A Primer

On Implementation Of The In-use Emission Norms As Amended By The Union Government In February 2004

Right to Clean Air Campaign

Centre for Science and Environment
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1. Implementation of the new in-use emission norms

The vehicle inspection programme in India called Pollution Under Control (PUC) Certificate, was enforced under the Central Motor Vehicles Rules (CMV rule No 116) in 1991. This requires all in-use vehicles to undergo periodic exhaust emission tests and obtain valid PUC certificate. The current programme has two elements – annual fitness certificate programme and exhaust emissions tests for commercial vehicles and periodic exhaust emissions test of personal vehicles. While the Regional Transport Authority (RTA) in different states are responsible for conducting the annual fitness and emissions tests for the commercial vehicles, privately run PUC centres authorised by the RTA undertake emission check for personal vehicles.

Emissions from in-use vehicles depend largely on the proper functioning of engine and emissions control components. Any malfunction can cause emissions to skyrocket. An effective vehicle inspection programme can identify these problems and ensure their repair to keep emissions within appropriate limit.

The PUC scheme in India however has remained unchanged while mass emission standards for the new vehicles have become more stringent since 1991. After over a decade the central government has revised the in-use emissions norms for the PUC programme. The Ministry of Road Transport and Highways (MoRTH) notified the revised in-use emissions norms in February 10, 2004. These were scheduled for implementation from October 1, 2004. Virtually every city governments have failed to come out with a time bound action plan for implementing the new norms within the stipulated deadline. As a result, even a small attempt for improving the current in-effectual PUC system remains a non-starter. This will require urgent intervention.

The Environment Pollution (Prevention & Control) Authority (EPCA) has drawn the attention of the Supreme Court to this issue in its recent report of November 2004, *Special report on the implementation of the in-use emissions norms as amended by the Union government in February 2004.*

2. The new in-use emission norms

The changes proposed in GSR 111 (E) dated February 10, 2004, slated for introduction from October 1, 2004 are as follow:

Comparison of the old and new norms for in-use emissions from Petrol/CNG/LPG driven vehicles

Sr No	Vehicle category	Old idle CO norms (in % by volume)	Revised idle CO norms (in % by volume)	New Idle HC norms (n-hexane equivalent ppm)
1.	2&3 wheelers (2/4 stroke) manufactured on and before 31 March 2000	4.5	4.5	9,000
2.	2&3 wheelers (2 stroke) manufactured after 31 March 2000	4.5	3.5	6,000
3.	2&3 wheelers (4 stroke) manufactured after 31 March 2000	4.5	3.5	4,500

4.	Bharat Stage II compliant 4 wheelers	3.0	0.5	750
5.	4-wheelers other than Bharat Stage II compliant	3.0	3.0	1,500

Diesel vehicles

	Old smoke density norms	**Revised smoke density norms**
All vehicles	Free acceleration test for turbocharged and naturally aspirated vehicles 65 Hartidge smoke unit (HSU) or 2.45 light absorption co-efficient (1/m)	Smoke density norm for diesel vehicles have not changed. **New test parameters have been introduced** The notification has stipulated among others: the requirement of the vehicle engine being warmed up to attain oil temperature of minimum 60^{o} C During free acceleration in each case, the maximum no load speed reached shall be within bandwidth of +500 revolutions per minute (rpm) of the average value in respect of three-wheeler vehicles and +300 rpm of the average value for all other categories of vehicles. The smoke density to be recorded shall be arithmetic mean of four readings. In case the valid readings are not within the limits, the testing shall be discontinued and the vehicle owner shall resubmit the vehicle after repair/service

Salient features of new norms

Petrol vehicles

For the first time hydrocarbon (HC) norms have been introduced and added to the current requirement of carbon monoxide (CO) measurements in petrol cars. Similarly, the norms have now been linked to the technology level of a vehicle. Bharat Stage II vehicles will meet tighter emissions limit as opposed to pre-Bharat Stage II vehicles. However, the emissions measurements will continue to be conducted under simple idle speed.

For pre-Bharat Stage II four-wheelers the proposed norms for idle CO and HC are 3.0 per cent and 1,500 ppm respectively. For passenger cars meeting Bharat stage II standards the corresponding proposed limit values for CO and HC are 0.5 per cent and 750 ppm respectively. A technical evaluation of the PUC system in Delhi organised by the Centre for Science and Environment (CSE) in 2003, *A Plan for Progress* had pointed out that the data available from other countries for comparable vehicle technology show that the HC level of more than 1,000 ppm at idle is very rare. For all light duty vehicles below 3,500 kg gross vehicle weight ratio (GVWR) without catalytic converters, corresponding HC level should be in the range of 600-700 ppm. Therefore, the amended norms are relatively poor in terms of global practice and technology capability.

The state governments have also been given the option to introduce lambda measurement with necessary notification. (Lambda represents actual to stoichiometric air fuel ratio. It's measurement is of considerable significance as any disturbance in the ratio can affect the functioning of the catalytic converters).

For two and three wheelers the norms have been differentiated according to the type of technology, thus four-stroke engines have to meet tighter HC limits as opposed to the two-stroke engines. The new norms for idle HC for two and three-wheelers are as follow: -- two-stroke engines and four stroke engines manufactured on and before March 31, 2000 to meet 9,000 ppm HC. Four-stroke engines manufactured after March 31, 2000 will meet 4,500 ppm HC, but post-2000 two stroke engines will meet a more lax limit of 6,000 ppm. Similarly, pre-2000 two-wheelers (both two-stroke and four-stroke) will continue to meet the old norm of 4.5 percent. The post-2000 vehicles will meet the tighter limit of 3.5 per cent.

Many experts are of the opinion that the HC norms are too lenient for new two-wheelers. A small survey conducted by ARAI shows that hardly any two-wheeler will fail these HC norms at PUC centres. In view of the fact that norms should correspond to the engine technology and that 20 per cent failure rate is acceptable, there is a strong need for reconsidering the limit values.

The notification also allows state governments to mandate, if the need be, tighter emission norms for in-use vehicles.

The revised norms though inadequate are important step forward to check the emissions of the existing in-use vehicular fleet. In particular, the introduction of lambda measurements will help maintain the effectiveness of the catalytic converters in the vehicles. If enforced properly, these norms would help reduce pollution from in-use vehicles.

Environment Pollution (Prevention and Control) Authority (EPCA) after consultation with the Delhi transport department and other target groups has come to a consensus decision that the new in-use norms would now be implemented from December 15, 2004, in Delhi. Delhi government has also agreed to introduce measurement of Lambda for petrol vehicles fitted with three-way catalytic converters. CSE feels that the Delhi government should start the necessary groundwork to facilitate the introduction of lambda measurement in Delhi.

Upgrade instruments for testing of the spark ignition vehicles (petrol, CNG, LPG)

To be able to implement the new in-use norms, the existing PUC testing equipments would have to be replaced or upgraded. The current instruments in the field called two-gas analysers are capable of measuring both CO and HC but these do not have the necessary accuracy to measure the tighter emission norms that have been prescribed for vehicles meeting Bharat Stage II norms. Moreover, these have been certified by ARAI to measure only CO.

If some PUC centres decide to continue with the existing 2-gas analyser the instrument will have to be upgraded and certified by ARAI once again to enable HC measurements. As per the Code of Practice and Type Approval Procedure (TAP) document, the original equipment manufacturer will modify the existing gas analyser (to enable measurement of both CO and HC) and obtain certification from ARAI. But such PUC centres will have to restrict themselves to testing of only two-wheelers, three-wheelers and pre-Bharat Stage II vehicles.

For conducting PUC tests as per the new norms in post-Bharat Stage II vehicles, the PUC centres would have to replace the two-gas analysers with four-gas analysers, as these would have higher level of accuracy. A four-gas analyser (capable of measuring all the four gases, CO, HC, CO_2 and O_2) is also necessary for the measurement of lambda in case the state governments decide to introduce that as well. It is necessary that the equipment comply with the high accuracy level of OIML standards Class-I. The specifications of the equipment needed to

measure the revised PUC norms are based on ISO 3930 standard. The average cost of four-gas analyser in the market is stated to be around Rs 1,80,000 to Rs 2,50,000.

Diesel vehicles

Currently, only smoke density is measured in diesel vehicles. While the norm for the smoke density test remains the same (which is 65 HSU on a Hartidge scale), additional test methods have been prescribed to ensure accuracy of test results. Smoke test can be manipulated without these additional test parameters. The revised free acceleration smoke test requirements include measurement of oil sump temperature to ensure that the engine has been sufficiently warmed up for the tests, and, measurement of engine rpm to ensure that the necessary governed speed has been achieved while conducting the tests.

Smoke meters are used for testing diesel vehicles and these will have to be upgraded to include these additional test parameters. The instrument manufacturers will carry out the upgradation of the existing equipment and get it approved by ARAI. The cost of upgrading the smoke meter has been fixed at Rs 40,000 by ARAI. The responsibility of upgrading the existing smoke-meters in the PUC centres rests with the instrument manufacturer. After upgrading the instruments the manufacturer will issue compliance certificates to the respective PUC centres based on which the concerned transport authorities will permit the PUC test centre to conduct tests as per the revised norms.

Code of practice

For the first time it has been mandated that both the PUC manufacturer/supplier and also the PUC centres will have to enter into an annual maintenance contract and adhere to a code of practice. The code of practice for the PUC centres require among others:

- The Type Approval certificate supplied by PUC equipment manufacturer /supplier shall be displayed in the PUC centres.
- The Operator training certificate issued by PUC equipment manufacturer /supplier shall also be displayed in the PUC centres.
- PUC operator shall submit the monthly report of all tested in-use vehicles along with test printout in original to the Transport Department.

Summary actions for the implementation of the new PUC norms:

a. The upgradation of test equipment -- smoke meters and gas analysers to test new emissions limits in vehicles;
b. Inclusion of revised test procedures in free acceleration smoke measurements for diesel vehicles;
c. Implementation of a code of practice for PUC equipment manufacturer/supplier and PUC centre operator

3. CSE's review of the status of implementation of the new norms in the country

Controlling emissions from in-use vehicles pose a serious challenge for the city governments today. But city governments have not charted a time bound implementation plan for the enforcement of new in-use norms. PUC centres across the country are ill prepared to start the new programme even after repeated communications from the MoRTH. CSE had the opportunity to review the status of implementation of the new in-use emission norms throughout the country. CSE has talked to various key officials of different state transport departments, and state pollution control board. It was surprising to note that the central government does not even maintain a database on the total number of PUC centres in the country.

While Delhi has decided to implement the new PUC norms from December 15, 2004, other state governments are dithering. Initially the process was held up on account of delays in obtaining the type approval certificates for the instruments from the ARAI. But things have changed since then. As of November 2004 a number of instruments manufacturers have got the necessary approvals for their equipments. Now the onus shifts to the state governments to enforce the PUC programme. The state government remains accountable for the implementation of the new in-use norms.

4. Review of implementation of new PUC norms in Delhi and observations

CSE has conducted field surveys in Delhi to gauge the ground reality. It held discussions with the PUC equipment manufactures and enforcement agencies to understand the obstacles that are holding up implementation of the programme.

Based on the findings CSE would like to highlight the key steps that are needed to make the PUC system more effective, enable smoother implementation of the new norms, and avoid wrong investment decisions.

4.1 Invest in the right technology

The state governments should insist that PUC centres invest in 4-gas analyser now, as it would be necessary in the near future. Bharat Stage II norms will be implemented in the entire country from April 1, 2005. These vehicles can be tested only with four-gas analysers. Plan investments taking into consideration the future requirements. Avoid investing in two-gas analysers.

4.2 Ensure lambda measurements are incorporated in the programme

The February 2004 notification for the in-use emission allows state governments to set tighter in-use emissions standards than the central stipulations, and also introduce lambda measurement as a part of the PUC programme. Given the possibility of introduction of lambda measurement and further improvements in the test procedures in the future CSE feels it is prudent to invest in a four-gas analyser. Two-gas analysers cannot measure lambda, since they measure only two gases (CO and HC). For measuring Lambda it is necessary that all the four gases, CO, HC, CO_2 and O_2 are measured.

4.3 Review the economics and management of PUC centres

PUC centres across the country are demanding higher fees to implement the new in-use emission norms, as they will have to invest in new gas analysers. CSE has reviewed the economic viability of PUC centres investing in four-gas analyser in Delhi. There are around 500 PUC centres in Delhi -- 350 for petrol and 150 for diesel vehicles. The volume of tests conducted in each PUC centre will largely influence the profitability of the centre. Therefore, the ability of the government to enforce the PUC programme is critical.

The fees charged for issuing a PUC certificate varies across the country. But generally it is around Rs 25 per test for petrol vehicles, and around Rs 50 per test for diesel vehicles. Delhi also has a similar fee structure.

In Delhi the total number of registered car/jeeps/station wagon and two wheelers – that can be broadly considered as personal vehicles -- are 39,18,093. Vehicle registration system in most Indian cities is cumulative and is not corrected on the basis of scrappage, retirement or transfers. As a result, registered data do not reflect the actual numbers on road. Assuming 60 per cent of the registered personal vehicles are on the road, there are around 23,50,855 personal vehicles in Delhi that ideally should go for PUC tests every three months. But the compliance level in Delhi is still very low -- around 30 per cent. Recent data from the State Transport Authority, Delhi shows that about 2.5 lakh PUC certificates are issued per month on an average, which means 30 lakh certificates per year. One personal vehicle requires four tests per year. This implies that about 7.5 lakh vehicles turn up for tests per quarter on an average, indicating a compliance level of 31 percent.

CSE's computation shows that a PUC centre testing 20 vehicles per day on an average – a lower bound estimate, can recover the cost of a four-gas analyser in two-years -- this in spite of the low level of compliance. Revenue can increase significantly with the improvement in the compliance levels. This clearly brings out that cost is not a hurdle.

PUC certification is a multi crore business, but it has been rendered unprofitable and ineffective due to sheer lack of enforcement.

Estimated economics of a typical PUC centre using a four-gas analyser (petrol/CNG/LPG vehicles) in Delhi

Year of operations	Cost of a four-gas analyser	Cost of Annual maintenance Contract (AMC)	Other estimated expenditures	Annual estimated expenses	Annual estimated earnings*	Balance
1	2,50,000	Warranty	36,000	2,86,000	1,82,500	(1,03,500)
2nd		14,000	36,000	50,000	1,82,500	1,32,500
3rd		14,000	36,000	50,000	1,82,500	1,32,500
4th		14,000	36,000	50,000	1,82,500	1,32,500
5th		14,000	36,000	50,000	1,82,500	1,32,500

*(Assuming 20 vehicles are tested a day per centre, paying Rs 25 per tests)

4.4. Need for a common software for all the PUC centres in the country

The Society of Indian Automobile Manufacturers (SIAM) has promoted a computerised PUC programme and many cities have introduced computerised PUC centres. CSE is concerned over the issue of software used in the computerised PUC centres. MoRTH has not standardised the software for PUC application, which has led to the use of different format across the country. As a result of which manufacturers have to develop different software for different markets. A World Bank study conducted in 2002 on the PUC programme in the country had pointed out that the existing software does not include functions necessary for quality control and quality assurance, such as calibration control, auto-zero and residual checks. Neither does it include any data transmission functions at this stage. Ideally the software involved should be developed centrally. This would drastically reduce its initial and on-going costs for each state and centre and at the same time take the control of the source code out of private hands.

CSE recommends that MoRTH takes up the issue immediately and prescribes one software package for all states and for all makes of equipment to be implemented across the country. This will allow common format for data recording and analysis.

In the absence of any control on software, CSE has noted rampant malpractices. For instance, it has been brought to CSE's notice that in regions neighbouring Delhi, many PUC centres have mushroomed without test facilities but have computers to issue fake PUC certificates. Even those that have test facilities issue fake certificates from the computers without conducting tests. The onus lies on state governments to stop such malpractices and ensure that the programme runs effectively.

4.5 The need for data collection and analysis

All PUC test centres should be linked to central data centre through electronic data transmission for the authorities to analyse and use it for auditing. This data should be regularly analysed for a feedback to upgrade the system. Currently, the computerised PUC centres are not connected to

a central server. The 300 computerised centres in Delhi are not connected to a central server. As a result the data generated is not analysed or utilised for policy development.

The city of Hyderabad has taken the lead in this regard by connecting around seven PUC centres in a pilot scheme. This should become the model for all cities to follow.

It will not be out of place to observe that for a good vehicle inspection programme a proper vehicle registration system should be in place to record actual vehicles on road. For inspection and re-inspection of vehicles, the registration office must be able to trace problem vehicles and track their inspection status. The registration system should also detect vehicles that have not been inspected on time or have failed. It is advisable to rationalise the registration system to meet these objectives. It has been demonstrated that the actual vehicle registration data available from the state transport authority is not representative of actual number of vehicles on road. As a result, it is difficult to arrive at a realistic estimate of actual volume of inspection that would be required annually.

4.6 Conduct special drives to check visible pollution for stricter enforcement

Across the world, governments conduct special drives to catch “visibly smoking vehicles” on roads. These are grossly polluting vehicles that need immediate action.

The Delhi transport department has conducted a special pollution drive against smoky transport vehicles during the month of October 2004. More than 1,582 vehicles were caught and their certificates of fitness (COF) were cancelled. In addition to this more than 1387 vehicles have been prosecuted.

CSE however is appalled to note that there is very little that a state transport department can do legally to control visible smoke from personal vehicles. There are no legal provisions that enable the state transport department to impound grossly polluting personal vehicles. The government can take the legal recourse of cancelling fitness certificates of commercial transport vehicles. But as personal vehicles do not require annual fitness certificates, such strong steps cannot be taken against a polluting personal vehicle on the road.

Section 56 (4) under the Motor Vehicles Act, 1988 points out, “the prescribed authority may for reasons to be recorded in writing cancel a certificate of fitness at any time, if satisfied that the vehicle to which it relates no longer complies with all the requirements of this Act and the rules made there under; and on such cancellation the certificate of registration of the vehicle and any permit granted in respect of the vehicle under Chapter V shall be deemed to be suspended until a new certificate of fitness has been obtained.” The state transport department enforces this section to control visibly polluting transport vehicles, but the same cannot be enforced for personal vehicles.

If personal vehicles are found emitting visible smoke, the transport department can ask for a PUC certificate. If the car owner already has the certificate, the department has the powers to cancel the existing PUC certificate and issue a notice for a fresh PUC test. If the car owner does not possess a PUC certificate, then the polluting car is fined Rs 1000 during the special pollution drive. But this is not a strong deterrent. Personal vehicles do not come under stringent legal cover. This is a major gap in the current policy. CSE feels this should change. Powers, under legal cover, should accordingly be given to the state transport departments for bringing the personal vehicles in the net. The transport departments across the country should be authorised to impound a personal vehicle, if it is found emitting visible smoke.

CSE also recommends that the license of the PUC centre, which has issued PUC certificate to the smoky vehicle, should also accordingly be cancelled.

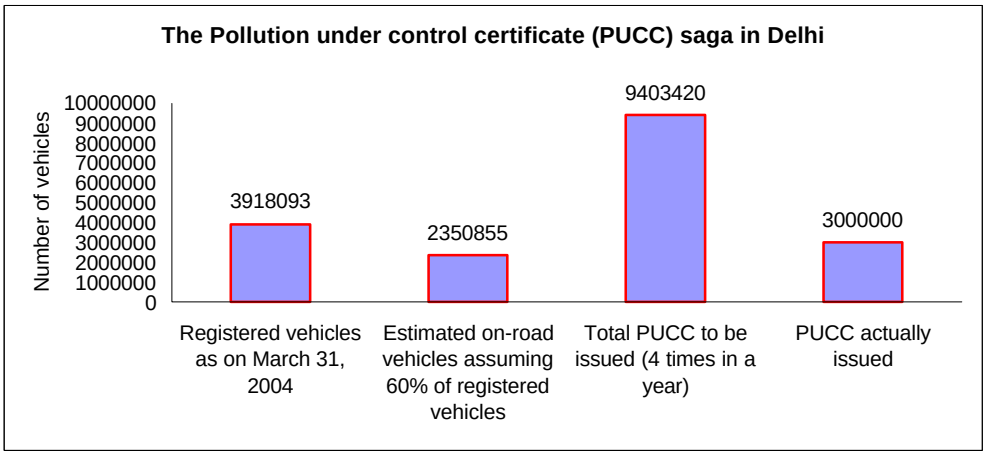
4.7. Ensure compliance

It is clear that most vehicles do not even turn up for the periodic PUC tests. A new system needs to be put in place that will deny renewal of annual insurance certificates to vehicles that do not have proof of having passed valid PUC tests. In other words, the insurance of the vehicle should be linked to the certificate from the PUC centre.

The available information shows that the compliance level in Delhi is low, even as it is held as a role model by many state governments (See The level of compliance in Delhi).

The level of compliance in Delhi

Only 30 percent vehicles report for PUC tests



Source: Delhi department of transport

The responsibilities of the regulatory agencies are often not well defined to ensure proper enforcement. It is the responsibility of the state government to provide for quality assurance and rigorous auditing. Where audits detect problems, the regulatory agencies must have the power and the capacity to enforce the required penalties.

5. CSE's roadmap for the enforcement of the new PUC norms

In view of the non-implementation of the new in-use emission norms nation-wide, CSE would like to suggest a few measures, which if implemented could go a long way in improving the current in-effectual PUC system:

- The Union government must ensure that state governments implement the new in-use emission norms. The amendments suggested by CSE to improve the enforcement and compliance of the system must be considered and implemented

- The state governments of the following cities – Chennai, Bangalore, Hyderabad, Lucknow, Kanpur, Ahmedabad and Sholapur – identified by the Hon'ble Supreme Court for high particulate pollution – should similarly implement the new in-use emission norms as fast as possible

- The Union Ministry of Road Transport and Highways should develop central software for all PUC centres, which would lead to a standard format across the country and avoid any kind of malpractices in future

- Union government and state governments should conduct with regular periodicity visible pollution drives to identify grossly smoking vehicles and to ensure that these drives are

given adequate publicity in the media. In case any vehicle, which is grossly polluting is found with a valid PUC certificate, then the state government must cancel the authorisation of the PUC centre. This information must be similarly posted on the official website and given publicity through different media

Till the time the current framework of PUC continues to allow time for transition to better system, upgrade it with better norms and instrumentation and make certain that these work the right way. But eventually, replace these numerous smaller centres that are difficult to control and supervise, with fewer centralised but bigger centres capable of testing large number of vehicles at a time and keep them under strict surveillance.

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Annexure A

Status of PUC Equipment Approval
(As On 16th Nov 2004)

2 Gas Analyser

List of Models for which Testing is Complete and Certificate Issued

Sr. No.	Manufacturer	Model	Certificate No.
1.	AVL India Pvt. Ltd.	DiGAs-422 (I)	ARAI/TA(HC)/AVL/DiGas 422 (I)/2004-05 Dt.27.8.2004
2.	Netel (India) Ltd.	NPM-CH-1	ARAI/TA(HC)/NETEL/NPM-CH-1/2004-10 Dt.27.8.2004
3.	Indus Scientific Pvt. Ltd.	PEA 202	ARAI/TA(HC)/INDUS/PEA 202/2004-09 Dt.27.8.2004
4.	Gen-Maint	EXOSCAN II	ARAI/TA(HC)/Gen-Maint/Excoscan ii/2004-11 Dt.27.8.2004
5.	Madhus Garage Equipments	HGA 200	ARAI/TA(HC)/MADHUS/HGA 200/2004-08 Dt.27.8.2004
6.	Indus Scientific Pvt. Ltd.	PEA 201	ARAI/TA(HC)/INDUS/PEA201/ 2004-20 Dt. 3 September 2004
7.	Elgi Equipment Ltd.	INFRAGAS 196	ARAI/TA(HC)/ELGI/INFRAGAS 196/ 2004-18 Dt. 3 September 2004
8.	Elgi Equipment Ltd.	INFRAGAS 196.2	ARAI/TA(HC)/ELGI/INFRAGAS 196.2/ 2004-19 Dt. 3 September 2004
9.	Modi Measurement Systems Pvt. Ltd.	MEXA 324 JA	TE/2004/112/TA/EMN/CD/141 Dt. 16 September 2004
10.	Neptune Equipment Pvt. Ltd.	TD 2040 / EGA 200	TE/2004/243/TA/EMN/CD/145 Dt. 16 September 2004
11.	Manatec Electronics	ECOGAS-2	ARAI/TA(2G)/MANATEC/ECOGAS-2/2004-24 Dt. 29th Sept 2004

List of Models for which Testing is Under Progress

Sr. No.	Manufacturer	Model	Test Agency
1.	Madhus Garage Equipments	IPEX-2	ARAI

List of Models Not Submitted for Approval

Sr. No.	Manufacturer	Model
1.	Hariwill Electronics	V-2001

Status of PUC Equipment Approval
(As On 16th Nov 2004)

4 Gas Analyser

List of Models for which Testing is Complete and Certificate Issued

Sr. No.	Manufacturer	Model	Certificate No.
1.	AVL India Pvt. Ltd.	DiGAs-444	ARAI/TA(4G)/AVL/DiGas 444/ 2004-14 Dt.27.8.2004
2.	Netel (India) Ltd.	NPM-MGA-1	ARAI/TA(4G)/NETEL/NPM-MGA-1/2004-15 Dt.27.8.2004
3.	Indus Scientific Pvt. Ltd.	PEA 205	ARAI/TA(4G)/INDUS/PEA205/ 2004-21 Dt. 10th Sept 2004
4.	Ace Cartech Pvt. Ltd.	AIR ULTRA TEC	ARAI/TA(4G)/ ACE CARTECH/ AIR ULTRA TEC/2004-23 Dt. 27th Sept 2004
5.	Modi Measurement Systems Pvt. Ltd.	MEXA 554JA	ARAI/TA(4G)/MODI/MEXA 554JA/2004-25 Dt.11th Oct 2004
6.	SMS Autoline Equipments Pvt. Ltd.	Crypton 290 EN2	ARAI/TA(4G)/SMS/Crypton 290 EN2/2004-26 Dt.25th Oct 2004

List of Models for which Testing is Under Progress

Sr. No.	Manufacturer	Model	Test Agency
1.	Manatec Electronics	EGA 1000/4	ARAI
2.	Precision Testing Machines Pvt. Ltd.	CAP 3200	ARAI

Equipment Submitted for Type Approval
But Testing Held-up Due to Non-Compliance to
Initial Verification Requirements

Sr. No.	Manufacturer	Model	Test Agency
1.	Madhus Garage Equipments	IPEX-D	ARAI
2.	TTC Laser Machines Pvt. Ltd	HG 540	ARAI
3.	Sarveshwari Technologies Ltd.	AGS-200	ARAI
4.	Manatec Electronics	ECOGAS-4	ARAI
5.	Neptune Equipments Pvt. Ltd.	Multi Gas 4005	ARAI
6.	AVL India Pvt. Ltd.	AVL DiGas 4000 Light	ARAI
7.	Elgi Equipments Ltd.	ECOMATE EGA 001	ARAI

Status of PUC Equipment Approval
(As On 16th Nov 2004)

Smoke Meter

List of Models for which Testing is Complete and Certificate Issued

Sr. No.	Manufacturer	Model	Certificate No.
1.	AVL India Pvt. Ltd.	AVL 437C	ARAI/TA(MOD-SM)/AVL/437C/ 2004-16 Dt.27.8.2004
2.	Netel (India) Ltd.	NPM-SM-111B	ARAI/TA(SM_MOD)/NETEL/NPM-SM-111B/2004-13 Dt.27.8.2004
3.	AVL India Pvt. Ltd.	AVL 437	ARAI/TA(MOD-SM)/AVL/437/ 2004-17 Dt. 27th August 2004
4.	Neptune Equipments Pvt. Ltd.	OPAX 2000 II / DX 200P	TE/2004/244/TA/EMN/CD/146 Dt. 16 September 2004
5.	AVL India Pvt. Ltd.	AVL 437S	ARAI/TA(SM_MOD)/AVL/437S/2004-22 Dt. 16th Sept 2004
6.	Manatec Electronics	ECO SMOKE	ARAI/TA(SM)/Manatec/ECO SMOKE/2004-27 Dt. 25th Oct 2004

List of Models for which Testing is Under Progress

Sr. No.	Manufacturer	Model	Test Agency
1.	Manatec Electronics	DSM 2000	ARAI
2.	Manatec Electronics	DSM 2000L	ARAI
3.	Madhus Garage Equipments	OPAX 2000 – II	ARAI

Equipment Submitted for Type Approval
But Testing Held-up Due to Clarifications/Rectifications Awaited from Manufacturer

Sr. No.	Manufacturer	Model	Test Agency
1.	Sarveshwari Technologies Ltd.	OPA-100	ARAI
2.	Indus Scientific Pvt. Ltd.	OMS 101	ARAI

List of Models not Submitted for Approval

Sr. No.	Manufacturer	Model
1.	Gen-Maint	SMOKESCAN MASTER SCANNER MS(A) 99 / MS (D) 99
2.	Hariwill Electronics	V-2005
3.	Elgi Equipment Ltd.	OPA 391 / HD

Source: Automotive Research Association of India, Pune

Annexure B

Implementation of Revised PUC Norms
From 1st Oct 2004
Frequently Asked Questions & Answers

Q1. What is the date of implementation of revised PUC norms and the Gazette Notification?

A1. The date for implementation of revised PUC norms and Gazette Notification GSR 111 is 1st October 2004.

Q2. Where to find out the latest information about approved manufacturers of PUC Equipment?

A2. The latest information about the approved manufacturers of PUC Equipment is available on the website www.araiindia.com

Q3. What will happen to the existing single gas analyzer and smoke meter?

A3 As per the Code of Practice and TAP document, the original equipment manufacturer will modify the existing single gas analyzer to 2-gas analyzer without cost and modify the smoke meter at cost as given in the website.

Q4. What is the validity of Type Approval Certificate?

A4. The validity of Type Approval Certificate is 5 years from the date of its issue.

Q5. What is the procedure for upgradation of existing single gas analyzer to 2-gas analyzer to meet the revised PUC norms?

A5. The gas analyzer manufacturers whose CO channel is already approved and the equipment already existing in the field, will carry out suitable modifications and calibration for HC channel in the field units after getting necessary HC channel approval from the authorized test agency. The manufacturer will then issue a compliance certificate to the respective PUC center based on which the concerned transport authorities should grant extension of validity to the PUC test center for the purpose of PUC testing as per revised norms.

Q6. What is the cost of upgradation of existing single gas analyzer to 2-gas analyzer and what formalities are involved?

A6. It is made mandatory for equipment manufacturer to enter into Annual Maintenance Contract (AMC) with the PUC test center to which the equipment is supplied. The AMC contract includes 3 visits for servicing and calibration per year. The PUC centers those who are in AMC will get automatically upgradation of single gas analyzer to 2-gas analyzer. This will be done free of cost provided one enters into AMC which is mandatory.

Q7. What is the procedure for upgradation of the existing smoke meter to meet the revised PUC norms?

A7. The smoke meter manufacturers whose smoke meter is already approved and the equipment already existing in the field, will carry out suitable modifications for

incorporation of oil temperature and engine rpm measurement in the field units after getting necessary approval for the modifications from the authorized test agency. The manufacturer will then issue a compliance certificate to the respective PUC center based on which the concerned transport authorities should grant extension of validity to the PUC test center for the purpose of PUC testing as per revised norms.

Q8. What is the cost of upgradation of existing smoke meter and what formalities are involved?

A8. The original equipment manufacturer will modify the smoke meter at the cost of Rs. 40000/- including excise duty and service tax, sales tax extra. As a part of the modification he will require to modify the hardware and provide sensors for temperature and rpm. Details of the modification are already included in our test report.

Q9. What is the procedure for entering into the Annual Maintenance Contract (AMC) and what is the cost of AMC?

A9. It is mandatory for the PUC center to enter into AMC contract with the equipment manufacturer only. The cost of the AMC is given in below :

Sl. No.	Details	4-Gas Analyzer	2-Gas Analyzer	Smoke Meter
1.	Maintenance done at centralized station of PUC equipment manufacturer	Rs.5,700/- (annual charges) ***plus*** Rs.750/- per calibration	Rs.3,750/- (annual charges) ***plus*** Rs.750/- per calibration	Rs.4,500/- (annual charges)
2.	Maintenance done at PUC center's place	Rs.9,500/- (annual charges) ***plus*** Rs.1,500/- per calibration	Rs.6,250/- (annual charges) ***plus*** Rs.1,500/- per calibration	Rs.7,500/- (annual charges)

NOTE :

1. For 2&4-gas analyzers, PUC equipment manufacturer shall provide the calibration gases required for calibration.
2. For smoke meter, the AMC charges include calibration with neutral density filters (NDF) by PUC equipment manufacturer.
   The AMC contract includes 3 visits for servicing and calibration per year but is exclusive of the cost of spares.

Q10. Who will supply calibration gases?

A10. Once an AMC is entered into, it will be the responsibility of the manufacturer to provide calibration gases as a part of the AMC.

Q11. What are the preconditions for granting extension of PUC Centre?

A11. It is made mandatory for equipment manufacturer to enter into Annual Maintenance Contract (AMC) with the PUC test center to whom the equipment is supplied. The AMC contract includes 3 visits for servicing and calibration per year. The PUC centers which are in AMC will get extension of the PUC Centre.

Q12. What is meant by Centralized Station of PUC equipment manufacturer?

A12 In any city, the Centralized Stations is a place authorized by manufacturer for conducting annual maintenance contract and calibration of the equipment by their authorized engineer. The name and location of the authorized station will be declared by the manufacturer before entering into the annual maintenance contract.

Q13 2-gas analyzers are suitable for testing which vehicles?

A13 As per the mandatory requirement, 2-gas analyzers can be used for all petrol/CNG/LPG 2&3-wheeler vehicles and 4-wheeler vehicles which are not Bharat Stage-II/III compliant.

Q14 4-gas analyzers are suitable for testing which vehicles?

A14 The new 4-gas analyzers can be used for 2, 3 & 4-wheeler vehicles. The Bharat State-II and tighter norms compliant vehicles will be certified by using 4-gas analyzer only.

Q15 Smoke meter are suitable for testing which vehicles?

A15 Smoke meters can be used for any diesel vehicles only.

Q16 What is the date of renewal of PUC norms for revised PUC norms, which are scheduled for implementation from 1st October 2004?

A16 The Transport Authority shall renew the PUC center for conducting tests as per revised PUC norms based on the report submitted by equipment manufacturer regarding completion of modification / calibration of the equipment belonging to the PUC center.

Q17 What is meant by 'Code of Practice' for PUC Center?

A17 Code of Practice for PUC Center is a set of mandatory rules laid down by the Government for the smooth operation of PUC center.

Q18 What is meant by 'Code of Practice' for equipment manufacturer?

A18 Code of Practice for PUC equipment manufacturer is a set of mandatory rules laid down by the Government for maintaining cordiality between PUC equipment manufacturer and the Test Agency.

Q19 Where is the updated information about certified PUC equipment available?

A19 The updated information about certified PUC equipment is available on the ARAI website at www.araiindia.com.

Q20 Does the AMC charges include cost of spares ?

A20 The AMC charges indicated on our website include cost of spares also. However, service tax as applicable will be extra.

Q21 Does the AMC charges include computerized PUC Centres ?

A21 The AMC charges indicated on our website include PUC equipment only but ***NOT*** the computer and its software.

Source: Automotive Research Association of India, Pune