

Environmental Protection

This is a preview. Click [here](#) to purchase the full publication.

This is a preview. Click [here](#) to purchase the full publication.



International Standards and Recommended Practices

Annex 16
to the Convention on
International Civil Aviation

Environmental Protection

Volume II
Aircraft Engine Emissions

This edition incorporates all amendments adopted by the Council prior to 8 March 2008 and supersedes, on 20 November 2008, all previous editions of Annex 16, Volume I.

For information regarding the applicability of the Standards and Recommended Practices, see Foreword.

Third Edition
July 2008

International Civil Aviation Organization

This is a preview. Click here to purchase the full publication.

Published in separate English, French, Russian and Spanish editions by the
INTERNATIONAL CIVIL AVIATION ORGANIZATION
999 University Street, Montréal, Quebec, Canada H3C 5H7

For ordering information and for a complete listing of sales agents
and booksellers, please go to the ICAO website at www.icao.int

*First edition 1981
Second edition 1993
Third edition 2008*

**Annex 16 — Environmental Protection
Volume II — Aircraft Engine Emissions**

Order Number: AN16-2
ISBN 978-92-9231-123-0

© ICAO 2008

All rights reserved. No part of this publication may be reproduced, stored in a
retrieval system or transmitted in any form or by any means, without prior
permission in writing from the International Civil Aviation Organization.

This is a preview. Click here to purchase the full publication.

AMENDMENTS

Amendments are announced in the supplements to the *Catalogue of ICAO Publications*; the Catalogue and its supplements are available on the ICAO website at www.icao.int. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

This is a preview. Click [here](#) to purchase the full publication.

TABLE OF CONTENTS

	<i>Page</i>
Foreword	(ix)
Part I. DEFINITIONS AND SYMBOLS.....	I-1-1
CHAPTER 1. Definitions	I-1-1
CHAPTER 2. Symbols	I-2-1
Part II. VENTED FUEL	II-1-1
CHAPTER 1. Administration	II-1-1
CHAPTER 2. Prevention of intentional fuel venting.....	II-2-1
Part III. EMISSIONS CERTIFICATION.....	III-1-1
CHAPTER 1. Administration	III-1-1
CHAPTER 2. Turbojet and turbofan engines intended for propulsion only at subsonic speeds.....	III-2-1
2.1 General	III-2-1
2.2 Smoke	III-2-3
2.3 Gaseous emissions	III-2-3
2.4 Information required	III-2-5
CHAPTER 3. Turbojet and turbofan engines intended for propulsion at supersonic speeds.....	III-3-1
3.1 General	III-3-1
3.2 Smoke	III-3-3
3.3 Gaseous emissions	III-3-3
3.4 Information required	III-3-3

APPENDICES

APPENDIX 1. Measurement of reference pressure ratio	APP 1-1
1. General.....	APP 1-1
2. Measurement.....	APP 1-1

	Page
APPENDIX 2. Smoke emission evaluation.....	APP 2-1
1. Introduction and definitions	APP 2-1
2. Measurement of smoke emissions.....	APP 2-1
3. Calculation of smoke number from measured data.....	APP 2-6
4. Reporting of data to the certificating authority	APP 2-6
APPENDIX 3. Instrumentation and measurement techniques for gaseous emissions.....	APP 3-1
1. Introduction.....	APP 3-1
2. Definitions.....	APP 3-1
3. Data required.....	APP 3-2
4. General arrangement of the system.....	APP 3-3
5. Description of component parts	APP 3-3
6. General test procedures	APP 3-5
7. Calculations.....	APP 3-7
Attachment A to Appendix 3. Specification for HC analyser.....	APP 3-13
Attachment B to Appendix 3. Specification for CO and CO ₂ analysers.....	APP 3-15
Attachment C to Appendix 3. Specification for NO _x analyser.....	APP 3-17
Attachment D to Appendix 3. Calibration and test gases	APP 3-19
Attachment E to Appendix 3. The calculation of the emissions parameters — basis, measurement corrections and alternative numerical method	APP 3-21
Attachment F to Appendix 3. Specifications for additional data	APP 3-27
APPENDIX 4. Specification for fuel to be used in aircraft turbine engine emission testing.....	APP 4-1
APPENDIX 5. Instrumentation and measurement techniques for gaseous emissions from afterburning gas turbine engines	APP 5-1
1. Introduction.....	APP 5-1
2. Definitions.....	APP 5-1
3. Data required.....	APP 5-2
4. General arrangement of the system.....	APP 5-3
5. Description of component parts	APP 5-3
6. General test procedures	APP 5-6
7. Calculations.....	APP 5-8
Attachment A to Appendix 5. Specification for HC analyser.....	APP 5-15
Attachment B to Appendix 5. Specification for CO and CO ₂ analysers	APP 5-17
Attachment C to Appendix 5. Specification for NO _x analyser.....	APP 5-19
Attachment D to Appendix 5. Calibration and test gases	APP 5-21

	<i>Page</i>
Attachment E to Appendix 5. The calculation of the emissions parameters — basis, measurement corrections and alternative numerical method	APP 5-23
Attachment F to Appendix 5. Specifications for additional data	APP 5-29
APPENDIX 6. Compliance procedure for gaseous emissions and smoke.....	APP 6-1
1. General.....	APP 6-1
2. Compliance procedures.....	APP 6-1
3. Procedure in the case of failure.....	APP 6-2

This is a preview. Click [here](#) to purchase the full publication.