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EIPPCB LCP BREF

European Integrated Pollution Prevention and Control Bureau: BAT Reference Documents

Industry feedback on the proposed NO_x/CO BAT level spans for stationary gas-fired engines

The Euromot Position – August 2004

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EUROMOT
Engine-in-Society

Euromot is the **European Association of Internal Combustion Engine Manufacturers**.

We represent the leading manufacturers of internal combustion engines used in a broad range of nonroad and marine applications (construction, mining and material handling equipment, trucks and buses, agricultural and forestry equipment, commercial marine and seagoing vessels, workboats and pleasure boats, rail traction, lawn/garden and recreational equipment, power generation).

Euromot has been working for many years with international regulatory bodies, eg European Union, the UN Economic Commission for Europe (UNECE), the UN International Maritime Organizations (IMO) and the Central Commission for the Navigation on the Rhine (CCNR). In addition, we are seeking an open and fair dialogue with national governments to provide reliable know-how on advanced internal combustion engine technologies in general and, in particular, on the feasibility of environmental as well as cost-effective product regulations. To achieve a pro-active engagement of all stakeholders in international harmonisation of regulations affecting engines and equipment, we coordinate our activities worldwide with trade associations of the non-road and marine industry sector.

For further information about our Association please refer to our Annual Report 2002 or pay us a virtual visit at **http://www.euromot.org** – your bookmark for engine power worldwide.

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0 Table of content

1 Introduction

In the EU Integrated Pollution Prevention and Control (IPPC) Directive 96/61/EC it is stated on page L 257/29, item 11: "**best available technique** shall mean the most effective and advanced stage in development of activities and their methods of operation which indicate the **practical suitability** of particular techniques for providing in principle the basis for emission limit values designed to prevent and where that is not practicable, generally to reduce emissions and the **impact on the environment as a whole**:

- 'techniques' shall include both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned,
- 'available techniques' shall mean those developed on a scale which allows implementation in the relevant industrial sector, under **economically and technically viable conditions**, **taking into consideration the costs and advantages**, whether or not the techniques are used or produced inside the Member State in question, as long as they are reasonable accessible to the operator,
- 'best' shall mean most effective in achieving a **high general level of protection of the environment as a whole.**

In determining the best available techniques, special consideration should be given to the items in Annex IV;"

In Annex IV of the IPPC Directive are amongst others listed: "**the consumption and nature of raw materials (including water) used in the process and their energy efficiency**"; "the need to prevent or reduce to a **minimum the overall impact of the emissions** on the environment and the risks to it"; etc.

In the LCP Directive 2001/80/EC, page L 309/2, item 13 energy **efficiency is also highlighted**: "The Community is committed to a reduction of carbon dioxide emissions. Where it is feasible the

combined production of heat and electricity represents a valuable opportunity for significantly improving overall efficiency in fuel use".

In other words: BACT (**B**est **A**vailable **C**ontrol **T**echnology) is determined on a case-by-case basis taking into account energy, environmental and economic impacts and other costs through application of an available technique.

In the Euromot Position paper "Industry feedback on the proposed NO_X/CO BAT level spans for stationary gas-fired engines" December 2003 (2) the consequences of the proposed emission values for the gas engines in EIPPCB TWG meeting 18-21 November 2003 are given and it is shown why the proposed emission values for NO_X and CO are not BAT.

2 Gas engine types

Small gas engines (< 1.5 MW_e) are usually of rich-burn type. These engines have high NO_X:s up to 10 times the NO_X emission of a lean burn gas engine. Therefore these engines are often equipped with catalytic three way conversion ("TWC:s") (reduce NO_X, CO, VOC:s) units in order to reduce the NO_X emission and to comply with the legislation in force. TWC is a also called non-selective catalytic reduction (NSCR), it is only effective with stochiometric or rich-burning engines (exhaust gas must contain less than 0.5 % O_2)!

Modern bigger gas engines are usually of lean burn type. Lean burn engine technology is a direct response to the need for cleaner burning gas engines. NO_X formation in an engine is a function of both flame temperature and residence time. The focus of lean burn developments was to lower combustion temperature in the cylinder using lean fuel/air mixtures. Lean combustion decreases the fuel/air ratio in the zones where NO_X is produced so the peak temperature is less than the stoichiometric adiabatic temperature, therefore suppressing thermal NO_X formation. An added performance advantage of lean burn operation is higher output and higher efficiency.

In USA, Finland[1)] and Germany BAT technique is to be used.

In non-attainment areas in USA LAER (**L**owest **A**chivable **E**mission **R**ate) is to be reached. As stated above in the BAT approach the whole picture shall be considered (costs, efficiency, other emissions, etc.). In many projects in these countries the lean-burn gas engine has only been equipped with an oxidation catalyst in order to keep the "unburned emissions" (CO, etc.) at an acceptable level and the NO_X value close to 190 mg/Nm³ (15 % O_2). Some recent references are:

Engine type	Catalyst	Output	Location	Delivery Year
20V34SG	Oxicat	(7300 kWe)	City of Raton, N.M (USA)	2002
2*18V34 SG	Oxicat	(tot.11340 kWe)	Missouri (USA)	2000
3*18V34SG	Oxicat	(tot. 17010 kWe)	Arkansas (USA)	2000

In Germany the new TA Luft 2002, which is often taken as a reference for a state-of-the-art emission regulation for stationary engines, stipulates for the NO_X emission limit value for lean-burn gas engine firing natural gas 190 mg/Nm^3 (@ 15 % O2). Reference plants recently delivered in Germany are given as an attachment to this document.

1) http://www.ymparisto.fi/download.asp?contentid=3708 on page 102 in tables 29 and 30 you will find the guidance values for BAT in Finland for small stationary engine /gas turbine plants 3 ... 50 MW_{th}

3 Final conclusions and recommendations

As a conclusion, Euromot strongly recommends to modify the gas engine part in table 7.32 (page 42) "BAT for the reduction of NO_X and CO emissions from gas fired combustion plants" as follows:

Plant type	Emission level associated with BAT [mg/N_m^3]		O_2 level [%]	BAT options to reach these levels	Monitoring
	NO_X	CO			
Gas engines	90-190	100	15	Low-NO_X tuned and SCR	Discontinuous
Gas engine with HRSG in CHP mode	90-190	100	15	Low-NO_X tuned and SCR	Discontinuous

Please note that continous engine emission monitoring is not common practice for stationary internal combustion engines.

Also, it should be clearly stated in the document that the emission levels associated with BAT for gas engines are only applicable for burning natural gas and not for renewable gases like landfill gas, biogas or purification gas. Otherwise, the emission levels indicated for gas engines would completely destroy the market for these from the environmental point of view absolute senseful applications.

4 References

(1) Euromot Comments on the Backup Document of the Second Draft Reference Document on Best Available Techniques for Large Combustion Plants, June 2003 (submitted to the EU Seville process)

(2) Euromot Comments on the Backup Document on the Second Draft Reference Document on Best Available Techniques for Large Combustion Plants, December 2003
http://www.euromot.org/download/news/positions/stationary/EIPPCB_BREF_BAT_gas_engines_comment_euromot_dec03.pdf

(3) NO_X standard, EPA-453/R-94-012 or New Performance Standards, Subpart Db-Technical Support for Proposed Revisions to NO_X Standard (1977)
http://envinfo.com/caain/797/noxreg.html

(4) Emission-table-6.41, June 2003 (submitted to the EU Seville process)

(5) The Environmental Protection Act 1990, Part 1 (1995 Revision), PG 1/5(95): Secretary of State´s Guidance-Compression Ignition Engines, 20-50 MW Net Rated Thermal Input, UK

(6) The Guide to the Emission Limits (Combustion Plant) Decree (Environmental Management Act) A ("ELCPD A"), 1998, The Netherlands