Fiamm Ecoforce

ecoFORCE

FIAMM GARAGIST 1ST CHOICE

CO_2 SAVER

START STOP

MHEV

ORIGINAL QUALITY SPARE PART Regulation (EU) 461/2010

FIAMM

Today, the energy requirements of modern vehicles increase inevitably the demand of batteries that maintain the power for a long time. In order to face the new measures about CO_2 emissions imposed by the European Union, car manufacturers have developed several models of hybrid cars equipped with different electrically powered devices, such as Start & Stop and Brake Energy Regeneration, which require a much more intensive use of the battery. The new range of **ECOFORCE** batteries for micro hybrid cars provides a response to this need.


-CO2

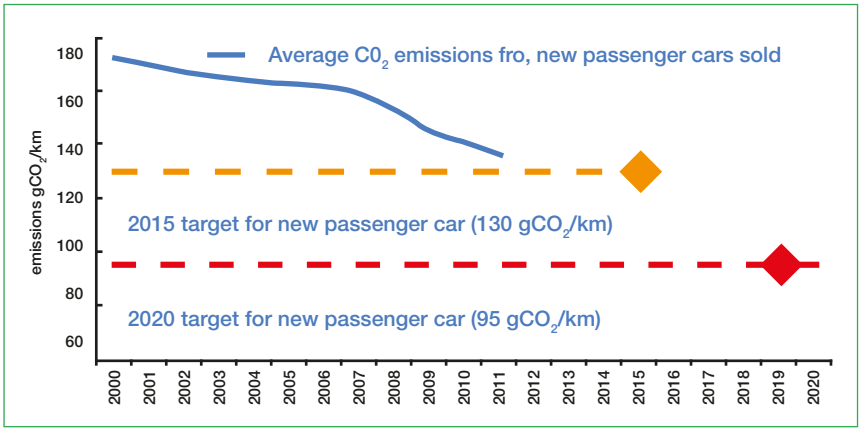
EMISSION

EU REGULATION ON CO_2 EMISSIONS REDUCTION

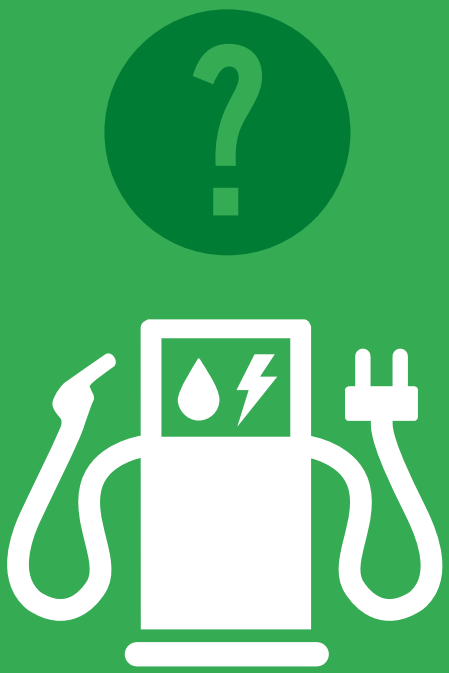
All together, cars and light commercial vehicles account for approximately 15% of CO_2 emissions in the European Union, including those from fuel procurement. The objectives fixed by the European Commission will allow to reduce the average CO_2 emissions of new cars from 135.7 g/km (in 2011) to 95 g of CO_2 per kilometre in 2020.
This challenge for auto makers is the beginning of a new era which will determine considerable changes in vehicle manufacturing and will also influence the automotive component sector in a major manner.
The battery will become the beating heart of the car even more than it is today and will be expected to provide increasingly more frequent starts and unprecedented storage capacity.

THE EU2020 OBJECTIVE

The European Parliament has approved new standards governing CO_2 emissions of new generation cars which starting **from 2020** must not exceed the maximum limit of **95 g/km**. This restriction will apply to manufacturers that make more than 1000 cars per year.
The reform includes a transition phase, limited to one year only (2020), and a “supercredit” system, applicable from 2020 to 2022, in which cars which emit less than 50 g/km of CO_2 will count double in the manufacturer average.
It is estimated that the 95 g/km CO_2 target will allow emitting 15 million tons less of CO_2 and reducing fuel consumption by € 4000 in the entire life cycle of a car.



UE 27 – Average CO_2 emissions of new cars sold (g/km)



HYBRID CARS

CAR MANUFACTURERS BEHAVIOUR IN RESPONSE TO THE EU REGULATION

Hybrid is an adjective that indicates, for a car, the simultaneous presence of two engines: an internal combustion engine (gasoline or diesel) and an electric one.

HYBRID CARS ARE NOT ALL ALIKE

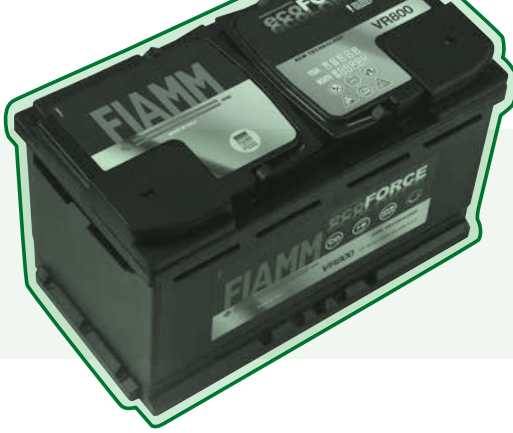
There are different hybrid levels depending on the electrical architecture and on the capacity of reducing consumption.

	MICRO HYBRID		MILD HYBRID
SPECIAL EQUIPMENTS CO_2 REDUCTION	Start & Stop	+ Start & Stop + B.E.R.	+ Start & Stop + B.E.R. + Power Motor Assist
ELECTRICAL ARCHITECTURE AND MAIN CHARACTERISTICS	+ 12 V Start & Stop system based upon a specific starter/alternator + Electrical Power < 3 kW		+ Micro Hybrid + braking energy recovery + Max. vehicle voltages 144 V + Electrical Power 5 ÷ 15 kW + Electric motor << Thermal motor
CO_2 AND FUEL SAVING	3 ÷ 6 %	5 ÷ 8 %	8 ÷ 12 %
TECHNOLOGY	+ ECOFORCE AFB + ECOFORCE AGM	ECOFORCE AGM	+ Carbon Lead-acid Advanced + Ni-Mh + Li-ion
APPLICATION EXAMPLES	+ Fiat Group Automobiles + Toyota Optimal Drive + Ford Econetic + WV (BlueMotion)	+ VW BlueMotion + Hyundai Blue Drive + BMW Efficient Dynamics + Mercedes Blue Efficiency + Audi	+ GM (Saturn Vue, Aura, Chevrolet Malibù) + Toyota (Crown S200) + BMW Active Hybrid + Honda IMA + Peugeot 308 e-HDI + Ferrari La Ferrari
FIAMM VISION	AFB 	AGM 	FIAMM has set partnership relations with CNR for the development of Carbon Lead-acid advanced technology FIAMM has filed a new Li-ion technology patent


START
STOP

MICRO HEV

START & STOP SYSTEM
BRAKE ENERGY REGENERATION

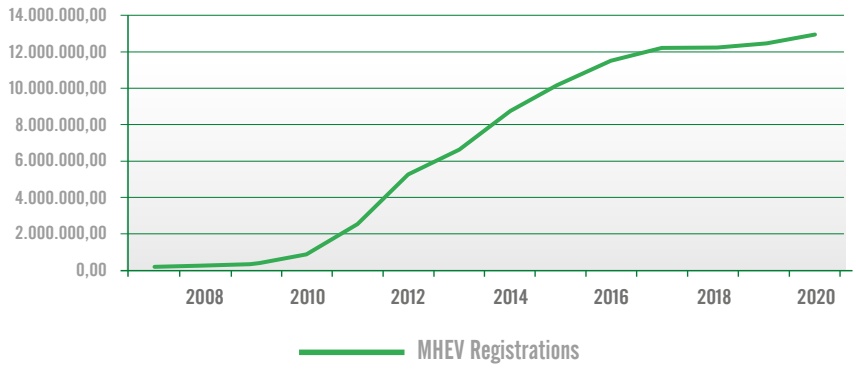


MICRO HEV (*Hybrid Electric Vehicle*) makes use of Start & Stop function that turns the engine off when the car is stopped and starts the engine up again when the driver presses the clutch pedal. Once the vehicle is stopped all electrical devices are powered by battery.
According to the NEDC cycle (*New European Driving Cycle* - used by all manufacturers for the calculation of fuel consumption) CO_2 emissions are reduced by 3-6% with the assistance of the Start & Stop function.

In addition to the Start & Stop function, MICRO HEV cars are also characterized by the presence of a device for the energy recovering during braking, reducing consumption by up to 8% compared to a conventional vehicle.
The Brake Energy Regeneration (*BER*) develops during deceleration or braking, then the energy produced by the movement of the vehicle is retrieved and stored in the battery. In this way, it reduces the engine work and decrease consumption. During the acceleration phase all unnecessary utilities are separated from the powertrain. In this way all engine power is available for acceleration and at the same time fuel consumption is reduced.

The devices described above require the use of a battery with an high charging and discharging acceptance.
AFB ECOFORCE is suited for cars with Start & Stop system, while AGM ECOFORCE is essential for those cars that combine different fuel-saving devices to the Start & Stop system.

EUROPEAN MARKET



FUEL SAVING TECHNOLOGIES

+ Gear shift indicator
+ High-efficiency alternator
+ Double clutch gear
+ Energy management system
+ Enhanced starter motor
+ Steering by wire and braking by wire

FIAMM HERITAGE TO SAVE THE ENVIRONMENT

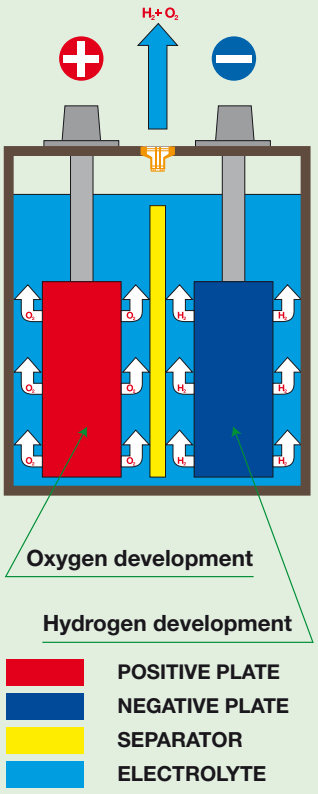
AFB TECHNOLOGY

EVOLUTION OF TRADITIONAL LEAD-ACID BATTERIES

ECOFORCE AFB (*Advanced Flooded Battery*) is an evolution of traditional lead-acid batteries. The main features that differentiate an AFB battery from a conventional lead acid battery are:

1. electrolyte reservoir increased;
2. high exchange surface with the electrolyte;
3. negative plates features:
   a. grids with a special Lead-Calcium-Tin alloy;
   b. negative active mass with an higher Carbon content;
   c. mixture of different expanders studied to face Start & Stop cycles;
   d. application of a specific organic fiber layer;
4. positive plates characterized by:
   a. grids with a special PbCaSn alloy (Lead-Calcium-Tin);
   b. grid specifically designed to resist to corrosion and high temperatures (SAEJ2801);
   b. layer to contain the expansion of the active mass during cycling;
5. protection of the electrodes against corrosion and potential danger.

ADVANCED FLOODED BATTERY DURING DISCHARGE



WARNING
Traditional lead-acid batteries are not suitable for micro hybrid vehicles.
In case of replacement FIAMM recommends the installation of AFB/AGM batteries in all above models, respecting the original battery technology.

ecoFORCE AFB

CO2 SAVER

START STOP

MHEV

ORIGINAL QUALITY SPARE PART
Regulation (EU) 461/2010

ECOFORCE AFB (Advanced Flooded Battery) is the best option for compact cars equipped only with Start & Stop system. In this case the battery is characterized by a withstand to cycles, two times higher than a traditional battery: in queues or at traffic lights, ECOFORCE AFB provides power to all electrical components when the engine is off and a reliable starting when the clutch is pressed.

THE PRINCIPAL BENEFITS OF ECOFORCE AFB AT A GLANCE

- Latest OE technology and quality
- High charge and discharge acceptance (two times more than a traditional battery)
- Negative active mass composition specifically designed to meet the typical cycles of Start & Stop
- Good starting performance
- Longer cycle life than standard lead-acid starter batteries (when measured in terms of energy output)
- Totally maintenance-free

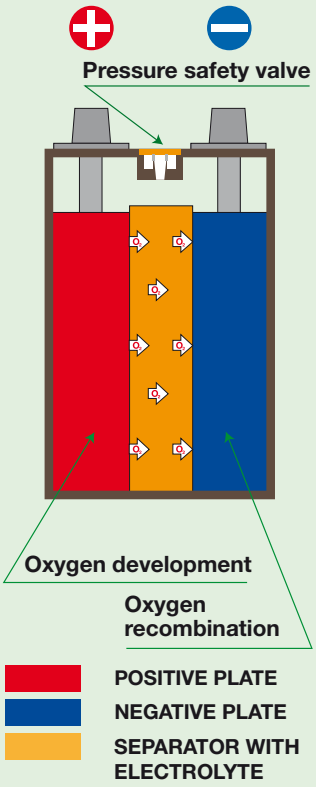
TECHNICAL INFORMATION ECOFORCE AFB

CODE	PERFORMANCE		DIMENSIONS				FEATURES		
	Ah	CCA A (EN)	BOX	LENGTH (mm)	WIDTH (mm)	HEIGHT (mm)	LAYOUT	TERMINAL	HOLD-DOWN
TR520	60	520	L2	242	175	190	0	1	B13
TR650	65	650	L3B	278	175	175	0	1	B13
TR680	70	680	L3	278	175	190	0	1	B13
TR730	75	730	L4B	315	175	175	0	1	B13
TR740	80	740	L4	315	175	190	0	1	B13
TR850	95	950	L5	353	175	190	0	1	B13

AGM TECHNOLOGY

The main feature that distinguishes ECOFORCE AGM from a traditional battery is the gas recombination technology. For a traditional lead-acid battery the phase of charging is characterized by the dissociation of water into hydrogen and oxygen. The two gasses leak from the caps, while the level of electrolyte inside the battery decreases. ECOFORCE uses instead the principle of recombination.
Thanks to a special microporous separator (*Absorbent Glass Material*), impregnated with a controlled quantity of electrolyte, the oxygen released from the positive plate after the dissociation of water during charging, can migrate to the negative from which is fixed and then recombine with hydrogen, restoring the water that was dissociated. This establishes a closed electrochemical cycle, without any gas emission and without water consumption. It's a simple system, but to work best it requires great precision in manufacturing and an accurate choice of components. Important are both the whole plate-separators compression and the purity of the components.

AGM BATTERY DURING DISCHARGE



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ecoFORCE AGM

CO2 SAVER

START STOP

MHEV

ORIGINAL QUALITY SPARE PART
Regulation (EU) 461/2010

ECOFORCE AGM (Absorbent Glass Material) is the best battery for micro hybrid car models with Start & Stop device, Brake Energy Regeneration and other technologies conceived to save consumption (such as gear shift indicators, intelligent alternator, etc.).
Therefore the functioning of all these instruments depend on the presence of a battery that provides optimal performance, mainly in conditions of extreme cycling.

THE PRINCIPAL BENEFITS OF ECOFORCE AGM AT A GLANCE

- Latest OE technology and quality
- High cranking amperage
- Extreme charge and discharge acceptance
  (three to four times longer cycle life than traditional batteries)
- Low self-discharge
- Higher resistance to vibrations than conventional batteries
- Totally maintenance-free
- Leak-proof and Spill-proof

TECHNICAL INFORMATION ECOFORCE AGM

CODE	PERFORMANCE		DIMENSIONS				FEATURES		
	Ah	CCA A (EN)	BOX	LENGTH (mm)	WIDTH (mm)	HEIGHT (mm)	LAYOUT	TERMINAL	HOLD-DOWN
VR200	12	200	BTX 14	150	87	145	1	-	B00
VR680	60	680	L2	242	175	190	0	1	B13
VR760	70	760	L3	278	175	190	0	1	B13
VR800	80	800	L4	315	175	190	0	1	B13
VR900	90	900	L5	353	175	190	0	1	B13
VR950	105	950	L6	394	175	190	0	1	B13

MICRO HEV
HYBRID ELECTRIC VEHICLE

Micro HEV are the latest generation cars that respect the environment through their ability to reduce significantly fuel consumption.

START & STOP

During stop status the Start & Stop function automatically switches the engine off and restarts it when the clutch pedal is pressed.

ecoFORCE

ORIGINAL QUALITY SPARE PARTS REGULATION (EU) 461/2010

ECOFORCE batteries are produced in the same production facilities where original equipment ones are manufactured, using the same technology, manpower, equipment and controls approved by the car manufacturers involved.

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