



COMITÉ INTERNATIONAL DE L'INSPECTION TECHNIQUE AUTOMOBILE
INTERNATIONAL MOTOR VEHICLE INSPECTION COMMITTEE
INTERNATIONALE VEREINIGUNG FÜR DIE TECHNISCHE PRÜFUNG VON
KRAFTFAHRZEUGEN

CITA

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2nd CITA PROGRAMME OF STUDIES ON EMISSION TESTING AT
PERIODIC AND OTHER INSPECTIONS

Study 1

'Best Practice' Procedure for Petrol Vehicles

June 2002

CITA/2E-ERSP/Study1

Note

This report is a consensus of the views of the **individuals** taking part in the working group. Neither the report nor its conclusions have been formally adopted by the CITA Bureau Permanent or by vote of the rest of the CITA membership and so it does not necessarily represent the views of CITA or individual CITA members.

Summary

Study 1 in the 2nd CITA Programme of Studies on Emission Testing at Periodic and Other Inspections examined the possibility of developing a 'best practice' procedure for the exhaust emission test in EU directive 96/96/EC, as amended. The work was done by a special working group of experts from some CITA members. The objective was to try to synthesise a recommended test procedure by taking the best elements of the procedures in current use in the member states in order to realise some of the potential exhaust emission reductions that had been identified as theoretically available from improved periodic inspection regimes.

After discussion, the group concluded that it was not now a cost/effective use of time to develop such a 'best practice' procedure. The work would take too long and the actual benefits were uncertain. Furthermore the vehicle types to which the procedure would be applicable were now reducing in number.

On the other hand, the group concluded that all future test procedures mandated in the directives must be more closely specified to prevent significant divergence between the actual procedures developed in each member state.

The group also made recommendations on the provision on an EU wide basis of emission relevant information about vehicles to increase the effectiveness of the visual examination part of an emission test and for further research on the influence of engine condition (temperature) on emission test results in order to improve the understanding of the influence of the various factors and to provide a basis for improved requirements in the directive.

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1. Introduction

During the mid 1990s, the EU Commission funded a consortium of research institutes to investigate current and future methods of emission tests for in-use cars. Their report, which is normally known as the joint services report¹, was published in May 1998. It suggested that, in theory at least, the following reductions in the emissions from current petrol engined vehicles (without a catalyst or with only an oxidation catalyst) might be possible with improved periodic inspection regimes –

Carbon monoxide	16%
Nitrogen oxides	15%
Hydrocarbons	15%

In its first research study programme, CITA was given a grant by the Commission Directorate General VII (forerunner of DG TREN) to investigate the potential of using type specific emission values to realise some of these potential exhaust emission reductions. A working group under the general guidance of the CITA Exhaust Emissions Working Group produced a report² that recommended certain reductions in the emission limits for some classes of vehicle. However, for various practical reasons it did not recommend either reduced general limits or the introduction of type specific limits for older petrol engined vehicles. Even if reduced limits had been recommended and implemented, it is unlikely that this development alone would have been sufficient to realise all the potential improvements in all member states.

Within the parameters of the basic test procedure, the scope for other improvements is limited. However, the specification of the test procedure in the directive is somewhat rudimentary. The testing authorities in some member states have put considerable effort into developing more detailed procedures in order to ensure the test is properly controlled and as effective as possible. Those member states that started emission testing on cars and light vehicles more recently have not had the time and, in some cases, the resources to do this development. The aim of this present study was to analyse all the procedures in use in the member states and to synthesise a 'best practice' procedure. The idea was that this could either be used as a recommendation to all member states or as the basis for an amendment to the procedures currently specified in the directive.

¹ The Inspection of In-use Cars in order to attain Minimum Emissions of pollutants and Optimum Energy Efficiency, May 1998

² Report of the CITA Working Group on Type specific Emission Limits, 16th November 2000

2. Working method and programme

The study was done by a special group of emission experts from interested CITA members working under the general guidance of the CITA Exhaust Emissions Working Group which is chaired by Dipl.-Ing Axel Richter from the Institute of Vehicle Technology of RWTÜV Fahrzeug GmbH.

The work programme was in three stages. Firstly a survey was done using a specially prepared questionnaire to gather information about the test procedures currently used by EU member states to test the emissions of non-catalyst equipped vehicles. Secondly an analysis of the replies was done to identify significant differences in procedures and to highlight issues that should be explored further. Finally a working group of experts met to consider the results of the analysis and to try to synthesize a 'best practice' procedure.

It was originally thought that up to three meetings of the group would be necessary to complete the third stage. In the event, for the reasons outlined later in this report, the group only met once.

A list of participants in the group is at **appendix 1**.

3. Survey of existing practice

Detailed and up-to-date information about existing test procedures used by member states was collected via a questionnaire which was developed in conjunction with some of the members of the CITA Exhaust Emissions Working Group. A copy of the questionnaire is at **appendix 2**.

Full replies were received from 19 bodies authorized to perform periodic inspection in 13 of the member states. Despite repeated requests no information was forthcoming from any body in the other 2 member states.

Consolidated tables showing full details of the responses to the questionnaire are at **appendix 3**.

4. Issues arising from survey

The results of the survey were carefully analysed to identify differences in the procedures used. The differences were then considered for their possible effect on the results of emission measurements and a number of possible issues were identified for discussion in the working group.

The following issues for discussion were identified:-

1. If a 'best practice' test can be defined, would it be necessary to consider how long such a test might take in typical situations?
2. Are the proposals that were made by the CITA Type Specific Emissions Limits to improve the visual examination requirements of directive 96/96/EC sufficient for a 'best practice' procedure?
3. Should a 'best practice' procedure include a list of emission-relevant information about the vehicles that should be collected at the time of test?
4. Should a 'best practice' procedure include limits for the ambient conditions under which testing is permitted? If so, what should the limits be?
5. In relation to pre-conditioning -
 - (i) Taking full account of the different ways in which testing is organized (e.g. whether vehicles are tested on arrival) and pragmatic ways to speed testing (e.g. 'fast pass'/'fast fail'), what provisions regarding pre-conditioning should there be in a 'best practice' procedure?
 - (ii) Should the engine or some other temperature be measured to verify that the vehicle is sufficiently warm?
6. Although the CITA Type Specific Emissions Limit WG did not recommend amending the directive to add measurement of HC or checks on other engine parameters, should a 'best practice' procedure include them? If so, what other parameters should be measured and/or checked?
7. What limits should be used in a 'best practice' procedure, particularly for parameters not specified in the directive (e.g. HC, if added)?
8. Although the question of whether vehicle presenters are given the results of emission measurements is not directly relevant to the performance of emission tests, the question of whether a 'best practice' procedure should include such requirements should be debated
9. What equipment standards and calibration arrangements should be put in a 'best practice' procedure?
10. Should any of the other points raised by respondents to the questionnaire be taken into account in a 'best practice' procedure?

A full copy of the discussion paper is at **appendix 4**

5. Discussion in the Working Group

Before considering the issues raised in the paper that had been prepared following the survey of emission procedures, the group had a general discussion about the objectives and likely benefits of synthesising a 'best practice' procedure. It rapidly became clear that there was a general consensus that while it might be possible to agree a 'best practice' procedure, it would take far longer than the time allocated to this work (three meetings) and by the time the work had been completed the benefits to be gained would have been considerably reduced in relation to the primary target vehicles (vehicles produced before the introduction of feed-back controlled three-way catalyst) would be greatly reduced because of the declining numbers of such vehicles in use and their decreasing use.

Instead, the group was of the strong view that the available time would be better employed in defining a list of key issues that must be addressed when future emissions test requirements and procedures are under discussion.

The following issues were identified –

(i) Date of first test and frequency of testing.

The directive sets minimum standards for the delay before first test and the subsequent test frequency. It is clear from the survey that many member states require earlier and more frequent testing. Against a directive requirement for light vehicles (cars and light goods vehicles) of first test at 4 years (1 year for other than taxis and ambulances), many member states set an earlier date (down to 1 year for cars (Austria, Germany (vehicles without 3 way catalyst)), and 6 months for light goods vehicles (Belgium). Against a directive frequency of 2 years, some countries require annual tests while some require 6 monthly tests on very old vehicles. The differences between member states are undoubtedly a reflection of multiple factors although the starting point is likely to be the political importance given to controlling emissions.

To achieve the required level of control in the most cost/effective manner for their particular circumstances, member states, as well as varying the date of first test and the test frequency, will also vary the severity of the test procedure. They will also take account of other types of control, for instance whether unannounced roadside emission checks are done and the reliability of the technology used to control emissions. Each member state has its own balance between these various variables. Where other means of control are not available and there is a need for tight control, frequent testing to demanding procedures may be the most cost/effective response. In other countries, it may be more cost effective to have test intervals at the level set in the directive 96/96/EC but supplemented by unannounced roadside checks. In other countries, where emission control has a lower level of importance, testing may be required at the intervals in the directive but the specified test procedure may be less demanding.

Ideally, before there are any future discussions on the detail of new test procedures, and before any further attempts are made to harmonize existing procedures, there should be an agreement on issues such as the date of first test and the frequency thereafter. However, this is unlikely to be achieved in the short term. Nevertheless the influence of these factors must not be forgotten in discussions about future test procedures.

(ii) Visual inspection of emission relevant equipment.

The working group of CITA members looking at type specific emission limits² has already made recommendations for improvements to the requirements in the directive for the visual inspection of emission related equipment. Although these are probably the most severe that could be agreed on a Europe wide basis at the present time, they do not go far enough for those wishing to have effective controls.

To be more effective the visual controls need to be made against vehicle type specific recommendations by the vehicle manufacture about the equipment that is critical to the emission performance of the vehicle. Collecting and distributing such information from manufacturers is a time consuming and difficult task. It is practical only in a few member states at present. The task could however be made much simpler and cost effective if a European-wide database of information could be established taking information direct from the manufacturers. To be practical, the provision and verification of the necessary information in a prescribed format would have to be made a type approval requirement.

The information could be distributed by a number of means. It could be embedded in the vehicle software or recorded on a vehicle specific "smart card". Alternatively the information could be held on an internet based database so that it could be made available readily and reliably at the point of test. The group was of the firm view that the Commission should give serious consideration to how this development and that it should urgently initiate a preliminary investigation into how it could be implemented and financed.

(iii) Pre-conditioning.

It is essential for reliable emission tests that proper account is taken of the working temperature of the vehicle at the time of test. That is not to say that all vehicles must be brought fully up to temperature as this would be time consuming and remove efficiencies that can be gained by 'fast pass/fast fail' procedures in use in many member states. Nevertheless much more attention must be made to the question of pre-conditioning which might include other factors , such as the build up of exhaust system deposits on diesel engines although such vehicles are outside the scope of this work.

Since the issue of pre-conditioning has to take account not just of the technical factors that affect the test results but also the influence of the type of testing regimes, booking system, prevailing weather conditions and many other factors, the group felt unable to undertake any useful work within the limits imposed by being just a working group, with no opportunity for experimental work. The group however was fully aware of the work done within study 4 of the 2nd CITA Programme of Studies on Emission Testing at Periodic and Other Inspections and supports the conclusions of that study that more work is necessary.

(iv) Information to customers.

Some members of the group thought that much more attention should be paid to the information fed back to vehicle owners after emission tests. Although clearly such information has no bearing on the results of the test, it was felt that to maintain public acceptance of the test and to assist vehicle owners to get their vehicle repaired in an appropriate manner, much more information about the reasons for failure should be given and that the specification of the information to be provided could be prescribed in the directive itself.

A wider issue is the collection and dissemination of the results of inspection by type of vehicle. This information can provide an important service to vehicle buyers. Examples are

"Weak points on cars" published in Sweden and an equivalent publication in Germany produced by TÜV. Collection of information on an EU wide basis would provide additional information. Although it would be expensive, it could probably be done as a commercial venture provided there was agreement on the scope of the items to be included, the definitions of failure and the information to be collected. However, the group did not make any specific proposals on how this could be taken forward as it was outside the scope of the study.

(v) Test procedures.

Although the group did not think that it was an effective use of their time to develop more detailed harmonized procedures for the test currently prescribed in the directive, they were firmly of the view that any new procedures mandated by the directive must be accompanied by more detailed specifications of the test procedure to be followed, the equipment to be used and the conditions under which the test can be done to avoid the sort of deviations between member states that are currently seen. Agreeing what should be prescribed in the directive will be difficult whilst there were differences in the date of first test, the test frequency, the availability of other means of control, such as roadside checks, and the perceived political importance of emission testing. However, the Group thought that this should be the aim and that they would be willing to assist with the development of proposals for more detailed requirements through participation in the appropriate CITA working groups.

In addition to the above issues, the group also worked through the other issues raised in the paper prepared following the survey on emission procedures. The following points were made:-

(i) The survey results on the time taken to undertake emission tests must be interpreted with caution. Due account must be made of the fact that the time in some cases is not just for the emission test itself but includes associated administrative processes, particularly if the emission test is done separately to the roadworthiness test. Also the way testing is organized (centralised, de-centralised, the layout of the test lane, the equipment used (automated, manual), the procedures used and whether additional parameters were checked all had an influence on the overall time.

(ii) While it was highly desirable to put limits on the ambient conditions under which testing can take place, it will be very difficult to agree limits that are suitable, practical and economic for the whole of Europe.

(iii) Standards for equipment and controls on calibration arrangements should form part of all future test procedures.

6. Conclusions and recommendations

As a result of its discussions, the group agreed the following conclusions and recommendations:-

(i) Given the work involved and the uncertainty of the benefits, it was not now a cost/effective use of time to develop 'best practice' procedures to try to improve the effectiveness of the current test prescribed in directive 96/96/EC.

(ii) Future test procedures prescribed in the directives should be more closely specified to prevent significant divergence between the actual procedures developed in each member state.

(iii) The CITA Working Group on Emissions would be willing to assist in the development of proposals for future procedures.

(iv) The Commission should look at the provision on an EU wide basis of emission relevant information about the equipment fitted to vehicles in order to increase the effectiveness of the visual examination done as part of an emission test. The information for this database could be collected on a mandatory basis during type approval and it could be made available at the time of test by a variety of means, for instance via the internet or vehicle specific "smart cards".

(v) The Commission should sponsor further research on the influence of engine condition (temperature) on the results of periodic emission tests with a view to improving the understanding of the influence of the various factors and as a basis for improved requirements on this aspect in the directive.

(vi) The Commission should consider whether the directive should be amended to include requirements on the information to be given to vehicle owners following a periodic emission test.

7. Acknowledgements

The working group members acknowledge and thank the EU Commission for their financial support for this work

APPENDIX 1 – LIST OF PARTICIPANTS

NAME	ORGANISATION
A.RICHTER	RWTÜV, GERMANY
G.AFFLERBACH	RWTÜV, GERMANY
J-P HUSSON	UTAC, FRANCE
M.ERICSSON	BILPROVNINGEN, SWEDEN (Swedish EPA)
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A.RIJNDERS	RDW, NETHERLANDS
H-J.MAÜRER	DEKRA, GERMANY
M.PRAEVCKE	VdTÜV, GERMANY
H-G. WEISSHAAR	EGEA (ROBERT BOSCH GmbH)
O.FRANKEN	EGEA (SENSORS EUROPE GmbH)
J.DAVID	CITA

APPENDIX 2 - QUESTIONNAIRE



CITA QUESTIONNAIRE ON METHODS USED IN THE EU FOR TESTING EMISSIONS FROM PETROL VEHICLES

1.	Name of person completing questionnaire	
2.	e-mail address or fax number	
3.	Name of organisation	
4.	Description and status of organisation (e.g. Ministry, supervising authority, testing body, etc.)	
5.	Geographical area where procedure is used (e.g. country, state, region or organisation)	

General

6.	Approximately how long do emission tests take?	
	(a) For vehicles <u>without</u> three-way catalyst	(minutes)
	(b) For vehicles <u>with</u> three-way catalyst	(minutes)
7.	Is the cost of the emission test included in the periodic inspection fee?	Yes/No
8.	If no, what is the fee, in euro?	
	(a) For vehicles <u>without</u> three-way catalyst	
	(b) For vehicles <u>with</u> three-way catalyst	
9.	How frequently are emission tests done? (answer in the form 1/1/1..., 3/2/2..., 4/1/1... etc)	
10.	Where are emission tests done?	
	(a) Inside inspection centres.	Yes/No
	(b) Outside at inspection centres.	Yes/No
	(c) In commercial garages	Yes/No
	(d) In the workshops of vehicle operators.	Yes/No
	(e) Elsewhere (specify)	
11.	Do you have fully documented emission test procedures? If 'yes' please attach a copy	Yes/No

For vehicles not controlled by an advanced emission control system such as a lambda controlled three way catalyst

12.	What <u>initial visual</u> inspections do you undertake?		
	(a) Visual inspection of the exhaust for leaks		Yes/No
	(b) Visual inspection of emission control system		Yes/No
	(c) Other (describe)		
13.	What information about the vehicle do you record or verify?		
	(a) Vehicle registration mark/number		Yes/No
	(b) Vehicle make/model		Yes/No
	(c) Engine capacity		Yes/No
	(d) Engine type identifier		Yes/No
	(e) VIN number		Yes/No
	(f) Other (please specify)		
14.	Do you stop testing when ambient conditions are outside specified limits?		Yes/No
	<i>If yes, what are the limits?</i>	Atmospheric pressure?	
		Ambient temperature?	
		Ambient humidity?	
15.	Do you pre-condition the engine before measuring the emissions?		Yes/No
16.	If yes, what do you do?		
	(a) Run the engine until a specified temperature is reached?		Yes/No
	(b) Run the engine at a specified speed for a specified time?		Yes/No
	(c) Drive the vehicle for minimum time or distance?		Yes/No
	(d) Other (please describe)		
17.³	If you do not pre-condition, do you require the engine to be fully warm when the vehicle is bought for test and test it on arrival?		Yes/No
18.¹	If you do not pre-condition before test, do you condition the vehicle if its emissions are outside the limits after the first test?		Yes/No

¹ ONLY ANSWER THESE QUESTIONS IF YOU DO NOT ALWAYS PRE-CONDITION BEFORE TEST

19.¹	If yes, what do you do?	
	(a) Run the engine until a specified temperature is reached?	Yes/No
	(b) Run the engine at a specified speed for a specified time?	Yes/No
	(c) Drive the vehicle for minimum time or distance?	Yes/No
	(d) Other (please describe)	
20.	If you measure engine temperature, what do you measure?	
	(a) Water temperature?	Yes/No
	(b) Oil temperature?	Yes/No
	(c) Engine surface temperature?	Yes/No
	(d) Other? (Please specify)	
21.	What exhaust gas components do you control?	
	(a) HC	Yes/No
	(b) CO	Yes/No
	(c) NO _x	Yes/No
	(d) Other (Please specify)	
22.	Do you measure or calculate any of the following vehicle/engine parameters?	
	(a) Idle speed	Yes/No
	(b) Ignition timing	Yes/No
	(c) Dwell angle	Yes/No
	(d) Other (list/describe)	

¹ ONLY ANSWER THESE QUESTIONS IF YOU DO NOT ALWAYS PRE-CONDITION BEFORE TEST

23.	What pass/fail limits do you apply?			
		EU Default limits	Manufacturer's limits	Other (specify)
	(a) For CO	Yes/No	Yes/No	Yes/No
	(b) For HC (if measured)	Yes/No	Yes/No	Yes/No
	(c) For other components	N/A	Yes/No	Yes/No
	(d) For other engines parameters	N/A	Yes/No	Yes/No
24.	What test procedure do you use? (please describe)			
25.	Is the vehicle owner/presenter given the emission measurements?			Yes/No
26.	Do you record all the emission and other measurements that you make?			Yes/No
27.	If yes, do you regularly analyse the information?			Yes/No

For vehicles controlled by an advanced emission control system such as a lambda controlled three way catalyst

28.	What <u>initial visual</u> inspections do you undertake?			
	(a) Visual inspection of the exhaust for leaks			Yes/No
	(b) Visual inspection of emission control system			Yes/No
	(c) Other (describe)			
29.	What information about the vehicle do you record or verify?			
	(a) Registration mark/number			Yes/No
	(b) Vehicle make/model			Yes/No
	(c) Engine capacity			Yes/No
	(d) Engine type identifier			Yes/No
	(e) VIN number			Yes/No
	(f) Other (please specify)			

30.	Do you stop testing when ambient conditions are outside specified limits?	Yes/No
	If yes, what are the limits?	
	Atmospheric pressure?	
	Ambient temperature?	
	Ambient humidity?	
31.	Do you pre-condition the engine before measuring the emissions?	Yes/No
32.	If yes, what do you do?	
	(a) Run the engine until a specified temperature is reached?	Yes/No
	(b) Run the engine at a specified speed for a specified time?	Yes/No
	(c) Drive the vehicle for minimum time or distance?	Yes/No
	(d) Other (please describe)	
33.⁴	If you do not pre-condition, do you require the engine to be fully warm when the vehicle is bought for test and test it on arrival?	Yes/No
34.²	If you do not pre-condition before test, do you condition the vehicle if its emissions are outside the limits after the first test?	Yes/No
35.²	If yes, what do you do?	
	(a) Run the engine for a fixed time?	Yes/No
	(b) Run the engine until a specified temperature is reached?	Yes/No
	(c) Drive the vehicle?	Yes/No
	(d) Other? (Please specify)	
36.	If you measure engine temperature, what do you measure?	
	(a) Water temperature?	Yes/No
	(b) Oil temperature?	Yes/No
	(c) Engine surface temperature?	Yes/No
	(d) Other? (Please specify)	

² ONLY ANSWER THESE QUESTIONS IF YOU DO NOT ALWAYS PRE-CONDITION BEFORE TEST

37.	What exhaust gas components do you control?			
	(a) HC	Yes/No		
	(b) CO	Yes/No		
	(c) NO _x	Yes/No		
	(d) Other (Please specify)			
38.	Do you measure or calculate any of the following vehicle/engine parameters?			
	(a) Idle speed	Yes/No		
	(b) Ignition timing	Yes/No		
	(c) Lambda	Yes/No		
	(d) Dwell angle	Yes/No		
	(e) Other (list/describe)			
39.	What pass/fail limits do you apply?			
		EU Default limits	Manufacturer's limits	Other (specify)
	(a) For CO	Yes/No	Yes/No	Yes/No
	(b) For HC (if measured)	Yes/No	Yes/No	Yes/No
	(c) For other components	N/A	Yes/No	Yes/No
	(d) For other engines parameters	N/A	Yes/No	Yes/No
40.	What test procedure do you use? <i>(please describe)</i>			
41.	Is the vehicle owner/presenter given the emission measurements?	Yes/No		
42.	Do you record all the emission and other measurements that you make?	Yes/No		
43.	If yes, do you regularly analyse the information?	Yes/No		

Equipment and calibration arrangements

44.	Do you have specifications for the emission test instruments? ⁵	Yes/No
45.	If yes, are they -	
	(a) National specifications not based on OIML?	Yes/No
	(b) National specifications based on OILM?	Yes/No
	(c) OIML without any additions?	Yes/No
	(d) Other? (please specify)	
	In all cases please attach a copy of the specification	
46.	How frequently are emission analysers calibrated/re-calibrated?	
	(a) According to the manufacturer's recommendation?	Yes/No
	(b) More frequently (please also give the frequency in the form 1/1/1..., 1/2/ 1/2/ 1/2..., 1/4/ 1/4/ 1/4..., etc)	Yes/No
47.	Does an independent body do the calibration?	Yes/No
48.	Are there means to ensure that calibration is done correctly and at the specified frequency?	Yes/No
49.	If yes, please describe	

Emission retest arrangements

50.	Are vehicles that fail the emission test always brought back for re-testing?	Yes/No
51.	If no, describe the circumstances in which they do not have to be brought back for an emission re-test.	
52.	Are vehicles brought back for an emission re-test given a full emission test?	Yes/No

³ IF YOU SPECIFY DIFFERENT EQUIPMENT FOR TWC VEHICLES AND PRE-TWC VEHICLES, PLEASE COMPLETE THIS SECTION FOR EACH TYPE.

53.	If they are <u>not</u> given a full emission check, describe what checks are done.	
54.	List any other <u>important</u> aspects of your exhaust emission testing procedures that are <u>not</u> covered by this questionnaire. If necessary, continue on a separate sheet.	

Please return the completed questionnaire to

CITA asbl
Rue de la Technologie 21-25
B-1082 BRUSSELS

FAX: + 32 (0)2 469 07 95
e-mail: cita.vehicleinspection@skynet.be

APPENDIX 3 – RESULTS OF SURVEY

General

TABLE 1

6. Approximately how long do emission tests take? (a) for vehicles without three-way catalyst
(b) for vehicles with three-way catalyst
7. Is the cost of the emission test included in the periodic inspection fee?
if no, what is the fee, in euro? (a) for vehicles without three-way catalyst
(b) for vehicles with three-way catalyst
9. How frequently are emission tests done?
Where are emission tests done? (a) inside inspection centres
(b) outside at inspection centres
(c) in commercial garages
(d) in the workshops of vehicle operators
(e) elsewhere (specify)
11. Do you have fully documented emission test procedures?

	Q6. duration		Q7. incl. PI fee?	Q8. if not, fee? €		Q9. frequency?	Q10. where?					Q11. procedures?	
	(a)	(b)		(a)	(b)		(a)	(b)	(c)	(d)	(e)		
Austria-1	6'	6'	yes	-	-	1/1/1	yes	-	yes ⁽¹⁾	no	-	yes	yes
Belgium-1	1'	1'30"	no	2,97	2,97	4/1/1 ⁽²⁾ 6m/6m or 3m/3m 6m/6m/6m	yes	yes	no	no	-	no	yes
Denmark-1	3'-5'	3'-5'	yes	-	-	-	yes	no	no	no	-	no	yes
Finland-1	2'	3'	no	8,30	8,30	3/2/1	yes	yes	yes	yes	-	yes	yes
Finland-2	2'	4'	no	8,00	8,00	1/1/1 ⁽³⁾ 3/2/1	yes	no	yes	yes	-	yes	no
France-1	2'-3'	5'-6'	yes ⁽⁴⁾	free competition		4/2/2 ⁽⁴⁾ 4/1/1	yes	yes	no	no	-	no	yes
France-2	4'	10'	yes	-	-	4/2/2 ⁽⁵⁾ 4/1/1	yes	yes	no	no	-	no	annexe
Germany-1	10'	20'	no	20,00	35,00	1/1/1 ⁽⁶⁾ 3/2/2	yes	no	yes	yes	-	yes	no
Germany-2	10'	15-20'	no	15,00-20,00	15,00-20,00	0/1/1 ⁽⁷⁾ 3/2/2	yes	no	yes	yes	-	yes	yes

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Germany-3	10'	20'	no	20,00	35,00	1/1/1 ⁽⁸⁾ 3/2/2	yes	no	yes	yes	-	?
Great-Britain-1	3'	10'	yes	-	-	3/1/1 ⁽⁹⁾ 1/1/1	yes	no	yes	no	-	annexe
Greece-1						4/1/1						
Ireland-1	3'	5'	yes	-	-	4/2/2	yes	no	no	no	-	annexe
Italy-1	3'	5'	-	10,00	10,00	4/2/2	yes	no	no	no	-	annexe
Luxembourg-1	30"	1'	yes	4,00	4,00	3,5/1/1 ^(*) 1/1/1 6m/6m/6m	yes ^(*)	(*)	no	yes ^(*)	-	annexe
Netherlands-1	2'	5'		free competition		3/1/1	-	-	yes	-	-	yes
N-Ireland-1	3'	n/a	yes	-	-	4/1/1	yes	no	no	no	-	yes
Portugal-1												
Spain-1	3'	8'	yes	-	-	4/2/2/2/1 ^(*) 2/2/2/1/1/1/1/6m 1 x10/6m 2/1/1/1/6m 1/1/1/1/1/6m	yes	no	no	no	-	yes
Spain-2												
Sweden-1	2'-3'	5'-7'	yes	-	-	3/2/1/1	yes	yes	no	no	-	yes

(1) Q10d: licensed by the authority

(2) Q9: 4/1/1 = M₁; 6m/6m/6m of 3m/3m/3m = M₂-M₃; 6m/6m/6m = N

(3) Q9: 1/1/1 = taxis, ambulances; 3/2/1 = M₁, N₁ other than taxis & ambulances

(4) Q7: except for 'complementary inspections' concerning the emissions of LGV conducted once every 2 years; Q9: 4/2/2 = private cars; 4/1/1 = LGV

(5) Q9: 4/2/2 = M₁; 4/1/1 = N₁

(6) Q9: 1/1/1 = vehicles without three-way catalyst - 3/2/2 = vehicles with three-way catalyst

(7) Q9: 3/2/2 = lambda-controlled - 1/1/1 = others

(8) Q9: 1/1/1 = vehicles without three-way catalyst - 3/2/2 = vehicles with three-way catalyst

(9) Q9: majority: 3/1/1 - others, taxi's, ambulances: 1/1/1

(*) Q9: 3,5/1/1 = passenger vehicles <= 3.500 kg; 1/1/1 = goods vehicles <= 3.500 kg; 6m/6m/6m = all vehicles > 3.500 kg; Q10a: only petrol vehicles; Q10b: only diesel vehicles; Q10d: vehicles > 3.500

(*) Q9: 4/2/2/2/1 = private cars; 2/2/2/1/1/1/6m = goods vehicles (< 3.500 kg); 1 x10/6m = goods vehicles (> 3.500 kg); 2/1/1/1/6m = passenger vehicles (< 8 pass.);

1/1/1/1/1/6m = passenger vehicles (> 8 pass.)

For vehicles not controlled by an advanced emission control system such as a lambda controlled three-way catalyst

TABLE 2

12. What initial visual inspection do you undertake?
 (a) visual inspection of the exhaust for leaks
 (b) visual inspection of emission control system
 (c) other (describe)
13. What information about the vehicle do you record or verify?
 (a) registration mark/number (e) VIN number
 (b) vehicle make/model (d) engine type identifier (f) other (specify)
14. Do you stop testing when ambient conditions are outside specified limits?
 (a) atmospheric pressure? (b) ambient temperature? (c) ambient humidity?

	Q12. initial visual inspection?			Q13. information recorded/verified?						Q14. ambient conditions outside limits		
	(a)	(b)	(c)	(a)	(b)	(c)	(d)	(e)	(f)	(a)	(b)	(c)
Austria-1	yes	yes	inspection of the ignition system including the measuring of specific data as ignition voltage, dwell angle, visual inspection of the intake filter if needed,...	yes	yes	no	yes	yes	-	no	-	-
Belgium-1	yes	yes	-	yes	yes	yes	no	yes	-	no	-	-
Denmark-1	yes	yes	-	yes	yes	no	no	yes	-	no	-	-
Finland-1	yes	yes	-	yes	no	no	no	yes	-	no	-	-
Finland-2	yes	yes	-	yes	no	no	no	yes	-	no	-	-
France-1	yes	no	visual inspection of hoses belts & condition of engine	yes	yes	no	no	yes	-	(1)	-	-
France-2	yes	yes	-	yes	yes	no	no	yes	-	yes	no	< 5°C or < 40°C
Germany-1	yes	yes	-	yes	yes	no	yes	yes	-	yes	860-1060 hPa	5°C to 40°C
Germany-2	yes	yes	visual inspection of all emission relevant parts, incl. injection system, air filters & narrow tank filling opening	yes	yes	no	no	yes	(2)	no	-	-
Germany-3	yes	yes	-	yes	yes	?	?	yes	odometer	yes	860-1060 hPa	5°C-40°C

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Great-Britain-1	yes	no	-	no	no	no	no	no	no	no	no	-	-	-
Greece-1														
Ireland-1	no	no	-	yes	no	no	yes	no	yes	no	no	-	-	-
Italy-1	yes	yes	-	yes	no	no	yes	no	no	yes	yes	85-102.5 kPa	5°C-40°C	-
Luxembourg-1	yes	yes	-	yes	yes	yes (*)	yes	yes	yes	no	no	-	-	-
Netherlands-1	yes	no	-	yes	no	yes	yes	no	yes	yes	no	-	-	-
N-Ireland-1	yes	yes	-	yes	yes	yes	yes	no	yes	no	no	-	-	-
Portugal-1														
Spain-1	yes	yes	-	yes	yes	yes	yes	yes	yes	yes	yes	690-770 mm Hg	5°C-30°C	no
Spain-2														
Sweden-1	yes	yes	-	yes	yes	yes	yes	yes	yes	yes	no	-	-	-

(1) Q14: the inspection centres are frost free

(2) Q13f: mileage, holder's name, date of test, target and measure values, last check, year of 1st permission

(*) Q13f: yes, if available

TABLE 3

15. Do you pre-condition the engine before measuring the emissions?
 if yes, what are the limits?
 (a) run the engine until a specified temperature is reached?
 (b) run the engine at a specified speed for a specified time?
 (c) drive the vehicle for minimum time or distance?
 (d) other (describe)
- 17.¹ If you do not pre-condition, do you require the engine to be fully warm when the vehicle is brought for test and test it on arrival?
 18.¹ If you do not pre-condition before test, do you condition the vehicle if its emissions are outside the limits after the first test?
 19.¹ If yes, what do you do?
 (a) run the engine until a specified temperature is reached?
 (b) run the engine at a specified speed for a specified time?
 (c) drive the vehicle for minimum time or distance?
 (d) other (describe)

¹ Only answer these questions if you do not always pre-condition before test

	Q15. pre-condition?	Q16. if yes, limits?				Q17. ¹ no pre-conditioning vehicle warm?	Q18. ¹ no pre-conditioning cond.if outside limits?	Q19. ¹ if yes, what do you do?						
		(a)	(b)	(c)	(d)			(a)	(b)	(c)	(d)			
Austria-1	yes, if needed	yes	no	no	-	yes	yes	no	no	no	-	-	-	-
Belgium-1	no	no	no	no	-	yes	no	no	no	no	-	-	-	-
Denmark-1	yes	yes	no	no	-	yes	yes	no	yes	yes	-	-	-	-
Finland-1	yes	yes	no	no	-	-	-	-	-	-	-	-	-	-
Finland-2	no	-	-	-	-	no	yes	no	no	no	no	no	run the engine until emission limit is reached or until normal engine temperature is reached	-
France-1	yes	yes	yes	yes ⁽¹⁾	(1)	-	-	-	-	-	-	-	-	-
France-2	yes	yes	no	yes	-	-	-	-	-	-	-	-	-	-
Germany-1	yes	yes	no	no	-	-	-	no	no	no	-	-	-	-
Germany-2	yes	yes	no	no	-	-	-	-	-	-	-	-	-	-
Germany-3	yes	yes	no	no	-	-	-	-	yes	no	no	no	-	-
Great-Britain-1	yes	no	yes	no	-	-	-	-	-	-	-	-	-	-
Greece-1														
Ireland-1	yes	yes	yes	no	-	-	-	-	-	-	-	-	-	-
Italy-1	yes	yes	no	no	-	yes	yes	no	no	no	no	no	-	-
Luxembourg-1	no	-	-	-	-	yes	yes	no	no	no	yes	yes	-	-
Netherlands-1	yes	no	in some cases	yes	-	-	-	-	-	-	-	-	-	-

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N-Ireland-1	no	-	-	-	yes	yes	yes	no	no	-
Portugal-1										
Spain-1	yes	yes	no	no	-	-	-	-	-	-
Spain-2										
Sweden-1	yes	yes	no	yes	no	yes	yes	no	yes	-

- (1) **Q16c:** yes, but this is normally done by the vehicle driver beforehand
Q16d: the vehicle must arrive with an engine warmed up by a min. 15 minutes or 5 km drive; the inspector completes the conditioning at high idle (+/- 3,000 tr/min) and next at idle until the starting and then stopping of the engine cooling fan or until an oil temperature of 80°C

TABLE 4

20. If you measure engine temperature, what do you measure? (a) water temperature? (c) engine surface temperature?
 (b) oil temperature? (d) other? (specify)
21. What exhaust gas components do you control? (a) HC (c) NO_x
 (b) CO (d) other (specify)
22. Do you measure or calculate any of the following vehicle/engine parameters? (a) idle speed (c) dwell angle
 (b) ignition timing (d) other (list/describe)

	Q20. engine temperature, what?				Q21. what gas components?				Q22. parameters?			
	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)
Austria-1	no	yes	no	-	yes	yes	no	-	yes	yes	yes	ignition voltage (peaks, comparison between the cylinders, function of time, compression ratio if HC > the limit of 600 ppm, ...)
Belgium-1	no	no	yes	temperature exhaust emission	no	yes	no	-	no	no	no	-
Denmark-1	yes	yes	no	-	no	yes	no	-	yes	no	no	-
Finland-1	no	yes	no	oil temperature if needed	yes	yes	no	after 01/01/00 O ₂ & CO ₂ components have to be documented	yes	no	no	-
Finland-2	no	no	no	oil temperature if needed	yes	yes	no	after 01/01/00 O ₂ & CO ₂ have to be marked on test documentation	yes	no	no	-
France-1	no	yes	no	indirect test by starting & then stopping of engine cooling fan	no	yes	no	CO2 to allow a correction of CO in case of	no ⁽¹⁾	no	no	-
France-2	yes	yes	no	-	no	yes	no	the equipment measures also HC and CO2, but there are no set limits for these components	no	no	no	-
Germany-1	yes	yes	no	-	no	yes	no	-	yes	yes	yes	-
Germany-2	no	yes	no	-	no	yes	no	normally CO - several 3-way cat.: 4-gas measurement comparable to λ-controlled cars	yes	yes	yes	-
Germany-3	yes	yes	no	-	no	yes	no	-	yes	yes	yes	-
Great-Britain-1	-	-	-	-	yes	yes	no	-	yes	no	no	-
Greece-1												
Ireland-1	no	yes	no	-	yes	yes	no	-	yes	no	no	-

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Italy-1	no	yes	no	-	-	-	no	yes	no	-	no	no	no	-
Luxembourg-1	no	yes (*)	-	-	-	-	no	yes	no	-	no	no	no	-
Netherlands-1	-	-	-	-	-	-	no	yes	no	-	yes	no	no	-
N-Ireland-1	no	yes	no	-	-	-	yes	yes	no	-	no	no	no	-
Portugal-1														
Spain-1	no	yes or ...	yes	-	-	-	no	yes	no	-	no	no	no	-
Spain-2														
Sweden-1	-	-	-	engine temperature at normal according to temperature gauge	-	-	yes	yes	no	-	no	no	no	-

(1) **Q21c:** CO₂ to allow a correction of CO in case of a dilution of the exhaust emissions by the air because of a non-detected leak or the impossibility to enter the probe deep enough

CO corrigé = CO lu x 15 / (CO lu + CO₂ lu)

(*) **Q20b:** min. 60°

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TABLE 5

23. What pass / fail limits do you apply? For (a) CO (c) other components (b) HC (if measured) (d) other engine parameters

	Q23. pass / fail limits											
	EU default limits				Manufacturer's limits				Other (specify)			
	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)
Austria-1	yes	no	n/a	n/a	yes	no	yes	yes	no	yes ⁽¹⁾	-	-
Belgium-1	yes	no	n/a	n/a	no	no	no	no	no	no	no	no
Denmark-1	yes	no	n/a	n/a	no	no	no	no	no	no	no	no
Finland-1	yes	no	n/a	n/a	yes	yes	no	yes	no	yes	yes	yes
Finland-2	yes	-	n/a	n/a	yes	yes	-	yes	-	yes	-	yes
France-1	yes	-	n/a	n/a	no	no	no	no	no	no	no	no
France-2	yes	no	n/a	n/a	no	no	no	no	-	-	-	-
Germany-1	yes	no	n/a	n/a	yes	no	yes	yes	no	no	no	no
Germany-2	yes	no	n/a	n/a	yes	no	yes	yes	yes ⁽²⁾	no	no	yes
Germany-3	yes	no	n/a	n/a	yes	no	yes	yes	no	no	no	no
Great-Britain-1	yes	no	n/a	n/a	no	no	no	no	n/a	yes ⁽³⁾	no	no
Greece-1												
Ireland-1	yes	yes	n/a	n/a	no	no	yes	yes	no	no	no	no
Italy-1	yes	-	n/a	n/a	-	-	-	-	yes ^(*)	-	-	-
Luxembourg-1	yes	n/a	n/a	n/a	no	n/a	n/a	n/a	no	n/a	n/a	n/a
Netherlands-1	yes	-	-	-	yes	-	-	yes	no	-	-	-
N-Ireland-1	yes	yes	n/a	n/a	no	no	no	no	no	no	no	no
Portugal-1												
Spain-1	yes	no	n/a	n/a	yes	no	no	no	no	no	no	no
Spain-2												
Sweden-1	yes	no	n/a	n/a	no	no	no	-	no	yes ^(*)	no	-

(1) Q23other: 600ppm or compression ratio less than 80% of manufacturers standard for the new vehicles

(2) Q23other: national limits

(3) Q23other: GB-limits

(*) Q23other: national limits

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TABLE 6

24. What test procedure do you use?
 25. Is the vehicle owner/presenter given the emission measurements?
 26. Do you record all the emission and other measurements that you make?
 27. If yes, do you regularly analyse the information?

	Q24. test procedure?	Q25.	Q26. records?	Q27. analysis?
Austria-1	as given in directive 96/96/EC - for ignition or compression measuring normal methods and know-how of engineers	yes	yes	no
Belgium-1	cf. annexe	no	no	no
Denmark-1	CO is measured at idle - limits: 3,5%, 4,5% before 01/10/86 & 5,5% before 01/04/84 - multiple exhaust pipes are connected during testing	yes	yes	yes
Finland-1	96/96/EC: CO (%) limits before 01/10/86 = 4,5 later = 3,5 HC (ppm) limits before 01/10/86 = 1000 later = 600 also O ₂ & CO ₂ components are documented	yes	yes	yes
Finland-2	96/96/EC: CO (%) limits before 01/10/86 = 4,5 later = 3,5 HC (ppm) limits before 01/10/86 = 1000 later = 600 if manufacturer's emission limits are greater than EC or other limits, then manufacturer's limits are used	yes	yes	yes
France-1	cf. annexe	not systematically	no	-
France-2	probe in tailpipe - warm engine - at idle speed after having eliminated HC residues	yes	yes	yes
Germany-1	measuring at idle speed and high-idle speed (2500-2800 1/min)	yes	yes	yes
Germany-2	cf. Q21d	yes	yes	yes
Germany-3	-	yes	yes	yes
Great-Britain-1	inspection manual (cf. annexe)	no	no	no
Greece-1				
Ireland-1	cf. annexe	yes	yes	yes
Italy-1	cf. annexe	cf. Q54.	yes	no
Luxembourg-1	specifications of 96/96/EC (cf. annexe)	yes (on request)	no	no
Netherlands-1	date first used before 01/01/80 measuring CO - date first used after 31/12/79 measuring idle speed & CO	no	no	no

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	check that the analyser probe can be inserted into the tailpipe - use the exhaust gas analyser to determine the proportions of CO and HC in the exhaust gas over a period of at least 5 seconds at idle - if a vehicle meets the CO requirement at its normal idling speed but fails the HC check, re-check the HC level at a high idle speed of 2000 rpm, if the HC reading is than 1200 PPM or less, the vehicle will meet both CO and HC requirements - the CO requirement must be met with the engine running at its normal (low) idling speed	only if emissions fail	no	-
N-Ireland-1				
Portugal-1				
Spain-1	procedure 96/96/EC	yes	yes	yes
Spain-2				
Sweden-1	exhaust emission testing at idle & high idle according to directive 96/96/EC	yes	yes	yes

For vehicles controlled by an advanced emission control system such as a lambda controlled three-way catalyst

TABLE 7

- 28.** What initial visual inspections do you undertake?
 (a) visual inspection of the exhaust for leaks
 (b) visual inspection of emission control system
 (c) other (describe)
- 29.** What information about the vehicle do you record or verify?
 (a) registration mark/number (d) engine type identifier
 (b) vehicle make/model (e) VIN number
 (c) engine capacity (f) other (specify)
- 30.** Do you stop testing when ambient conditions are outside specified limits?
 if yes, what are the limits?
 (a) atmospheric pressure?
 (b) ambient temperature?
 (c) ambient humidity?

	Q28. initial visual inspection?			Q29. information recorded/verified?						Q30.		
	(a)	(b)	(c)	(a)	(b)	(c)	(d)	(e)	(f)	(a)	(b)	(c)
Austria-1	yes	yes	visual inspection of intake filter if needed	yes	yes	no	yes	yes	-	no	-	-
Belgium-1	yes	yes	-	yes	yes	yes	no	yes	-	no	-	-
Denmark-1	yes	yes	-	yes	yes	no	no	yes	-	no	-	-
Finland-1	yes	yes	-	yes	no	no	no	yes	-	no	-	-
Finland-2	yes	yes	-	yes	no	no	no	yes	-	no	-	-
France-1	yes	no	visual inspection of hoses belts & condition of engine	yes	yes	no	no	yes	-	(1)	(1)	-
France-2	yes	yes	-	yes	yes	no	no	yes	-	yes	5°C to 40°C	no
Germany-1	yes	yes	-	yes	yes	no	yes	yes	-	yes	5°C to 40°C	< 90%
Germany-2	yes	yes	cf. Q12c	yes	yes	no	no	yes	cf. Q13f	no	-	-
Germany-3	yes	yes	-	yes	yes	?	?	yes	odometer (2)	yes	5°C to 40°C	< 90%
Great-Britain-1	yes	no	-	yes	yes	yes	yes	yes		yes	5°C to 40°C	< 90%
Greece-1												

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Ireland-1	no	no	-		yes	yes	yes	no	yes	-	no	-	-	-
Italy-1	yes	yes	-	yes	no	no	no	no	no	-	yes	85-102.5 Kpa	5°C-40°C	-
Luxembourg-1	yes	yes	-	yes	yes	yes	yes	yes (*)	yes	engine power; no. of engine cylinders + fuel consumption & CO ₂ emissions (> 12/00)	no	-	-	-
Netherlands-1	yes	yes	-	yes	yes	no	yes	yes	yes	-	no	-	-	-
N-Ireland-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Portugal-1														
Spain-1	yes	yes	-	yes	yes	yes	yes	yes	yes	date of first matriculation & homologation no.	yes	690-770 mm Hg	5°C-30°C	no
Spain-2														
Sweden-1	yes	yes	-	yes	yes	yes	yes	yes	yes	exhaust emission control	no	-	-	-

(1) Q14: the inspection centres are frost free

(2) Q29f: other identifying features as specified by vehicle manufacturers, e.g. engine management system

(*) Q29d: yes, if available

TABLE 8

31. Do you pre-condition the engine before measuring the emissions?
 if yes, what are the limits?
 (a) run the engine until a specified temperature is reached?
 (b) run the engine at a specified speed for a specified time?
 (c) drive the vehicle for minimum time or distance?
 (d) other (describe)
32. If you do not pre-condition, do you require the engine to be fully warm when the vehicle is brought for test and test it on arrival?
 if you do not pre-condition before test, do you condition the vehicle if its emissions are outside the limits after the first test?
 if yes, what do you do?
 (a) run the engine for a fixed time?
 (b) run the engine until a specified temperature is reached?
 (c) drive the vehicle?
 (d) other (describe)

² Only answer these questions if you do not always pre-condition before test

	Q31. pre-conditioning?	Q32. if yes, limits?				Q33. ² no pre-conditioning vehicle warm?	Q34. ² no pre-conditioning cond. if outside limits?	Q35. ² if yes, what do you do?														
		(a)	(b)	(c)	(d)			(a)	(b)	(c)	(d)											
Austria-1	yes, if needed	yes	no	no	-	yes	yes	no	yes	no	no	no	-	-	-	-	-	-	-	-	-	-
Belgium-1	no	no	no	no	-	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	-
Denmark-1	yes	yes	no	no	-	yes	yes	no	yes	no	yes	yes	no	yes	no	no	no	no	no	no	no	-
Finland-1	yes	yes	no	no	-	-	-	no	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Finland-2	no	-	-	-	-	no	yes	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	run the engine until emission limit is reached or until normal engine temperature is reached
France-1	yes	yes	yes	(1)	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
France-2	yes	yes	no	yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Germany-1	yes	yes	no	no	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Germany-2	yes	yes	yes	no	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Germany-3	yes	yes	no	no	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Great-Britain-1	yes	yes	no	no	-	-	-	-	-	-	cf. Q54	-	-	-	-	-	-	-	-	-	-	-
Greece-1																						
Ireland-1	yes	yes	yes	no	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Italy-1	yes	yes	no	no	-	yes	yes	no	yes	no	yes	yes	no	yes	no	yes	no	no	no	no	no	-
Luxembourg-1	no	-	-	-	-	yes	yes	-	-	yes	yes	yes	no	no	no	yes	yes	no	yes	yes	yes	-
Netherlands-1	yes	yes	yes	yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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N-Ireland-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Portugal-1																			
Spain-1	yes	yes	no	no	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spain-2																			
Sweden-1	no	no	no	no	-	no	no	no	yes	no	no	no	yes	no	no	no	yes	no	-

(1)

Q32c: yes, but this is normally done by the vehicle driver beforehand

Q32d: the vehicle must arrive with an engine warmed up by a min. 15 minutes or 5 km drive; the inspector completes the conditioning at high idle (+/- 3.000 tr/min) and next at idle until the starting and then stopping of the engine cooling fan or until an oil temperature of 80°C

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TABLE 9

- 36.** If you measure engine temperature, what do you measure? (a) water temperature? (c) engine surface temperature?
 (b) oil temperature? (d) other? (specify)
- 37.** What exhaust gas components do you control? (a) HC (c) NO_x
 (b) CO (d) other (specify) (e) dwell angle
 (a) idle speed (f) other (list/describe)
 (b) ignition timing
 (c) lambda
- 38.** Do you measure or calculate any of the following vehicle/engine parameters?

	Q36. engine temperature, what?				Q37. what gas components?				Q38. parameters?				
	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(e)
Austria-1	no	yes	no	-	yes	yes	no	-	yes	no	yes	no	-
Belgium-1	no	no	yes	temperature exhaust emission	no	yes	no	-	no	no	yes	no	-
Denmark-1	yes	yes	no	-	yes	yes	no	O ₂	yes	no	yes	no	-
Finland-1	no	yes	no	-	yes	yes	no	after 01/01/00 O ₂ & CO ₂ components have to be documented	yes	no	yes	no	also high idle (= >2000 rpm) & λ-value with high idle speed
Finland-2	no	no	no	oil temperature if needed	yes	yes	no	after 01/01/00 O ₂ & CO ₂ have to be marked on test documentation	yes	no	yes	no	also high idle (= >2000 rpm) & λ-value with high idle speed
France-1	no	yes	no	indirect test by starting & then stopping of engine cooling fan	no	yes	no	-	yes	no	yes	no	-
France-2	yes	yes	no	-	no	yes	no	the equipment measures also HC and CO ₂ , but there are no set limits for these components	no	no	yes	no	-
Germany-1	yes	yes	no	-	-	-	-	-	yes	yes	yes	yes	control circuit test
Germany-2	no	yes	no	-	no	yes	no	lambda (calculated)	yes	yes	yes	yes	-
Germany-3	yes	yes	no	-	no	yes	no	-	yes	yes	yes	yes	control circuit test
Great-Britain-1	no	yes	no	-	yes	yes	no	-	yes	no	yes	no	-
Greece-1													
Ireland-1	no	yes	no	-	yes	yes	no	-	yes	no	yes	no	-
Italy-1	no	yes	no	-	no	yes	no	-	no	no	yes	no	-
Luxembourg-1	no	yes	no	-	no	yes	no	-	no	no	yes	no	-

TABLE 10

39. What pass / fail limits do you apply? For (a) CO (c) other components (b) HC (if measured) (d) other engine parameters

	Q39. pass / fail limits											
	EU default limits				Manufacturer's limits				Other (specify)			
	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)
Austria-1	yes	?	yes	n/a	no	yes	yes	-	-	60 ppm	-	-
Belgium-1	yes	no	n/a	n/a	no	no	no	no	no	no	no	no
Denmark-1	yes	no	n/a	n/a	no	no	lambda	-	no	no	no	no
Finland-1	yes	yes	n/a	n/a	no	no	no	-	yes	yes	yes	-
Finland-2	yes	yes	n/a	n/a	yes	yes	-	yes	-	-	no	-
France-1	yes	-	n/a	n/a	no	no	no	no	no	no	no	no
France-2	yes	-	n/a	n/a	-	-	-	-	-	-	-	yes
Germany-1	yes	no	yes	no	yes	no	yes	yes	no	no	no	no
Germany-2	yes	no	n/a	n/a	yes	no	yes	yes	yes ⁽¹⁾	no	yes	no
Germany-3	yes	no	n/a	n/a	yes	no	yes	yes	no	no	no	no
Great-Britain-1	yes	yes	n/a	n/a	yes	yes	yes	no	no	no	lambda	no
Greece-1												
Ireland-1	yes	yes	n/a	n/a	no	no	yes	yes	no	no	no	no
Italy-1	yes	-	n/a	n/a	no	-	-	-	no	-	-	-
Luxembourg-1	yes	n/a	n/a	n/a	no	n/a	n/a	n/a	-	n/a	n/a	n/a
Netherlands-1	yes	no	n/a	n/a	yes	no	no	yes	no	no	no	no
N-Ireland-1	-	-	-	-	-	-	-	-	-	-	-	-
Portugal-1												
Spain-1	yes	no	n/a	n/a	yes	no	no	no	no	no	no	no
Spain-2												
Sweden-1	yes	no	n/a	n/a	no	no	no	no	-	100 ppm	no	no

(1) Q39other: national limits

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TABLE 11

40. What test procedure do you use?
 41. Is the vehicle owner/presenter given the emission measurements?
 42. Do you record all the emission and other measurements that you make?
 43. If yes, do you regularly analyse the information?

		Q40. test procedure?	Q41.	Q42. records?	Q43. analysis?
Austria-1		96/96/EC	yes	yes	no
Belgium-1		cf. annexe	no	no	no
Denmark-1		measurements made at idle and at 2.500 +/- 200 rpm - limits must comply with relevant directives from the year of the vehicles' first registration	yes	yes	yes
Finland-1		96/96/EC: CO (%) limits before 01/10/86 = 4,5 later = 3,5 HC (ppm) limits before 01/10/86 = 1000 later = 600 lambda before 01/10/86 = 0,97-1,03 later = 0,97-1,03 also O₂ & CO₂ components are documented	yes	yes	yes
Finland-2		96/96/EC: CO (%) limits idling speed = 0,5 => 2000 rpm = 0,3 HC (ppm) limits idling speed = 100 => 2000 rpm = 100 lambda idling speed = 0,97-1,03 => 2000 rpm = 0,97-1,03 if manufacturer's emission limits are greater than EC or other limits, then manufacturer's limits are used	yes	yes	yes
France-1		cf. annexe	not systematically	no	no
France-2		trials at idle and high idle speed (2.500-3.000 min ⁻¹) - measuring lambda (1,03-0,97)	yes	yes	yes
Germany-1		CO at idle speed; CO & lambda at high idle speed; control circuit test	yes	yes	yes
Germany-2		4-gas measurement - vol % CO at throttle, idle at throttle, vol.% CO at specified idle (usually 2500-2800 rpm), function test λ regulation at throttle	yes	yes	yes
Germany-3		-	yes	yes	yes
Great-Britain-1		inspection manual (cf. annexe)	yes	no	no
Greece-1					
Ireland-1		cf. annexe	yes	yes	yes
Italy-1		cf. annexe	cf. Q54.	yes	no
Luxembourg-1		specifications 96/96/EC (cf. annexe	yes (upon request)	no	-
Netherlands-1		date first used after 31/12/92 measuring CO idle speed - measure λ more than 2000 σ_{min} & CO based on 92/55/EC	no	no	-
N-Ireland-1		-	-	-	-

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Portugal-1					
Spain-1	procedure 96/96/EC		yes	yes	yes
Spain-2					
Sweden-1	exhaust emission according to directive 96/96/EC		yes	yes	yes

Equipment and calibration arrangements

TABLE 12

44. Do you have specifications for the emission test instruments? ³
 If yes, are they
 (a) national specifications not based on OIML?
 (b) national specifications based on OIML?
 (c) OIML without any additions?
 (d) other (specify)
45. How frequently are emission analysers calibrated/re-calibrated?
 (a) according to the manufacturer's recommendation?
 (b) more frequently?
47. Does an independent body do the calibration?
48. Are there means to ensure that calibration is done correctly and at the specified frequency?
49. If yes, please describe.

³ if you specify different equipment for TWC vehicles and pre-TWC vehicles, please complete this section for each type.

	Q44. specifications?	Q45. type of specifications?				Q46. frequency?		Q47. independent body?	Q48. correctness?	Q49. describe
		(a)	(b)	(c)	(d)	(a)	(b)			
Austria-1	yes	no	yes	-	-	yes	6m/6m/6m	yes	yes	periodical & unforeseeable supervision
Belgium-1	yes	no	yes	no	-	no	3m/3m/3m ⁽¹⁾	yes	yes	certification ISO 9002 of the inspection stations; certificate; 'board documents' of equipment
Denmark-1	yes	no	yes	no	Bosch ETT O88.55 exhaust gas analyser ⁽²⁾	-	-	-	-	procedures for calibration and quality assurance are under development
Finland-1	yes	no	no	no	-	yes	1/1/1	yes	yes	documentation test equipment & quality manual
Finland-2	yes	no	no	no	4-gas analyser, printing device, in print there must be CO, HC, O ₂ , CO ₂ , idle speed, lambda, rpm, identification of vehicle, test place ⁽³⁾	yes	no	no	yes	service documentation of test instruments
France-1	yes	-	-	-		yes ⁽³⁾	6m/6m/6m	yes	yes	* the first annual inspection is obligatory carried out by a body certified by the State - after the calibration the equipment is sealed & an official green vignette giving the validity limit is affixed - the metrological booklet as well as different quality documents are completed & signed * at the second annual inspection, if the equipment has not been unsealed, different quality documents are completed and signed /..

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	yes	no	yes	no	-	yes	6m/6m/6m	yes	yes	* audits are carried out by the central body (réseau) to which the inspection centre belongs as well as by the Administration (DRIRE)
France-2	yes	no	yes	no	-	yes	6m/6m/6m	yes	yes	- systematic annual audit of the inspection centres by the 'réseau' - random audit by the Administration
Germany-1	yes	no	yes	no	-	yes	6m/6m/6m	yes	yes	computer controlled - State controlled
Germany-2	yes	no	yes	no	-	yes	2/2/2	yes	yes	in-firm regular checks - regular servicing
Germany-3	yes	no	yes	no	-	yes	6m/6m/6m	?	yes	computer controlled - State controlled
Great-Britain-1	yes	no	yes	no	-	yes	yes (4)	no	yes	cf. EGA specifications - EGA lock-out to prevent testing when calibration is overdue; national certification body & authorised engineers for products; documentary controls and traceability
Greece-1										
Ireland-1	cf. annexe	no	no	yes	-	no	6m/6m/6m	no	yes	cf. annexe
Italy-1	yes	no	yes	no	-	yes	no	yes	yes	only by the frequency
Luxembourg-1	no	-	-	-	-	-	min. 3 months	no	yes	calibration registers - comparison tests
Netherlands-1	yes	no	yes	no	-	no	1/1/1	no	yes	checked by supervising authority
N-Ireland-1	no (*)	-	-	-	-	no	3m/3m/3m	yes	yes	DVTA Test Centre managers are responsible to ensure that calibration are completed before the previous calibration certificate has expired
Portugal-1										
Spain-1	yes	no	yes	no	cf. annexe	no	6m/6m/6m	yes	yes	weekly measure level of mixture calibrated gas
Spain-2										
Sweden-1	yes	no	yes	yes	-	yes	no	yes	yes	the equipment is calibrated according to company quality manual and to accreditation manual

(1) Q46b: 3m/3m/3m + once a year every inspection body independently
 (2) Q45.(d): MAHA MDO2 diesel smoke emission tester
 (3) Q45d: OIML R99 (1991 edition) does not include the measuring of oxygen and thus of lambda, therefore the ISO 3930 standard is used (--> French standard NF R10-019); OIML R 99 (2000 edition) is identical to ISO 3930 --> both specification can be used; Q46a: yes, if more frequent than
 (4) Q46b: dependent upon in-use performance
 (*) Q46a: yes, but min. 3 months
 (*) Q44: use GB-specifications

Emission re-test arrangements

TABLE 13

- 50. Are vehicles that fail the emission test always brought back for re-testing?
- 51. If no, describe the circumstances in which they do not have to be brought back for an emission re-test.
- 52. Are vehicles brought back for an emission re-test given a full emission test?
- 53. If they are not given a full emission check, describe what checks are done.
- 54. List any other important aspects of your exhaust emission testing procedure that are not covered by the questionnaire.

	Q50. re-test?	Q51. if not, circumstances	Q52. full test?	Q53. if not, describe	Q54. other important aspects
Austria-1	yes	-	yes	-	supervision - roadside inspections - remote sensing
Belgium-1	yes	-	yes	-	-
Denmark-1	yes	-	yes	-	(1)
Finland-1	yes	-	yes	-	if CO-value > 6%, vehicle is prohibited for use in traffic
Finland-2	yes	-	yes	-	if CO-value > 6%, vehicle shall not be used before accepted re-test - if test is made by commercial garage or workshop of vehicle operator and vehicle inspection limits are not the same, vehicle inspection limits are accepted - if test is made by commercial garage or workshop of vehicle operator, there will be no inspection fee at inspection - vehicle inspection checks commercial garage and vehicle operator workshop test
France-1	yes	but vehicles < 01/10/72 do not	yes	-	cf. annexe
France-2	yes	impossible because of the vehicle's construction to enter the probe	yes	-	- it is allowed to accept a vehicle that is not completely pre-conditioned - a not completely pre-conditioned vehicle cannot be refused
Germany-1	yes	-	yes	-	-
Germany-2	no	if the repair is too expensive, the cars are often sold or scrapped	yes	-	(*)
Germany-3	yes	-	yes	-	-
Great-Britain-1	yes	-	yes	-	additional information: Q32-Q35 - a safeguard is built into the EGA programming and is triggered if the engine fails the fast idle test - the program leads the tester into a 3 minute countdown with an engine speed between 2000-3000 rpm or until all the emission readings are within limits

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Greece-1									
Ireland-1	yes	-			yes	-			if the car is failed in the visual section (leaks, ...) the test results will be overwritten
Italy-1	yes	-			yes	-			
Luxembourg-1	yes	-			yes	-			
Netherlands-1	yes	-			yes	-			
N-Ireland-1	yes	-			yes	-			
Portugal-1									
Spain-1	yes	-			yes	-			
Spain-2									
Sweden-1	yes	-			yes	-			the EGR-valve is checked for functioning & vacuum signal components vital for the exhaust emission system are checked to see whether they work properly e.g. pulsair, airpump, etc.

(1) **Q54:** diesel engines are tested in accordance with directive 96/96/EC, incl. Commission directive 1999/2, with a simplified procedure in case the measured emission level is less than 70% of prescribed values, again according to the wording in the directive.

(*) **Q54:** diesel vehicles are checked too (cars: 3/2/2): measured is the ... of the emission during free acceleration - other checks are: idle at throttle & idle at full throttle (without strain)

APPENDIX 4- QUESTIONNAIRE ANALYSIS

'BEST PRACTICE' EMISSION TEST PROCEDURE FOR PETROL VEHICLES – A DISCUSSION PAPER

This paper is based on the 18 completed responses received in response to the CITA questionnaire on emission test procedures. The aim of the paper is to analyse the responses and highlight significant differences between the various emission tests that are carried out within the European Union. No replies were received from Greece or Portugal.

1. Questions 6 – Test time

Annex 1 contains a comparison between the longest and shortest test.

Issue for discussion: Once a 'best practice' test is defined, is it necessary to consider a likely test time?

2. Questions 7– 10

The answers to these questions provide background information that has no direct relevance to the emission test procedure used.

3. Question 11 – Availability of written procedures

83% have fully documented test procedures.

4. Questions 12 (Non-catalyst vehicles) and 28 (Catalyst vehicles) - Initial Visual Inspection

All but one response indicated that some form of visual inspection is carried out. Where a visual inspection is carried out 11% carry out only an inspection of the exhaust for leaks, the remaining 89% also inspect the emission control system with one or two also inspecting all emission relevant parts e.g. injection systems, air-filters, etc..

The CITA Working Group on Type Specific Emission Limits recommended some amendments to the requirements in directive 96/96 regarding visual inspection (see annex 2). These were briefly discussed at a Technical Adaptations Committee meeting on 10th July and will be further discussed at a special technical meeting this autumn.

Issue for discussion: Are the proposals made by the CITA Type Specific Emissions Limits WG 'best practice' sufficient for a 'best practice' procedure?

5. Questions 13 (Non-catalyst vehicles) and 29 (Catalyst vehicles) – Information recorded

The information recorded about the vehicle being tested varies considerably. Recording information does not of itself affect the test undertaken but more information enables more informed analysis of the results of emission tests.

Issue for discussion: Should a 'best practice' procedure include a list of emission-relevant information about the vehicles that should be collected?

6. Questions 14 (Non-catalyst vehicles) and 30 (Catalyst vehicles) – Ambient condition limits

Only 28% of the responses indicated that they stop testing when ambient conditions are outside specified limits. All 28% use ambient temperature as a criterion, 22% also use atmospheric pressure with 11% using ambient humidity as an additional criterion.

Issue for discussion: Should a 'best practice' procedure include ambient condition limits for testing? If so what should the limits be?

7. Questions 15-20 (Non-catalyst vehicles) and 31-36 (Catalyst vehicles) - Pre-conditioning and engine temperature

Nearly 80% of the responses use pre-conditioning. All except one of this 80% use at least a temperature criterion with some also using engine speed for a specified time and/or driving the vehicle for a minimum time. The exception does require the engine to be run at a specified speed for a specified time. The majority of those requiring pre-conditioning measure the oil temperature but some measure water temperature in addition.

All but one of the 20% not requiring specific pre-conditioning do require the engine to be fully warm when the vehicle is brought for test and they test the emissions on arrival - either the oil temperature or the exhaust emission temperature is measured in these cases. The one exception however does require the vehicle to be conditioned if its emissions are outside the limits after the first test – the temperature gauge being used to measure the temperature.

Issues for discussion:

(i) Taking full account of the different ways in which testing is organized (e.g. whether vehicles are tested on arrival) and pragmatic ways to speed testing (e.g. 'fast pass'/'fast fail'), what provisions regarding pre-conditioning should there be in a 'best practice' procedure?

(ii) Should the engine or some other temperature be measured to verify that the vehicle is sufficiently warm?

8. Questions 21-22 (Non-catalyst vehicles) and 37-38 (Catalyst vehicles) - Exhaust Gas Components / Engine Parameters Measured

CO is measured in every case and in about 40% of the responses HC is also measured. In two responses O₂ and CO₂ are also measured and recorded.

For vehicles not controlled by advanced control systems about 55% of the responses measure the idle speed, 22% in addition measure the ignition timing and dwell angle. 45% of the responses show that no vehicle / engine parameters are measured.

For vehicles controlled by advanced emissions control systems all but one response showed that lambda is measured with 60% also measuring idle speed. 17% in addition measure ignition timing and dwell angle.

Issues for discussion: Although the CITA Type Specific Emissions Limit WG did not recommend amending the directive to add measurement of HC or checks on other engine

parameters, a 'best practice' procedure could include them. If so, what other parameters should be measured and/or checked?

9. Questions 23 (Non-catalyst vehicles) and 39 (Catalyst vehicles) - Pass / Fail Limits

For vehicles not controlled by advanced emission control systems:-

For CO – 100% apply EU default limits, 45% also apply manufacturer's limits with 11% also applying national limits.

For HC – of those measuring HC, 72% apply national default limits, 28% apply manufacturer's as well as other limits.

For other engine parameters – 45% apply manufacturer's limits with 17% also applying other limits.

For vehicles controlled by advanced emission control systems:-

For CO – 100% apply EU default limits, 40% also apply the manufacturer's limits with 11% also applying national limits.

For HC – of those measuring HC, 28% use manufacturer's limits, the rest use national limits.

For other engine parameters – 45% apply manufacturer's limits or other limits.

Issue for discussion: What limits should be used in a 'best practice' procedure, particularly for parameters not specified in the directive (e.g. HC)?

10. Questions 24-25 (Non-catalyst vehicles) and 40-43 (Catalyst vehicles) – Test procedures, information and analysis

Vehicle presenters are not always given the results of the test and test results are not always recorded or analysed.

Issue for discussion: Although these items are not directly relevant to the performance of emission tests, the question of whether a 'best practice' procedure should include requirements should be debated.

11. Questions 44-49 – Equipment and equipment calibration

Most respondents use emission measuring equipment that must meet national standards based on OIML standards. 11% use OIML without any additions. The frequency of calibration varies greatly. Some use the manufacturer's recommended intervals, others require calibration more frequently. 61% use independent organisations for calibration. 94% have arrangements to ensure that calibration is done correctly.

Issue for discussion: What equipment standards and calibration arrangements should be put in a 'best practice' procedure?

12. Questions 50-53 – Re-test arrangements

All respondents require vehicles that fail to be brought back for a full re-test of the emissions (unless they are scrapped)

13. Question 54 – Other items not covered by the questionnaire

Issues raised include

- (i) Vehicles with CO over 6% are prohibited from further use;
- (ii) Exhaust gas analysers can be programmed to ensure proper conditioning if vehicle initially fails;
- (iii) Checks on EGR valve function, vacuum signal components vital for exhaust emissions should also be checked.

Issue for discussion: Should any of these points be taken into account in a 'best practice' procedure?

**ANNEX 1
TIME OF EMISSIONS TEST**

The table below indicates the diversity of the time taken to do an emissions test.

	Approximate Time of Test in Minutes							
	0 - 1	1 - 2	2 - 3	3 - 4	4 - 5	5 - 10	10- 15	15 - 20
For vehicles without 3-way catalyst	11%	0%	28%	28%	11%	5%	17%	0%
For vehicles with 3-way catalyst	0%	12%	0%	6%	12%	41%	12%	17%

The Two Extremes

The least severe test takes less than 1 minute for vehicles without a 3-way catalyst and less than 2 minutes for vehicles with them and includes:-

- i. Initial visual inspection of exhaust for leaks and of emission control system
- ii. Testing not stopped as a result of ambient conditions
- iii. No pre-conditioning of the engine takes place but the engine is to be fully warm when the vehicle is brought for test and it is tested on arrival. Oil temperature is measured.
- iv. Only CO is measured. Lambda is also measured in the case of vehicles with 3-way catalyst. No engine / vehicle parameters are measured.
- v. Pass / fail limits applied are solely EU default limits.

The most severe test takes up to 10 minutes for vehicles without a 3-way catalyst and up to 20 minutes for vehicles with them and includes:-

- i. Initial visual inspection of exhaust for leaks and of emission control system. Also all emission relevant parts including injection system, air filter etc are inspected
- ii. Testing is stopped when ambient conditions are outside specified limits for atmospheric pressure, temperature and humidity
- iii. Pre-conditioning of engine carried out before test by running the engine until specified temperature is reached. Water and oil temperature are measured
- iv. CO is measured together with idle speed, ignition timing and dwell angle. In the case of vehicles with 3-way catalyst, lambda is also measured and a control circuit test is carried out.
- v. Pass / fail limits applied are EU default limits together with manufacturer's and other limits on both gas and component / engine parameters