIEW CYCLE. THIS PUBLICATION WILL NO LONGER BE IN EFFECT FIVE YEARS AFTER ITS PUBLICATION DATE AS AN OPERATIVE API STANDARD OR, WHERE AN EXTENSION HAS BEEN GRANTED, UPON REPUBLICATION. STATUS OF THE PUBLICATION CAN BE ASCERTAINED FROM THE API AUTHORIZING DEPARTMENT [TELEPHONE (202) 682-8000]. A CATALOG OF API PUBLICATIONS AND MATERIALS IS PUBLISHED ANNUALLY AND UPDATED QUARTERLY BY API, 1220 L STREET, N.W., WASHINGTON, D.C. 20005.

FOREWORD

In 1957, the API Evaporation Loss Committee initiated an extensive effort to collect available petroleum industry data on evaporative losses from external floating-roof tanks. An intensive study of these data resulted in correlations for estimating evaporative losses from external floating-roof tanks. These results were published in February 1962 as API Publication 2517.

By the mid-1970s, as a result of the national energy crisis and increased concern for the environment, additional emphasis was placed on the need to reduce evaporative losses from petroleum storage tanks. Accordingly, in 1976 the API Committee on Evaporation Loss Measurement began a review and analysis of prior API studies and more recent testing performed by oil companies, manufacturers, industry groups, and regulatory agencies. As a result of this analysis, and in view of the considerable improvements that had been made in both the technology of floating-roof tank seals and the methods for measuring evaporative losses, the committee recommended that the evaporative loss data be updated and combined with new data obtained from an extensive test program. API responded by sponsoring a broad program that included laboratory, test-tank, and field-tank studies. This intensive effort identified the mechanisms of evaporative loss and precisely quantified the effects of the relevant variables. The results were published in February 1980 as the second edition of API Publication 2517.

The second edition of API Publication 2517 dealt with evaporative loss from floating-roof rim seals and shell-wetting loss from lowering the stock level in external floating-roof tanks. In 1984, as the result of other related API test programs, the Committee on Evaporation Loss Measurement believed that sufficient evidence existed to warrant an additional test program to determine the magnitude of evaporative losses from floating-roof fittings. A survey of tank manufacturers and owners was conducted to establish the type and number of typical roof fittings used on tanks of various diameters. From this survey and an API-sponsored test program performed in 1984, methods were developed for calculating the evaporative loss from the various external floating-roof fittings. This information was included in the third edition of API Publication 2517.

In the early 1990s, with continuing environmental concerns and passage of the Clean Air Act Amendments, further emphasis was placed on the need to reduce evaporative emissions from tankage. API sponsored a program that included laboratory testing to validate the emissions loss factors for roof fittings previously tested and to test new equipment configurations to establish loss factors. This program also included testing to establish the effect of wind speed on evaporative losses.

The fourth edition of API Publication 2517 is forthcoming. In the interim, API is publishing this addendum to the third edition of Publication 2517 to release new, pertinent information regarding evaporative losses from slotted versus unslotted guide poles.

API publications may be used by anyone desiring to do so. Every effort has been made by the Institute to assure the accuracy and reliability of the data contained in them; however, the Institute makes no representation, warranty, or guarantee in connection with this publication and hereby expressly disclaims any liability or responsibility for loss or damage resulting from its use or for the violation of any federal, state, or municipal regulation with which this publication may conflict.

Suggested revisions are invited and should be submitted to Measurement Coordination, Industry Services Department, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005.

CONTENTS

	Page
SECTION 1—SCOPE	1
1.1 Purpose	1
1.2 Comparison to Previous Data	1
1.3 Components Tested for Reducing Guide-Pole/Sample Well Emissions	1
1.4 Use of Results	1
1.5 Definitions	1
1.6 Referenced Publications	2
SECTION 2—MECHANICS OF EVAPORATIVE LOSS FROM GUIDE POLES	2
2.1 Introduction	2
2.2 Wind Driven Emissions	2
2.3 Temperature and Pressure Driven Emissions	2
2.4 Diffusion Driven Emissions	4
2.5 Withdrawal Driven Emissions of Stock	4
2.6 Emissions Control Features	4
SECTION 3—DESCRIPTION OF GUIDE-POLE MODIFICATIONS	5
3.1 Basic Guide Poles and Wells	5
3.1.1 Unslotted Guide Pole	5
3.1.2 Slotted Guide Pole	5
3.1.3 Guide-Pole Well	5
3.2 Emissions Sealing System	5
3.2.1 Well Gasket	5
3.2.2 Guide-Pole Sleeve and Pole Wiper	5
3.2.3 Float With Wiper	5
3.2.4 Low Clearance Float Without Wiper	6
SECTION 4—DEVELOPMENT OF ROOF FITTING LOSS FACTORS FOR GUIDE POLES	6
4.1 Introduction	6
4.2 Mathematical Development of Roof Fitting Loss Factors	6
4.3 Database for Roof Fitting Loss Factors	6
4.4 Guide-Pole Roof Fittings Tested	7
4.5 Analysis of Guide-Pole Roof Fittings Loss Data	7
4.6 Comparison of Guide-Pole Roof Fittings Loss Factors	7
SECTION 5—HIERARCHIES OF EVAPORATIVE LOSS FROM GUIDE POLES	10
5.1 Loss From Tank Guide Poles	10
5.2 Slotted Guide Poles	10
5.3 Unslotted Guide Poles	11
SECTION 6—REFERENCES	11
Figures	
1—Unslotted Guide-Pole Well	3
2—Slotted Guide-Pole/Sample Well	3
3—Emissions Loss Paths	3
4—Wind Driven Emissions	3