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ECO-TEST AT VEHICLE TESTING CENTRES

ABSTRACT

Following the world conference on sustainable development of ecology, the care for the environment has to be strictly complied with, and this should be the task both of every individual and of the society as an organised whole. The work presents concrete measurements from practice and the indicators of the situation regarding motor vehicles in Croatia. The ECO-TEST has been performed in Croatia according to the European Union directives; first on the vehicles with petrol engines. Now, it is starting to be applied on the vehicles with Diesel engines as well. Compliance with the ECO TEST regarding motor vehicles in Croatia will take into consideration the guidelines provided by the European Union and thus reduce the harm from exhaust gases and noise pollution, and increase the possibility of using motor vehicles in order to reduce the danger and increase the safety on the roads by excluding old vehicles from traffic.

KEY WORDS

environment, roadworthiness inspection, ECO-TEST

1. INTRODUCTION

Following the world conference on sustainable development, ecology is set as the only limit and the leading idea in the development of humankind. The traffic, without which this development and globalisation would be impossible, has to give its contribution to the environmental protection.

Because of the ever stricter standards, the manufacturers were forced in the past decade to produce engines that are ecologically much friendlier. Along with the improvement of engines, the types of fuels have changed as well. When one considers this problem superficially, it may seem that the problem will be solved by itself. But this would prove to be a terrible trap.

As a country trying to catch up with Europe, Croatia is in an even more difficult situation because of the purchasing (im)potency of her inhabitants, and the situation is even deteriorating from year to year. Thus, the Croatian Centre for Vehicles analysed in September 2002 the data about the average age of automobiles (Table 1).

Table 1 - Average age of automobiles

	1993	2001
passenger cars	9.19 years	11.31 years
cargo vehicles	11.3 years	12.63 years
buses	8.74 years	14.22 years

The older motor pool certainly also means a greater number of defective vehicles. The problem lies in the fact that a vehicle may be ecologically faulty without the driver being aware of this.

Therefore, in April 2001, the composition of the exhaust gases from petrol engines started to be checked, and it was popularly called the ECO-TEST. The Eco-test for Diesel engines started a year later, on 18 April 2002.

This problematic is much more complex than what it seems at the first glance. The real problems occur when the test concludes that the exhaust gases are not within the law-stipulated limits, and the authorised technical services do not have the necessary equipment for testing, thus not being able to remove the fault.

Therefore, a transition period of one year has been approved and during this period the eco-test has been performed but the composition of exhaust gases has no effect whatsoever on the final opinion given about the proper functioning of the vehicle. In the meantime, due to the large number of faulty vehicles - as much as 61.86%, this transition period has been prolonged for one more year.

Leaving these problems aside, it may be concluded that the Eco-test in Croatia is performed in compliance with the European Union directives[1], i.e. the Eco-test is performed in Croatia in the same way as in any other European Union country. Table 2 shows the limit values of exhaust gases for single road vehicle en-

Table 2 - European limit values of exhaust gases

Values	Petrol		Gas Oil		
	HC + NOx	CO	HC + NOx	CO	PM
EU I (1993)	0.97	2.72	0.97 T,36(DI)	2.72	0.14 0.2 (DI)
EU II (1997)	0.50	2.20	0.70 (IDI) 0.90 (DI)	1.00	0.08 0,7 (DI)
EU III* (2001)	**0.2 + 0.15**	**2.30**	**0.56 Nox = 0.50**	**0.64**	**0.05**
EU IV* (2006)	0.1 + 0.08	1.00	0.30 Nox = 0.25	0.50	0.025

gine generations, Croatian Centre for Vehicles, Zagreb, 2000.

Because of the size of the problem this paper we will consider only the Eco-test performed at the Vehicle Test Centre, its performance and the necessary devices.

For the Eco-test itself, the type of engines tested is also of great importance in the motor pool of the Republic of Croatia in 2001. For the Eco-test requirements, three types of vehicles are distinguished (according to the Croatian Centre for Vehicles - Figure 1) which are classified as:

The NO CAT. group includes all the automobiles running on petrol engine that have no regulated catalytic converter, i.e. which are not equipped with a lambda probe.

The REG. CAT. group includes vehicles with regulated catalytic converters, i.e. those vehicles that have a lambda probe. For the present, the test does not distinguish the types of Diesel engines. For each of the three types of vehicles there is a specific test available.

In the future, the number of vehicles from the NO CAT. group (the greatest polluters) will be reduced both in manufacture and in purchase, because it will be impossible to register new vehicles of that type. It is precisely the year 2002, the first one in which the number of vehicles from the REG. CAT. group in the Republic of Croatia exceeded the number of vehicles from the NO CAT. group. The decreasing rate of the NO CAT. vehicles will certainly be in close correlation to the two factors: economic power of the citizens and their environmental awareness.

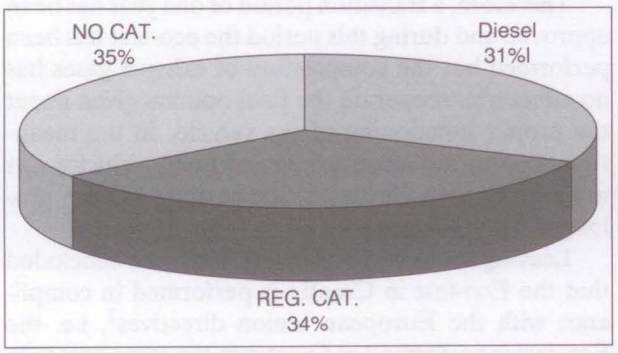


Figure 1- Share of vehicles (with or without the catalytic converter) in the Republic of Croatia

There is also a trend in Europe to increase the number of vehicles with Diesel engines, which have much improved in performance due to the introduction of direct injection. In the Republic of Croatia, this trend is not yet felt so much because of the price of such vehicles. It is difficult to foresee in which direction and at what rate the situation in Croatia is going to develop, but we are certainly facing one modest goal and that is to maintain the situation as it is, functioning ecologically as correctly as possible, and that is precisely the role of the Eco-test.

2. ABOUT THE ECO-TEST IN GENERAL

Today, two types of Eco-tests are performed in Croatia:

1. Eco-test for petrol engines
2. Eco-test for Diesel engines

In case of Diesel engines, the amount of blackening, i.e. the volume of solid particles in m^{-1} is measured, and in case of petrol engines the composition of exhaust gases.

The following categories of vehicles are subjected to Eco-test:

- passenger cars,
- buses,
- combined vehicles,
- heavy-duty vehicles,
- work vehicles.

There are also several vehicle categories exempted from the Eco-test:

- mopeds,
- motorcycles,
- work machines,
- tractors.

Unfortunately, the vehicles that represent the biggest polluters are exempted as well[2]*:*

- vehicles with two-stroke engines,
- vehicles with petrol engines older than 1970,
- vehicles with Diesel engines older than 1978.

Also, the "slow" vehicles have been exempted, as well as all the vehicles using alternative propulsion:

- vehicles with petrol engines if their design speed does not exceed 50 km/h,
- vehicles with Diesel engines if their design speed does not exceed 30 km/h,
- vehicles with alternative engines (methane, hydrogen, propane-butane, etc.).

New vehicles undergo Eco-test two years following the first registration. This has been agreed upon so as to avoid conflict with the owners of new vehicles, since the testing itself is relatively noisy and it may seem to those less experienced that the test might cause damage. Besides, these vehicles are in most cases functioning properly anyway.

The Eco-test procedure itself has been meant as forming part of the technical inspection and it is closely related to it. For instance, vehicles with faulty or punctured exhaust pipe cannot be tested since the measured data would not match the actual ones and the measurement would not be in compliance with all the regulations. The Eco-test is an excellent indicator of the car engine condition, and with the ecological function makes it possible for the owner to save time and money by timely identification of certain faults.

3. ECO-TEST OF PETROL ENGINES

The Eco-test of petrol engines can be divided into two main types:

1. Eco-test of the NO CAT. engines
   This group includes all the cars without catalytic converters and also those that have the catalytic converter but do not have the lambda probe.
2. Eco-test of the REG. CAT. engines
   This group includes automobiles that have a catalytic converter and a lambda probe installed.

The measurements and approach to these types of engines differ greatly. In order to determine the category to which the vehicle belongs, it is necessary to determine whether it has the lambda probe[3] (Figure 2), and this is at the same time the beginning of the Eco-test.

The Eco-test of petrol engines measures the levels of the following gases:

- CO_2 - carbon dioxide,
- CO - carbon monoxide,
- HC - hydrocarbons,
- O_2 - oxygen,
- NO_x - nitrogen oxides.

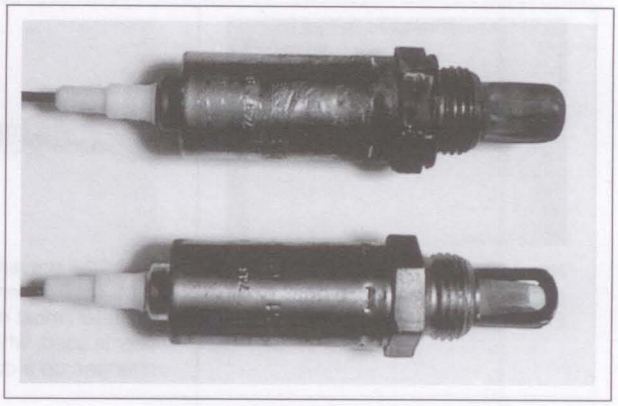


Figure 2 - Lambda probe

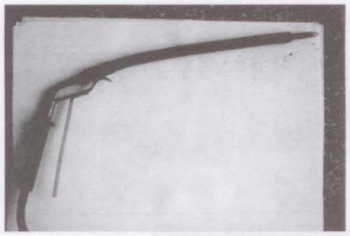
Although, a higher level of CO only would be reason enough to fail the Eco-test, the measurement of all these components forms a certain picture about the engine condition: increased concentration of HC often indicates a rich mixture and higher NOx concentrations indicate a lean mixture, higher concentration of O_2 also indicates incomplete burning and usually a lean mixture. Considering the concentration values of these gases for the parameters, we have enough data to estimate the optimality of burning and even of the condition of the engine itself.

Table 3 - Causes of disturbance in the composition of exhaust gases

gas	concentration too high	concentration too low
CO	Dirty air filter, unadjusted fuel-air ratio, worn out nozzles, too high fuel pressure. If the fuel injection engine is faulty regulator in idle gear, faulty sensor of the suction air temperature, fuel pressure too high, faulty fuel gauge.	Punctured suction pipe, punctured exhaust system. In case of engine with fuel injection, the cause may be dirty fuel injection pump.
HC	Engine worn out, badly adjusted valves, in combination with CO punctured exhaust pipe.	
NOx	Faulty fuel gauge.	Punctured exhaust pipe.

Table 3 shows that, apart from protecting the environment, the Eco-test also has the function of supplementing the technical inspection and of assisting in prolonging the engine service life.

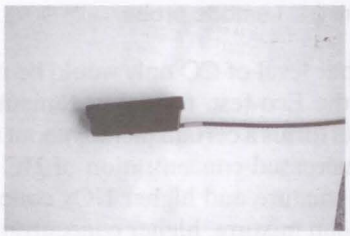
In order to measure the composition of exhaust gases, the Vehicle Test Centres usually use the devices produced by the Technotest company (488, Stargass 848) (Figure 3), Bosch (Esa), Cartec, Maha. These apparatuses are easy to handle, but they are quite sensitive and require careful handling. The more recent devices such as Technotest 898 and Bosch Esa 3250 are



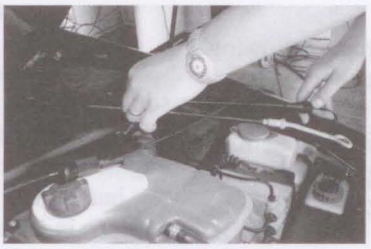
Nozzle for taking exhaust gas sample is set directly into the exhaust pipe.

As a filter preventing solid particles from entering the analyser, most often the fuel filter is used, which should be changed on a daily basis.

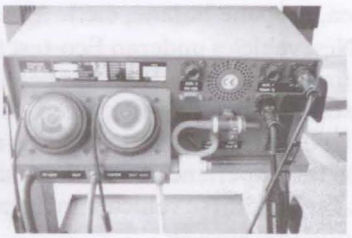
The front panel of the Technotest 488.



Induction pliers measure the changes on high-voltage cables and thus determine the engine speed.



Sensor for determining the oil temperature and its conversion into the electric pulse.



The back panel of the 488.

Figure 3 - Equipment necessary to carry out the Eco-test by means of the Technotest 488

in fact analytical centres which, apart from measuring the composition of gases also have a wider servicing application.

BDM devices, i.e. rpm measuring devices (Figure 4) are often used as the supplement to the devices. Usually the rpm rate is determined from the battery charging frequencies, but there are also gauges that determine the speed by means of the phonometer i.e. from the engine noise frequency. In case of indirect gauges connected to the battery, it is important to determine correctly the number of cylinders in order to determine the rpm speed from the battery charging frequencies. The indication pliers are connected to the indirect gauge and the analyser calculates the engine rpm speed.

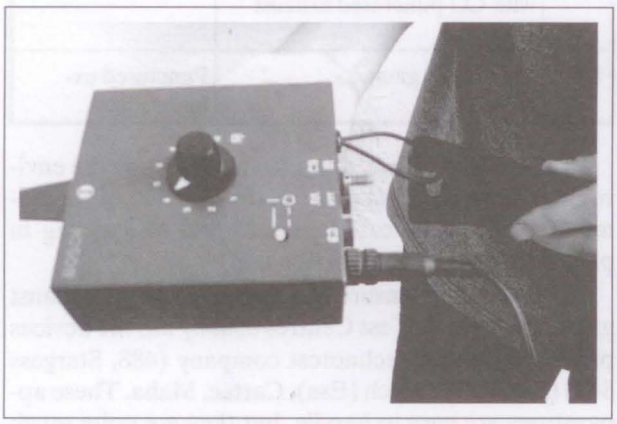
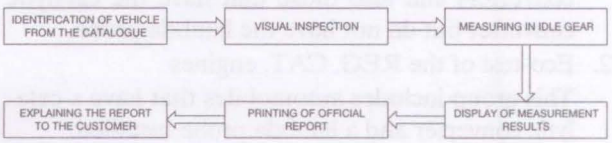


Figure 4 - BOSCH BDM - indirect gauge which is connected to the battery

4. ECO-TEST OF THE NO CAT. ENGINES

The NO CAT. engines are subjected to the Eco-test when it has been determined that the vehicle has no lambda probe. The testing procedure itself is carried out according to the following diagram:



The vehicle is identified according to the catalogue of the German company Autodate, which contains all the stipulated values and technical data needed for the Eco-test.

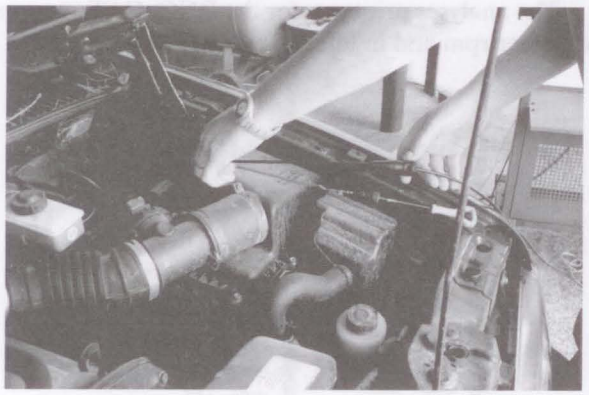
In some cases the concrete vehicle cannot be found in the catalogue and then the data of a similar engine are taken for reference. This is not such a big mistake, since the data are given in quite a wide range, and the manufacturer often lists the same data for a whole series of engines. If it proves impossible, however, to find any similar engine, then the Eco-test relies on the legally stipulated values.

STIPULATED LIMIT VALUES FOR NO CAT. ENGINES
N = IDLE GEAR
T 80°C
CO 3.5% if the vehicle is of 1987 or later production
CO 4.5% if the vehicle is older than 1987

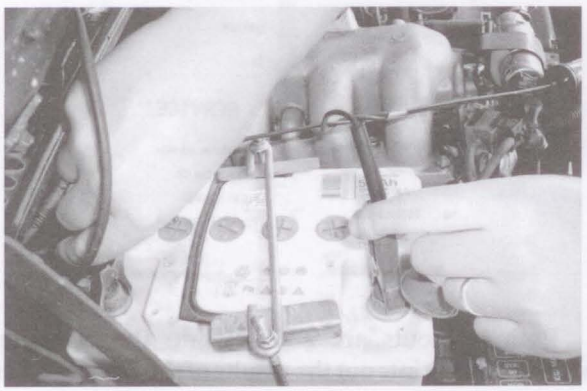
Visual inspection is required before using the exhaust gases analyser for measurement: the ignition system control (condition of cables, etc.), suction manifold control, control of the fuel supply system, control of the fuel tank cover, exhaust system control.

After this has been done, the measuring is performed in idle gear. In this type of engine the measuring is not performed at the increased rpm.

Measurements are carried out in the following way:



1. The temperature probe is inserted into the oil dipstick opening. Before inserting, the length of the temperature probe needs to be adjusted to the length of the oil dipstick.



2. Connecting the rpm gauge - if direct connection to high-voltage cables is not possible, the connection should be made by the indirect rpm gauge to the battery.
3. Heating the oil in the engine to the stipulated temperature (60-80°C). Heating should not be performed by pressing and releasing the accelerator pedal, because this would affect the fuel mixture.
4. Inserting the analyser probe into the exhaust, waiting for the values on the analyser to become stable, and analysing the results on the analyser.

The obtained results are then entered into the computer that automatically analyses the data and prints out an Eco-test report.

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                                                  Šifra TP: 83-2002-3-3355
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                          ZAPISNIK O ISPITIVANJU
                    ISPUŠNIH PLINOVA MOTORNIH VOZILA
                              E K O   T E S T
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Datum: 21.05.2002
  Sat: 14:58
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
VOZILO

Vrsta vozila: Osobni automobil                VIN oznaka: XTA21070M0587908
Marka vozila: LADA                            Reg.oznaka: VZ 934-CS
  Tip vozila: 1500                            Kilometara: 75643
Model vozila: 2107                    Godina proizvodnje: 1991
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 Mjerni uređaj: TECNOTEST
Mjerni program: BEZ-KAT
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VIZUALNA KONTROLA DIJELOVA MOTORA BITNIH ZA EKO TEST                STANJE

Stanje ispušnog sustava (nepropusnost, mehaničko oštećenje)        DOBRO #
Stanje usisnog sustava (nepropusnost, filtar zraka, el. inst. senzora)  DOBRO #
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
                      POTREBNE VRIJEDNOSI          IZMJERENO      STANJE

Temp. ulja/vode      (C): min.:   60 maks.:  -          68  Ulje   DOBRO
/1/ Prazni hod (s/min-1): min.:  900 maks.:  950      1010        LOŠE
CO pri /1/             (%): min.: 1.00 maks.: 1.50      0.69      DOBRO *
CO2 pri /1/            (%): min.: 13.00 maks.: 17.00    7.90      LOŠE
HC pri /1/           (ppm): min.:   -  maks.:  300      597       LOŠE
O2 pri /1/             (%): min.:   -  maks.:  2.00     5.40      LOŠE
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
PRIMJEDBE
# - Subjektivna procjena          * Rezultat utječe na prolaznost na EKO testu

Motor se prebrzo okreće na praznom hodu

Neodgovarajuć sadržaj ugljikova dioksida (CO2)
Prevelik sadržaj neizgorenih ugljikovodika (HC)
Prevelik sadržaj kisika (O2)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
ZAVRŠNA OCJENA

Vozilo zadovoljava na EKO testu ali savjetujemo odlazak ovlaštenom serviseru
zbog navedenih nepravilnosti

Nadzornik: 1107 MARIN SOŠA                    Vlastoručni potpis:
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The customer receives this report and the analyser printout is attached to the report on the technical inspection. In case of observed faults the customer should show the report to the authorised technical service and the faults should be then repaired and removed.

The car from the presented example has passed the Eco-test because the CO share is satisfactory, but

the fuel consumption is too high, so that apart from the ecological advantage the repair would be also to the economic advantage for the owner.

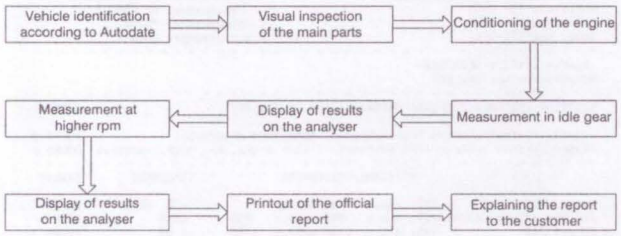
5. ECO-TEST OF THE REG. CAT. ENGINES

Most of the data provided for NO CAT. engines is also true of those engines with a regulated catalytic converter, and the same devices are used for the measurements. Unlike NO CAT. engines, in case of the REG. CAT. engines two samples of exhaust gases are taken: in idle gear and at a higher rpm number. There are also stipulated legal values for the REG. CAT. engines.

STIPULATED LIMIT VALUES OF THE REG. CAT. ENGINES

1. 60 sec / 3000 min^{-1}
2. n = 2500 3000 min^{-1}
   T 80 C
   CO 0.3
   $\lambda = 1 \pm 0{,}03$
3. n = idle gear
   CO [0.05

The method in which the Eco-test for REG. CAT. engines is performed, is presented in the following flowchart:



In case of this type of engines the identification is even more important since the Autodate stipulates also the conditioning time of the catalytic converter which is for the majority of vehicles longer than the legally stipulated one. Conditioning is important since only after the proper heating the catalytic converter starts to function properly.

Visual inspection is identical to the one performed for the NO CAT. engines: control of the ignition system (condition of cables, etc.), suction manifold control, fuel supply system control, fuel tank cover control, exhaust system control, and in this case, visual inspection of the condition of the catalytic converter and the lambda probe.

Apart from the time necessary for conditioning, it is important to know that the heating up of the catalytic converter should not be performed by sudden pressing and releasing of the gas pedal, since this would lead to improper mixture and might be the cause for obtaining incorrect results.

Before conditioning, an rpm gauge is connected as well as a temperature probe so as to control the number of revolutions and the oil temperature increase during conditioning.

The probe is inserted into the exhaust pipe just before the measurement is done, so that it would not get unnecessarily dirty during the conditioning procedure.

In sampling at higher rpm, the important thing is to wait at this rpm long enough to let the measuring data stabilise. Then the data are displayed.

The same measurement is repeated also in idle gear, and after having done the measurement, the measured data are printed out.

The analyser printouts for the REG. CAT. engines at higher rpm and in idle gear:

Both printouts are entered into the computer which in turn prints out the results of the Eco-test. The computer independently makes the conclusion about the roadworthiness of the vehicle based on the following data:

- oil temperature,
- idle gear,
- CO in idle gear,
- increased rpm,
- CO at higher revolution speed,
- λ at higher rpm

Lambda factor, i.e. air factor are not measured but calculated according to the formula:

$$\lambda = \frac{21 \times \left[CO_2 + \frac{CO}{2} + O_2 + \left(\frac{Hcv}{4} \times \frac{3.5}{3.5 + \frac{CO}{CO_2}} - 0.0087 \right) \times (CO_2 + CO) \right]}{\left[21 + 0.5628 \times \frac{\frac{CO}{CO_2}}{3.5 + \frac{CO}{CO_2}} \right] \times \left[1 + \frac{Hcv}{4} - \frac{0.01754}{2} \right] \times \left[CO_2 + CO + HC \times 6 \times 10^{-4} \right]}$$

6. ECO-TEST OF DIESEL ENGINES

In order to avoid unnecessary problems, the Eco-test of Diesel engines started a year later than the test of petrol engines. Such shift made it possible for the technical supervisors to get well acquainted with the Eco-test of petrol engines, and then to start testing the Diesel engines.

The testing of Diesel engines started later for two reasons:

1. smaller number of vehicles compared to petrol engines,
2. the testing itself is "more dangerous" for older vehicles – in case of improper engines the engine might accelerate excessively, and this may cause collision between the piston and the valves and lead to complete or partial damaging of the engine.

The testing is in many ways different from the testing of petrol engines. The cause lies in the fact that in Diesel engines the chemical composition of exhaust gases is not measured any more, but rather the amount of solid particles contained in it. In the Eco-test of Diesel engines the criterion for passing the test is the blackening of the exhaust gases. The blackening is measured in m^{-1} or in percentages. The percentages do have to be converted before printing since the measurement unit m^{-1} has been determined by the law.

The list of malfunctions that may cause excessive blackening is large and it is difficult to determine the origin of the problem, unlike petrol engines.

STIPULATED LIMIT VALUES FOR DIESEL ENGINES

N = MAXIMUM RPM
T≥80 °C
$K_{medium} \leq 2.5\ m^{-1}$ (for engines without pressure charging)
$K_{medium} \leq 3.0\ m^{-1}$ (for engines with pressure charging)

Here is the list of the most common problems:

- dirty air filter,
- malfunctioning pressure charging device,
- broken part of the suction manifold,
- worn out fuel injection devices,
- not original high-pressure tubes,
- worn out high-pressure pump,
- clogged exhaust system or soot filter,
- faulty temperature sensor,
- faulty suction air sensor,
- time lag in fuel supply.

Some of these defects can be identified by visual inspection, and if identified, then there is no need to proceed with the measuring itself. Before describing the measurement procedure, the types and methods of Diesel analyser functioning need to be considered.

All the manufacturers that have been mentioned up to now offer in their supply also the exhaust gases analysers for Diesel engines.

Some devices are meant only for Diesel engines, and more recently they are also manufactured as addition to petrol engine analysers.

The operating principle of such an analyser is relatively simple. The device is fitted with a chamber which is filled with exhaust gas. On one side of the chamber there is the source of light and a lux meter, and on the other side there is a mirror. The light passes through a system of lenses and reflects from the mirror into the lux meter which measures the light intensity. Since the intensity of light at the source is known, the loss of light until arrival into the lux meter can be determined. By comparing the data the device can determine the blackening of the exhaust gas.

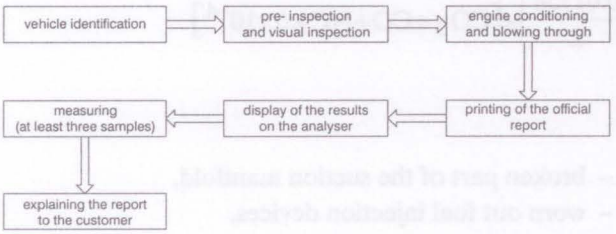
The number of rpm is determined by a piezo transmitter which measures the pulses of the high-pressure pipes. The oil temperature is determined by means of a temperature probe. The measuring process is completely automated, and the computer indicates the intensity and gas pressure.

In case of all the devices for testing Diesel engines regular maintenance is of utmost importance. The sooth gets deposited on the lens and on the walls of the measuring chamber because of the exhaust gases. Therefore, the calibration of the device should be performed after several measurements already. In case

the device cannot perform measurements, it needs to be disassembled and cleaned. It is also recommended to regularly use compressors to clean (blow-through) the hoses that supply the exhaust gases.

The following flowchart shows the sequence of the Eco-test of Diesel engines:

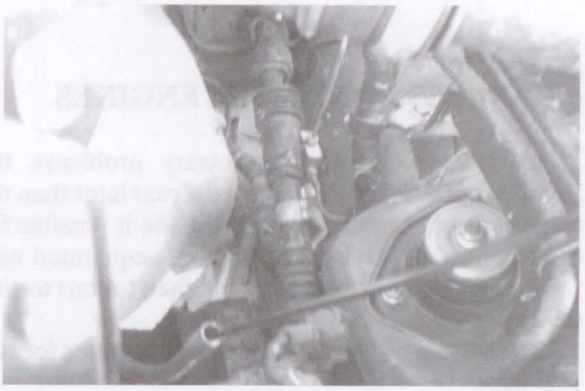
1. The vehicle identification is performed according



to the Autodate catalogue. The catalogue contains all the necessary data regarding measurements, limit values of blackening and the time and method of conditioning. If the vehicle cannot be found in the catalogue, the data for a similar model can be used, and if not even such a vehicle can be found then we rely on the law-stipulated standards.

2. The pre-inspection and visual inspection are much more important than on cars with petrol engines because the inspection determines whether the vehicle can be subjected to Eco-test at all. In case this part of the inspection is not done properly and the supervisor fails to notice an important detail, the test may cause serious damage to the engine. The inspection itself consists of the following:
   - control of the input into the fuel tank,
   - condition of the manifold system (if it is greased the inspection should be refused),
   - inspection of the condition of the toothed belt,
   - inspect whether the vehicle has been serviced regularly,
   - listening to whether the car is running roughly (if there are any irregularities in the operation of the engine, the inspection should be refused),
   - inspection of tightness of the exhaust system,
   - ask the vehicle owner when the air filter was replaced last,
   - check the accuracy of limiting the number of revolutions (if the number of revolutions does not stop at catalogue values, the inspection should be refused).

   In case technical inspection is refused, the note is entered into the report that the inspection was impossible to perform.
3. Conditioning and blowing-through are important parts of the inspection. The majority of passenger car engines during normal operation do not run at high rpm so that gas oil does not burn completely, and this causes soot build-up in the exhaust system. Blowing-through in fact means raising the number of revolutions up to the point at which the regulator starts reducing the engine speed. Blowing through is performed three to four times. If the vehicle is cold, it needs to be conditioned and heated to the operating temperature. The temperature is measured by means of a temperature probe which is inserted into the opening of the oil dipstick.
4. The rpm can be measured by means of a piezo



transmitter or by connecting the indirect gauge to the battery. The probe is inserted into the exhaust pipe immediately prior to measurements so as not to damage the analyser during the blowing-through procedure.

The measurement samples (at least three) are taken at the maximum rpm. The acceleration is done by evenly pressing the gas pedal for one second, the engine running at maximum rpm for 1 to 2 seconds. The analyser then takes a sample. The procedure is repeated after 15 seconds, and then it is repeated three times.

If the measuring samples are too different the analyser requires that the procedure is repeated until we obtain three measurements in the run with a deviation of ±10%, if the measuring is performed in m^{-1}. If the measurement is done in percentages, then a greater number of samples is taken (e.g. five), but the analyser takes into consideration only the three closest ones.

The measurement is very noisy and generates a lot of fumes and it is very important that the technical supervisors use protective equipment (air-conditioning and noise protecting headsets).

5. This is followed by the display of the measured data on the analyser in m^{-1}.
6. The measured data are then entered into the computer which automatically determines the engine condition. If data entered into the computer are expressed in percentage, they will be automatically converted into m^{-1}.

SMOKEMETER
COMPUTERIZED
EEC TEST

25/06/99 10:53

MAKER : VW
MOD. : VENTO 1,9D
LIC.Nr:
KM : 96500

RPM : 4480
°C ENGINE : 105
PRESSURE : -01

OPACITY m-1

VALUE 1 : 0.97
VALUE 2 : 1.05
VALUE 3 : 1.07
VALUE 4 : 1.06

MEAN : 1.04

TECNOTEST S.R.L.
VIA PROVINCIALE N.8
SALA BAGANZA (PR)
0521/836520

STANICA ZA TEHNIČKI PREGLED VOZILA
"CENTAR KOVAČIĆ", Ludbreg H-083-0006686
Šifra TP: 83-2002-3-3356

ZAPISNIK O ISPITIVANJU
ISPUŠNIH PLINOVA MOTORNIH VOZILA
E K O T E S T

Datum: 21.05.2002
Sat: 15:10

VOZILO

Vrsta vozila: Osobni automobil VIN oznaka: WDB1241851F010949
Marka vozila: MERCEDES Reg.oznaka: VZ 366-EA
Tip vozila: 250 Kilometara: 411122
Model vozila: TD Godina proizvodnje: 1987

Mjerni uređaj: TECNOTEST
Mjerni program: DIZEL-PREDNABIJANI

VIZUALNA KONTROLA DIJELOVA MOTORA BITNIH ZA EKO TEST	STANJE
Redovno servisiranje / ovjerena servisna knjižica vozila	DOBRO #
Stanje motora (zauljenost dijelova oko razvodnog sustava)	DOBRO #
Stanje ispušnog sustava (nepropusnost, mehaničko oštećenje)	DOBRO #
Stanje usisnog sustava (nepropusnost, filtar zraka, el. inst. senzora)	DOBRO #
Stanje termometra u kabini vozila (ako postoji)	DOBRO #

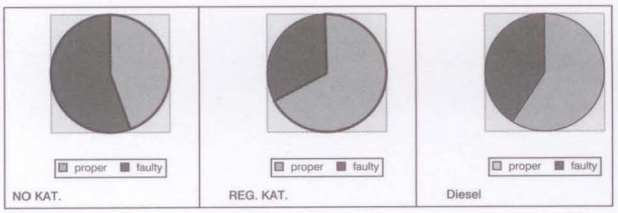
POTREBNE VRIJEDNOSTI			IZMJERENO	STANJE
Temp. ulja/vode (C): min.:	-	maks.: -	80 Ulje	DOBRO
Prazni hod (min-1): min.:	610	maks.: 800	800	DOBRO
Regul. isključuje (min-1): min.:	4900	maks.: 5400	5400	DOBRO
Propuh. (br.ubrz./min-1) : min.:	-			
Vrijeme mjerenja (sec): min.:	-	maks.:	1.00	
Zacrnjenje uzorak 1 (m-1):			0.59	
2 (m-1):			0.53	
3 (m-1):			0.50	
4 (m-1):			0.50	
5 (m-1):			0.44	
6 (m-1):			-	
7 (m-1):			-	
8 (m-1):			-	
9 (m-1):			-	
10 (m-1):			-	#
Raspanje rezultata (m-1): min.:	-	maks.: 0.50	0.15	DOBRO
Srednje zacrnjenje (m-1): min.:	-	maks.: 2.10	0.51	DOBRO *

PRIMJEDBE
- Subjektivna procjena * Rezultat utječe na prolaznost na EKO testu

7. CONCLUSION

The paper presents the testing performed at vehicle test centres along with the Eco-test in Croatia.

The ratio between proper and faulty NO CAT. and REG. CAT. and Diesel cars:



Such diagrams show best the seriousness of the situation and the extent of the unnecessary environmental pollution going on in Croatia. Moreover, it should also be considered that the only gas that currently affects whether a vehicle passes the test is CO whereas the increased quantity of other harmful gases, such as NOx, is neglected. There is a similar situation with Eco-test of Diesel engines where the chemical composition of particles and the composition of gases are not controlled at all.

It may be concluded that the ratio of NO CAT. and REG. CAT. vehicles is 56 : 44. The average of faulty NO CAT. engines is 72% with an average content of CO of 5.63% and the average of faultiness of REG. CAT. engines is 47% with an average content of CO of 1.06%. The question is how to solve this problem since the stations for technical inspection of vehicle roadworthiness cannot accept the responsibility of refusing the registration for half of the vehicles in the Republic of Croatia, but after the year 2003 such vehicles will be ecologically unsuitable.

In order to avoid such a situation, the vehicles have to be maintained on a more regular basis at the authorised technical services equipped with the necessary testing equipment, and less often at unauthorised and unequipped workshops. A great problem lies also in the fact that even the authorised repair shops do not have the necessary equipment due to the high cost of such devices, and there is no legal regulation which would force them to purchase it.

The solution to the problem itself lies in the indicator of the unnecessary pollution. Compared to Europe, the environment in Croatia is quite unpolluted. In order to keep it that way, the environmental awareness must be developed in every single individual car owner, and the checks of this type, apart from their preventive function are certainly also a step in the right direction in the education of Croatian drivers. This is precisely what also forms the last line of the Eco-test: MAKE THE DRIVER LEARN ABOUT HIS/HER RESPONSIBILITY, and also the responsibility of all of us.

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SAŽETAK

PROVOĐENJE EKO TESTA U STANICAMA ZA TEHNIČKI PREGLED VOZILA

Nakon svjetske konferencije o održivom razvoju ekologije mora se strogo provoditi briga za okoliš i to da bude zadaća svakog pojedinca ali i društva kao organizirane cjeline. U radu su data konkretna mjerenja iz prakse i pokazatelji našeg stanja motornih vozila u Hrvatskoj. EKO TEST se provodi u Hrvatskoj prema smjernicama Europske Unije, i to prvo na vozilima opremljenim benzinskim motorima. Sada počinje primjena na vozilima s dizelskim motorima. Kod pridržavanja EKO TEST-a kod motornih vozila u Hrvatskoj poštivati će se smjernice Europske Unije i smanjiti štetnost ispušnih plinova, buke, a povećati mogućnost uporabe motornih vozila, kako bi se smanjila opasnost i povećala sigurnost na cestama uklanjanjem starih vozila.

KLJUČNE RIJEČI

okoliš, ispitivanje po EKO TEST-u

REFERENCES

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2. There were extensive discussions regarding this problem, but due to the technical characteristics of engines that generate exhaust gases that might damage the measuring devices and because of the economic situation in the country, these vehicles were exempted from the Eco--test.
3. the recently manufactured cars often have the OBD system installed with two lambda probes where the additional lambda probe is located behind the catalytic converter and has the role of controlling the operation of the catalytic converter. Such system is also treated as a REG. CAT. engine.

LITERATURE

[1] *Eko test – analiza podataka iz 2002. godine*, Centar za vozila Hrvatske, Zagreb, September 2002
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