



Deutsche Umwelthilfe



Exhaust emissions from hand-held equipment

Measurements 2018

Initial situation

The Deutsche Umwelthilfe e.V. (Environmental Action Germany, DUH) identified, as part of its emission measurements, that many engines of handheld equipment do not comply with the European emission limit values. The environmental and consumer protection organisation has had the exhaust emissions of motor saws and other handheld mobile machinery checked by TÜV NORD since 2013.

About Environmental Action Germany

Environmental Action Germany is an independent nonprofit environmental and consumer protection organization, founded 1975 and is entitled to take legal action on behalf of consumers in the event of infringements since 2004. DUH is one of the five most important environmental organizations in Germany and runs projects on the topics of air pollution, climate change and energy transition, nature conservation, local environmental protection, recycling and consumer protection. When it comes to air pollution and consumer protection Environmental Action Germany plays a leading role in Europe.

DUH has been advocating for a consistent implementation of environment-related consumer protection regulations for years. The organisation sees itself as advocate for consumers as market players who trust that the products marketed in Germany and Europe comply with the legal requirements and are therefore deceived by the non-compliance with the limit values for harmful pollutants. DUH is the only German environmental and consumer protection organisation that is engaged in the enforcement of regulations under emission legislation regarding handheld equipment. As a registered consumer protection agency, DUH also takes legal action in the interest of consumers against violations of environmentally relevant consumer protection regulations.



Hardly any consumer knows about the invisible health risks resulting from excessive pollutant emissions. The DUH advocates for better market surveillance – to give devices which exceed the limit values no chance on the market.

Such legal disputes aim at removing non-compliant products from the market. They are a strong signal towards manufacturers to bring only those products to the market that reliably comply with the set limit values.

Background and legal framework

Emissions from combustion engines contribute considerably to air pollution. Handheld mobile machinery emits, among other things, the following substances that are extremely dangerous to human health:

- Carbon monoxide (CO) is a hazardous respiratory poison. It is colourless, non-irritating, odourless and tasteless and it is easily absorbed through the lung. Consumers who use a motor saw that exceeds the limit value for carbon monoxide can show symptoms of slight poisoning. The risk of accidents considerably increases due to the typical impacts such as headache, dizziness and flu-like symptoms. Higher doses may have a significantly toxic impact on the central neural system and the heart.
- Hydrocarbons (HC) contribute, together with nitrogen oxides and sunlight, to the formation of ground-level ozone and are therefore regulated in the exhaust gas legislation. In addition, aromatic (benzene) and in particular polycyclic aromatic hydrocarbons (PAH) are often classified as especially hazardous to health. They may trigger leukaemia, bone marrow damage and other diseases without any known threshold level.
- Nitrogen oxides (NO_x): Nitrogen oxides lead to irritations and damage of the respiratory system and thus have a negative impact on human health. Nitrogen oxides are a by-product of combustion processes. In these processes, nitrogen oxides are mainly emitted as nitrogen monoxide (NO). In the atmosphere they oxidise into nitrogen dioxide (NO₂) which attacks human mucous membranes and thus leads to diseases of the respiratory system, such as chronic bronchitis and asthma. A higher NO₂ concentration also increases the risk of dying from cardiovascular diseases.
- Ground-level ozone (O₃): Ozone is a greenhouse gas. It originates from nitrogen oxides and volatile hydrocarbons under the influence of solar radiation. Since it is not directly emitted, ozone is also described as a secondary pollutant. From an ozone content of more than 110 µg/m³ onwards, a clear impairment can be noted, and from approx. 200 µg/m³ of ozone onwards, symptoms such as lacrimal irritation, mucous membrane irritation, bronchial irritation, headache and a deterioration of the lung function can occur, and plants can be damaged. Furthermore, it is assumed that there is a correlation between ozone concentrations and cardiovascular diseases (e.g. heart attack).

For this reason, limit values for these substances were first established in 1997 and have been tightened over the years.



Machines which exceed the emission limit values by several hundred percent can still be found on the German market.

The European Directive 97/68/EC was introduced to effectively protect persons against health risks resulting from air pollution caused by mobile machinery, and thus serves both environmental and consumer protection. Mobile machinery and equipment not intended for use on the road (Non-Road Mobile Machinery, shortly NRMM) must not exceed the mandatory pollutant limit values. Since the regulations serve to protect the safety and health of consumers, they also aim at regulating market behaviour in line with the Unfair Competition Act (UWG) in the interest of consumers as market players. But despite the importance of the aims of the regulation, the necessary official infrastructure to impose and control it, has not been established to a sufficient degree.

A first and important step to overcome this dilemma was taken at European level. The Directive 97/68/EC has been replaced by the Regulation (EU) 2016/1628. From 1 January 2017 on uniform regulations throughout Europe for market surveillance activities are valid. Both the duties of the authorities and the obligations of manufacturers and traders of these products are regulated more transparently now.

If retailers sell products covered by the EU directive, they are now obliged to ensure, that these products comply with the law. This obligation is part of the directive for the first time. DUH recommends that retailers start relevant surveillance activities at an early stage. This is especially the case if NGOs or authorities express suspicions. In such cases, the professional diligence required in

the DUH's view also includes the performance of spot checks on test stands operated or commissioned by trade associations.

DUH measurements of pollutant emissions from mobile machinery

In 2013, DUH commissioned the TÜV NORD testing institute for the first time with testing pollutant emissions from handheld equipment on a random basis. The measurement results showed considerable exceedances of emission limit values for eight of twelve motor saws and brush cutters tested. The engines of all eight machines were produced in China.

At the end of 2014, TÜV NORD was asked again to carry out a second test. The results were published at the beginning of 2015: Six out of eleven devices scored badly in the test and some of them exceeded the European limit values by up to 400 percent. All engines, which failed the test, were imported from China.

In 2016, DUH also tested machines from the Swedish and French market for the first time. A total of 33 devices was measured, among them 24 different device types of motor saws and brush cutters. In total, 18 of the 24 devices significantly exceeded the European limit values for HC+NO_x (total of hydrocarbon and nitrogen oxide emissions). These engines were all imported from China. Only seven of the 33 objects tested complied with the current limit value level II of Directive 97/68/EC in its version 2012/46/EU.

The 21 devices measured in 2017 were taken from the German, Swedish and French market. Nine of them did not comply with the combined limit values for HC+NO_x – three of these machines exceeded the limit value for CO additionally. With a limit value exceedance of 760% the highest exceedance since the beginning of the measurements was recorded in 2017.

Measurement results 2018

The switch to rechargeable battery technology is making steady progress with hand-held machinery. However, for very powerful machines, such as motor chain saws, there are no equivalent alternatives with battery drive available for all types of application yet. Therefore, in 2018 the emissions of ten motor chain saws were checked. The focus of the measurements was on the German market. In order to reflect the most common sales channels, the majority of the equipment was procured online.

Five of the motor chainsaws tested show high exceedances of the EU total limit value for HC+NO_x - three of those additionally exceed the limit value for carbon monoxide (CO).

Results of the emission measurements in spark ignition engines for non-road mobile machinery 2018

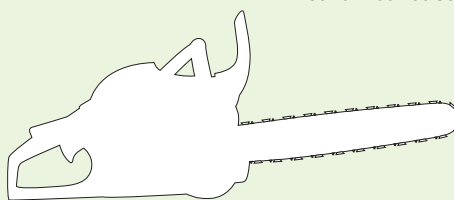
Specific hydrocarbon (HC) and nitrogen oxide (NO_x) emissions from motor chain saws

Manufacturer/Importer	Type	Limit value* [g/kWh]	Deviation to the limit value*
ISC GmbH	Mr. Gardener BKS 1335-2 WKS	50	-37,28
-	GREENCUT GS250X-10		572,18**
			308,12
HECHT MOTORS s.r.o.	HECHT 45		-0,46
ISC GmbH	Gardol GMSE 1535		452,90
MATRIX GmbH	MATRIX MCS 46-45		-15,46
MTD Products AG	MTD GCS 3800/35		-30,76
ATIKA GmbH & Co. KG	ATIKA BKS 38 A		-2,42
GÜDE GmbH & Co. KG	GÜDE KS 400-41		198,74
			-61,28**
scheppach GmbH	scheppach CSP 2540		640,78
VARO N.V.	POWERPLUS POWEG2010		578,40**
			150,78

* Emission limit value (stage II): sum of HC+NO_x, according to EU Directive 97/68/EC (2012/46/EU).

** Factory setting

-100 0 100 200 300 400 500 600 700 800 in %



The measurements were carried out by TÜV NORD Mobilität GmbH & Co.KG (IFM - Institut für Fahrzeugtechnik und Mobilität) on behalf of DUH. For freely adjustable carburetors, the emission measurements were carried out with the adjustments "high" and "low". The limit values must not be exceeded in either case.

Results of the emission measurements in spark ignition engines for non-road mobile machinery 2018

Specific carbon monoxide(CO) emissions from motor chain saws

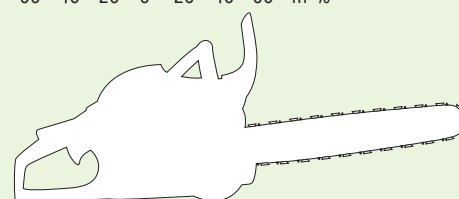
Manufacturer/Importer	Type	Limit value* [g/kWh]	Deviation to the limit value*
ISC GmbH	Mr. Gardener BKS 1335-2 WKS	805	-50,48
-	GREENCUT GS250X-10**		-3,17***
			-72,31
HECHT MOTORS s.r.o.	HECHT 45		-38,08
ISC GmbH	Gardol GMSE 1535		136,05
MATRIX GmbH	MATRIX MCS 46-45		-39,20
MTD Products AG	MTD GCS 3800/35		-97,01
ATIKA GmbH & Co. KG	ATIKA BKS 38 A		-96,14
GÜDE GmbH & Co. KG	GÜDE KS 400-41		90,68
			-92,06***
scheppach GmbH	scheppach CSP 2540		-34,57
VARO N.V.	POWERPLUS POWEG2010		14,05***
			-72,79

* Emission limit value (stage II): CO, according to EU Directive 97/68/EC (2012/46/EU).

** Although the limit value was not exceeded in the documented tests, a carburettor setting leading to the limit values being exceeded would be possible due to a lack of limitation.

*** Factory setting

-100 -80 -60 -40 -20 0 20 40 60 in %



The measurements were carried out by TÜV NORD Mobilität GmbH & Co.KG (IFM - Institut für Fahrzeugtechnik und Mobilität) on behalf of DUH. For freely adjustable carburetors, the emission measurements were carried out with the adjustments "high" and "low". The limit values must not be exceeded in either case.



Consumers must be effectively protected against exceeding the exhaust gas emission limits – if necessary by legal action.

In addition, no approval number could be found for one device. Likewise, no reference to the manufacturer or importer could be found. No serial number was noted on another test object.

Law suits and successes

As a follow-up to the tests, DUH informed the respective manufacturers, trade retailers and responsible authorities about the measurement results. Since the series of measurements started, several manufactures have guaranteed DUH that they will comply with the limit values and withdraw non complying devices from the market.

Within the project DUH initiated seven model processes against manufactures of machines so far, which emissions significantly exceeded the limit values. DUH already won six cases and one case is still ongoing.

Although retailers must ensure the legal conformity of the products distributed by them, the trade sector often refuses to assume responsibility for their products. The Amazon mail order chain, when addressed by DUH, consented to stop selling at least one of their distributed products. Under pressure from DUH, the toom DIY chain already took one product from their shelves in 2014, because it exceeded the pollutant value limits. In February 2015, on the initiative of DUH, the OBI DIY chain withdrew from circulation two motor saws produced by its subsidiary Euromate.

In addition, following pressure from DUH, the responsible authority initiated contempt proceedings against the company.

Almost all devices, which exceeded the official limit values in the DUH tests, were approved for the European market by the British approval authority Vehicle Certification Agency (VCA). Together with her partner Client Earth, DUH won the appeal before the UK

Information Tribunal after asking for approval information and documents over years and several juridical instances. The Tribunal ordered full disclosure of all the requested documents in July 2017.

Official market surveillance measures

The annual measurement results demonstrate how important it is that authorities constantly monitor the market. They are responsible for imposing the emission limit values. At the same time, the tests commissioned by the DUH also show that the activities carried out by market surveillance authorities are far from satisfactory.

Since 2013, DUH has carried out annual surveys at market surveillance authorities of the Federal States and has subsequently evaluated the monitoring activities. These surveys investigate whether and to what extent emission measurements and formal controls have been carried out on handheld equipment and which results were obtained, as well as which sanctions were imposed in cases of violations of the law.

The results of the first survey in 2013 were disappointing. Most of the Federal States did not consider it to be their task to make sure that the emission limit values were imposed. The 2015 survey regarding official measures showed first improvements. In the meantime, awareness of the problem has been rising among the authorities. Nevertheless, in 2017 only Bavaria punished violations of the emission limit values, and a further eight federal states carried out inspections. For the future DUH expects more and more market surveillance activities from public authorities in Germany and Europe. This is essential for consumer as they cannot identify products exceeding the limit values by any characteristic or missing label. Due to the problem awareness created by the DUH, more and more controls by the authorities will force manufactures to finally comply with the law.



Clamping fixture for string trimmers/brush cutters.



It is estimated that in Germany around 1,8 million motor chain saws and 1,2 million brush cutters are privately owned.

and retailers from bringing products into circulation that do not comply with the legally established limit values over their entire period of distribution in Europe.

In general, Environmental Action Germany welcomes the increasing use of battery-powered mobile machines. These do not emit any exhaust gases on site and the operation causes significantly less noise. This promises protection for consumers and residents alike. At the same time, the new technology poses new challenges in terms of sustainability, for example in terms of service life, material requirements, reusability or recycling.

Conclusion

As part of its pollutant measurements for motor saws and brush cutters, DUH has repeatedly confirmed that many products that pose a danger to users' health and contaminate the air are being sold.

Monitoring pollutant emissions of mobile machinery by the responsible authorities in Europe and China is urgently needed to ensure effective consumer protection. The measures taken so far are not consistent enough, but constitute a positive signal for the future. Effective controls and sanctions will prevent manufacturers

Join us!

Protecting nature, health and consumers is vital and urgent. **Therefore, Environmental Action Germany (Deutsche Umwelthilfe – DUH) fights for:**

- Clean Air and Climate Protection
- Intact Ecosystems, Biodiversity and Wilderness
- Waste Reduction and Recycling
- Affordable Energy and Mobility Transition
- Responsible Consumption and Eco-friendly Products
- Environmental Justice and "Green" Cities
- Enforcement of Consumer Rights
- Healthy and Ecological Lifestyle

All in all: A better life – now and for the future generations.

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We have been fighting to protect our climate and natural resources for over 40 years. Please help us with a donation! Your support will enable us to fulfill our mission – for a future of nature and mankind.
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