



MAN EGR: Add Profit
Trucknology[®] delivers

MAN EGR: WHAT'S THE STORY

Since the introduction of the 'Euro emission limits' back in 1990 - to achieve a steady, but drastic, reduction in trucks emissions - trucks have been getting cleaner and cleaner.

Exhaust limits, both in Particle Matter and in Nitrogen Oxide have been reduced considerably over the staged legislation changes.

For example: Particle Matter

The 'Euro 4' legislation calls for just 0.02 g/kWh
At 'Euro 0' this figure was at 0.7 g/kWh
(Some 35 times larger than Euro 4)

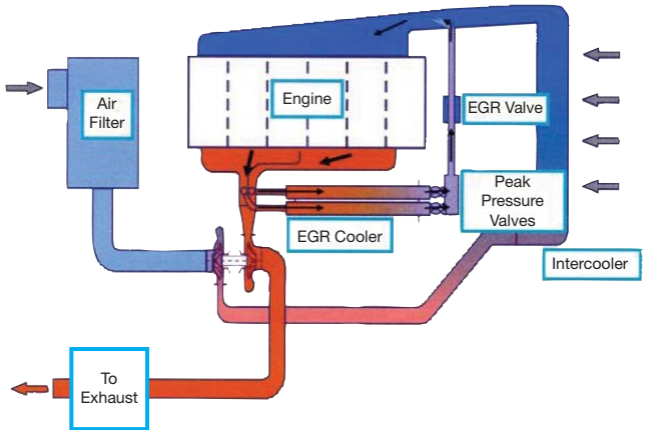


With Nitrogen Oxide (NOx) the reduction figures are just as impressive...

For 'Euro 4' trucks must achieve a 3.5 g/kWh
At 'Euro 0' truck this figure was at 14.4 g/kWh
(That equates to a massive 75% reduction in NOx)

The MAN designers took the view that to meet these onerous standards, a positive and reliable approach was required to achieve these emission limits for Euro 4 / Euro 5 and beyond... their solution:

EXHAUST GAS RECIRCULATION (EGR).



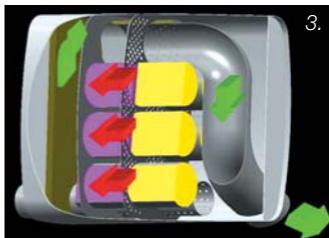
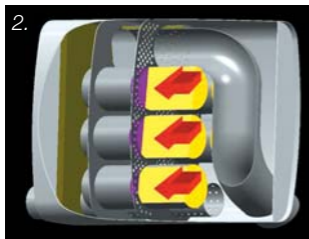
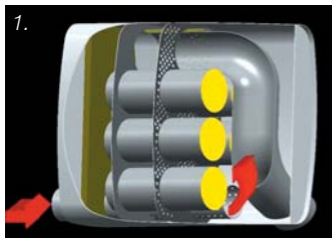
In 1999 MAN introduced an Exhaust Gas Recirculation (EGR) solution for their Euro 3 trucks.

MAN's EGR technology actually recycles a small percentage of the cooled exhaust gases back into the engine - to help reduce the Nitrogen Oxide (NO_x) emissions.

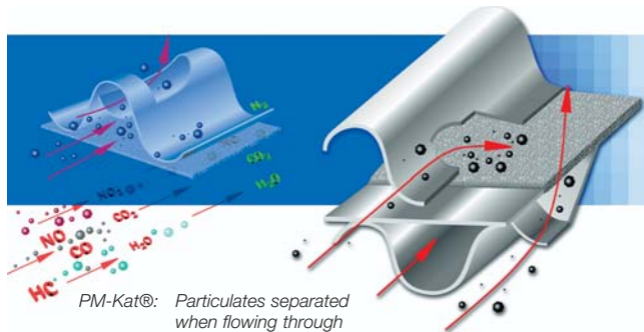
**SINCE ITS INTRODUCTION
MAN'S EGR TECHNOLOGY
HAS BEEN OPERATING SUCCESSFULLY
IN OVER 400,000 TRUCKS.**

MAN PM-KAT®

To meet the more stringent 'Euro 4' legislation, MAN has further developed its EGR technology by adding its unique PM-Kat® - fitted within the trucks silencer box - to help achieve the new Particle Matter (PM) levels.



**MAINTENANCE FREE,
THE MAN PM- KAT® IS DESIGNED
TO LAST THE FULL LIFE OF THE ENGINE.**



The catalyser takes the Nitrogen Monoxide (NO) and oxidises this into Nitrogen Dioxide (NO₂), then in the soot separator, particles are separated into a sintered metal mat and combusted along with the generated NO₂ gases to simply convert the exhaust gases into Carbon Dioxide (CO₂).

EURO 4: MAN EGR + PM-KAT® ADVANTAGES

- Reliable, maintenance-free system made of stainless steel
- No change in fuel consumption (in UK trials)
- Totally independent of AdBlue® infrastructure
- No restrictions in space; maintains maximum tank size
- Up to 150 kg weight advantage as compared to SCR solution
- Above average elimination of the smallest particulates
- No restriction on payload capacity
- No complicated metering units / monitoring systems required

EURO 4? DON'T JUST



“Based on an overall operational productivity factor combining fuel economy and payload, the winner of the CM Euro-4 1000-mile group test is the MAN TGA 6x2, at 97p per tonne/km; the only contender to beat the £1 mark.”

Commercial Motor, 28.09.06 – '1000 Mile Euro 4 Group Test'



MAN TGA 440, 6x2,
AT 44 TONNES

For months we've been saying EGR technology is the simple, fuel-efficient solution for Euro 4. Now you don't have to take just our word for it. Now, no less than three independent magazine tests have shown MAN EGR will deliver industry-leading results for operators. And all without the complexities and costs of AdBlue. It means you can stop worrying about the technology, and start maximising your profitability in the new Euro 4 era. With MAN EGR – you just add profit!

www.euro4.co.uk

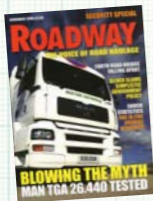
MAN ERF UK – A member of the MAN Group.



TAKE OUR WORD FOR IT!

“ So MAN has apparently done the almost impossible, not simply bettering the fuel returns achieved by its Euro 3 forerunners, but doing so with a self-contained system requiring no additional liquids. ”

Motor Transport, 02.11.06. Road Test report of MAN TGA 440hp (EGR), 6x2



“ ...the best result we have recorded at 44 tonnes around this route ...excellent fuel returns, decent average speed and low chassis weight, this tractor takes the honours by a massive margin. ”

ROADWAY, November 2006.

Road Test report of MAN TGA 440hp (EGR), 6x2.

MAN EGR: JUST ADD PROFIT!



MAN EGR: ADD

In the *CM* Euro-4 1000-mile group test at the all important 44 tonnes / 6x2 tractor category, a standard MAN TGA 26.440 - with the reliable and economical D20 diesel engine coupled to a TipMatic automated gearbox, was matched against three other trucks: a Mercedes-Benz Actros 2546, a Volvo FH 440 and a Scania R420.

The results below clearly illustrate the MAN TGA's impressive winning margin.

	MAN TGA	Mercedes Actros	Scania R420	Volvo FH 440
Overall				
Lit/100km	35.82	38.35	39.50	38.72
MPG	7.89	7.37	7.15	7.30
AdBlue TOTAL	0.00	24.68	0.00	24.50
£/100km	28.66	31.32	31.79	31.61
Productivity				
Kerb weight	7773	8555	8176	7850
Trailer	6820	6820	6820	6820
Payload	29407	28625	29004	29330
£/t/km	0.97	1.09	1.10	1.08



OVERALL WINNER @ 44 Tonnes: MAN TGA

PROFIT!



When you annualise these results - with a truck covering some 100,000 miles / year - the operational and monetary benefits of the MAN TGA, with its EGR technology, are simply staggering.

MAKE / MODEL	MAN TGA	Mercedes Actros	Scania R420	Volvo FH
MPG	7.89	7.37	7.15	7.30
Total AdBlue Required (Ltrs)	<u>NONE</u>	2,468	<u>NONE</u>	2,450
£/100km	£28.66	£31.32	£31.79	£31.61
Extra Operating Costs, based on 100,000 Miles / Year	The Benchmark	£4,280 / Year !	£5,037 / Year !	£4,746 / Year !

Results Calculated on Fuel based @ 80p / litre and with AdBlue @ 40p / litre

Fact: SCR vehicles would cost an operator more than £4,280 extra, per year, in fuel and AdBlue®.

MAN TGA – WINNER ON POUNDS !



with EGR Technology

MAN EGR: Add Nothing!

EGR

The facts. H

A simpler solution with nothing to add.

It's as simple as that. MAN's EGR and PM-KAT® filter technologies offer the technically and economically simpler system for Euro 4, with everything you need already built into either the engine or silencer box.

Proven technology and performance.

As pioneers of the world's first diesel engine in 1897, with the help of Rudolf Diesel, MAN claimed a massive advantage. Now, with expertise in both solutions, MAN has selected exhaust-gas recirculation (EGR) as the way forward at Euro 4 and beyond. It's a system that adds virtually no weight to the vehicle and requires no extra chassis space or maintenance. In spite of some SCR suppliers' claims that EGR only works in lower power engines, MAN can achieve Euro 4 and beyond with the all new 480PS D26 engine.

Not just an engine. A family of engines from 150PS to 480PS.

No matter what size of vehicle you need, every MAN and ERF truck, from 7.5 - 44 tonnes GVW, MAN has a Euro 4 solution using its patented EGR / PM-KAT® filter technology.

Less cost. More payload. More profit.

EGR offers a low front end cost, no payload penalties and hassle-free operation for drivers - meaning better and safer driving. Result? Less stress and more profit potential for our operators.



head to head.

SCR

Fuel saving? But extra cost.

Claims of improved diesel consumption are as yet unproven. Even if this proved to be the case, the cost of AdBlue must be included along with the operational costs of storage, infrastructure, handling, maintenance and filling.

With extra parts comes extra weight and extra maintenance.

The AdBlue tank and fluid, electronic management system, sensors, pump, injection system, metering unit, catalytic converter. It all adds up. The result? An increase in chassis weight of around 150kg. And all equipment needing maintenance to ensure compliance with emissions regulations. For vehicles registered after Oct 2007, running out of AdBlue can and will have serious consequences for the vehicle and operator.

Two tanks. Two pumps. Two fills.

Alongside your fuel tank, you need a separate AdBlue tank. This obviously takes up valuable space on the chassis. A particular concern on 6x2 tractors where additional fuel tanks or ancillary equipment are often required. The fitting of vertical exhaust systems on SCR equipped vehicles can also be problematic. Meanwhile, out on the road, drivers must find and use both diesel and AdBlue pumps, making their job more stressful and time consuming.

Don't go too far from home.

Some operators will establish their own bulk supplies and storage of AdBlue, with all that added cost and hassle. All others will have to rely on the growth of an AdBlue network across the UK and beyond – nowhere near established yet.



FREQUENTLY ASKED QUESTIONS - MAN'S RESPONSE

Q: When do the new exhaust gas directives apply?

A: Euro 4 for all newly registered vehicles, started from October 1st 2006. Euro 5 legislation will become effective for newly homologated vehicles from October 1st 2008, and for newly registered vehicles from October 1st 2009.

Q: How does MAN's PM-KAT[®] work?

A: In the PM-KAT[®] filter particulates are separated by the deliberate creation of turbulence when the exhaust gas is redirected into the separator and by the passage through the sintered metal mat. The disintegration of the particulates deposited in the metal mat is the result of a permanent chemical reaction which is brought about with the aid of the NO₂ in the oxidation catalyst.

Q: Will the PM-KAT[®] require periodic maintenance?

A: No, the PM-KAT[®] is a 'maintenance free' unit which has been designed to last the life of the engine.

Q: What is exhaust gas recirculation (EGR) and how does it work?

A: A small percentage of the exhaust gas is recirculated externally and cooled, this cooled mixture is then fed back into the combustion chamber, this process cuts the share of nitrogen oxide in the exhaust gas. The lower levels of particulate matter required by Euro 4 legislation are reduced by means of the patented MAN PM-KAT[®] filter.

Q: Does the EGR system require the addition of the AdBlue chemical in order to function correctly?

A: NO! MAN'S *proven* EGR technology does not require the addition of any chemicals to operate and achieve Euro 4 emissions.

Q: Does the EGR system add any weight to the chassis?

A: No, the EGR system does not add any significant weight to the chassis - unlike the SCR system which adds around 150kgs.

Q: How much extra space is required with the EGR system?

A: A major advantage of the EGR system is that it does not take up any valuable chassis space, this is particularly important for operators who need to mount ancillary equipment onto the chassis. By contrast the SCR system requires a considerable amount of space on the chassis to mount the AdBlue tank, and all the associated SCR components.

Q: I have heard that fuel economy will be significantly reduced with the EGR system?

A: Our own 'back to back' performance tests (pre Euro 4) concluded that there is minimal difference in fuel economy between Euro 3 and Euro 4. However, the independent Commercial Motor 1,000 Mile Euro-4 Test which took place last Autumn pitched trucks with EGR against SRC equivalents; the results speak for themselves: the MAN TGA 26.440 returned a winning fuel figure of 7.89 mpg - equating to an annual saving of over £4,400/year (based upon running @ 100,000 miles/year). *In addition, at £0.97 the MAN was the only truck to deliver an overall productivity figure below the magical £1/t/km mark on the CM Test.*

Q: How long has MAN been using EGR technology?

A: EGR is proven technology and has been used successfully by MAN since the introduction of Euro 3 emissions legislation in 1999. Today 400,000 trucks with MAN EGR technology are operating successfully.

Q: I have heard that EGR is only available on lower powered engines, is this true?

A: No. MAN offers Euro 4 EGR technology throughout the whole model range from 7.5 - 44 tonnes gross weights, from 140PS up to 480PS.

Q: Will the EGR system with PM-Kat® be available at Euro 5?

A: The MAN EGR technology with PM-KAT® filter has brought a unique solution for cleaning exhaust gas with the particulate filter onto the market. This has been born out by its great sales success to date and the convincing advantages of this level of engineering. MAN is now developing an EGR solution for Euro 5 which will be available in 2008 - *well in advance of the Euro 5 legislation coming into effect.*

MAN's EURO 4 EGR TECHNOLOGY VS SCR @ EURO 5

The push to move trucks to Euro 5, in advance of the planned legislation, appears to make some sense - that is, until you consider the points below...

1. Operators want to be seen as 'green', but is a truck with SCR @ Euro 5 any greener than an MAN EGR truck @ Euro 4?

Production of Urea is very heat and energy intensive, with additional processes required to produce the AdBlue.

The number of vehicle journeys consuming more of this valuable natural resource will add to pollution - *not reduce it*.

Reliability issues and AdBlue consumption render today's Euro 5 SCR trucks *less efficient* and *less productive* than MAN's EGR Euro 4 spec.

2. The additional cost of operating SCR trucks @ Euro 5

It is almost certain that most manufacturers will charge an additional premium for their SCR trucks with Euro 5 specification (*anything from £1,000 - £1,500*).

3. Increased AdBlue usage @ Euro 5

Reports have confirmed that operators' running SCR trucks @ Euro 5 will ultimately consume 50% more AdBlue than similar SCR trucks running @ Euro 4 (usage increases from 4% to 6% of diesel consumed).

4. RPC rebate for Euro 5 trucks?

Potentially an RPC (when finally released) will only be in place for a period of 2 years - reports anticipate RPC at £500/truck/year rebate.

5. AdBlue supply - the long term view

Whilst the usage of AdBlue certainly increases to 6% of diesel consumed @ Euro 5, the long term demand for AdBlue is expected to reduce as trucks @ Euro 6 and beyond are likely to require less AdBlue.

AdBlue Cost Table - Euro 4 vs Euro 5 Usage

ANNUAL MILEAGE	80,000	100,000	120,000	140,000
AdBlue cost per year @ Euro 4	£818	£1,022	£1,227	£1,431
AdBlue cost per year @ Euro 5	£1,227	£1,534	£1,840	£2,147
AdBlue cost over 5 years @ Euro 4	£4,090	£5,110	£6,135	£7,155
AdBlue cost over 5 years @ Euro 5	£6,135	£7,670	£9,200	£10,735

Calculation based on AdBlue @ 45p/litre for tractors achieving an average of 8.0 mpg
AdBlue calculated @ 4% of diesel consumption for Euro 4 and @ 6% for Euro 5.

Operators' running with SCR trucks @ Euro 5 have both increased vehicle pricing and increased AdBlue usage to consider in their calculations:

Increased ownership and operating costs = potential reductions in profitability.

An RPC rebate of £500/year would only cover the additional operating cost - if the trucks are running @ 100,000 miles/year.

Environmental Assessment - MAN's Euro 4 EGR Technology vs SCR @ Euro 5

Consider these carbon footprint characteristics before you decide:

CO₂ Emissions :	<i>MAN EGR at least 5% better than SCR equivalent!</i>
Particulates :	<i>MAN better on Microdust</i>
Compliance Risk :	<i>MAN – zero risk, due to no AdBlue</i>
2nd Life Risk :	<i>MAN – zero risk, no AdBlue</i>
Freight / Payload :	<i>MAN – zero risk, no AdBlue</i>
AdBlue Production / Distribution:	<i>MAN – none required</i>



MAN's EGR technology @ Euro 4:
the truly green approach. Trucknology delivers®

MAN EGR: Add Nothing!



MAN EGR: Add Nothing!

MAN ERF UK Ltd.,
Frankland Road, Blagrove,
Swindon. Wiltshire SN5 8YU
www.euro4.co.uk



A member of the MAN Group.

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