ISO 8178-9:2012-08 (E)

Reciprocating internal combustion engines - Exhaust emission measurement - Part 9: Test cycles and test procedures for test bed measurement of exhaust gas smoke emissions from compression ignition engines operating under transient conditions

Contents

Page

Foreword iv

Introduction v

1 Scope 1

2 Normative references 1

3 Termsanddefinitions 2

4 Symbols and units 4

5 Test conditions 5
5.1 Ambient test conditions 5
5.2 Power 5
5.3 Engine air inlet system 6
5.4 Engine exhaust system 6
5.5 Cooling system 6
5.6 Lubricating oil 6
5.7 Engines with charge air cooling 6
5.8 Test fuel temperature 6

6 Test fuels 6

7 Measurement equipment and accuracy 7
7.1 General 7
7.2 Dynamometerspecification 7
7.3 Determination of smoke 7
7.4 Accuracy 9

8 Calibration of the opacimeter 9
8.1 General 9
8.2 Calibration procedure 9

9 Test run 9
9.1 Installation of the measuring equipment 9
9.2 Checking of the opacimeter 10
9.3 Test cycle 10
9.4 Determination of effective optical path length (LA) 10

10 Data evaluation and calculation 10
10.1 Data evaluation 10
10.2 Bessel algorithm 12
10.3 Ambient correction 13
10.4 Test report 14

11 Determination of smoke 14
11.1 General 14
11.2 Full-flowopacimeter 15

11.3 Partial-flow-opacimeter 16

Annex A (normative) Test cycle for variable-speed off-road engines 19

Annex B (normative) Test cycle for constant-speed off-road engines 26

Annex C (informative) Remarks on test cycles 30

Annex D (informative) Example of calculation procedure 31

Annex E (normative) Test cycle for marine propulsion engines 42

Annex F (normative) Test cycle for variable speed engines type F (rail traction) 48

Bibliography 52