Guide to WLTP Testing and Emissions

Summer 2020

INTRODUCTION: WLTP TESTING AND EMISSIONS

The introduction of the Worldwide harmonised Light vehicle Test Procedure (WLTP) means new vehicle testing and homologation processes are changing fast.

WLTP has been phased in since September 2017, and replaces the New European Drive Cycle (NEDC) which has been used to assess vehicles since 1992. WLTP brings a more demanding drive cycle to the homologation process, aimed at producing fuel consumption and emissions data which is more representative of on-road driving. The process has been complex and exhaustive, and entire model ranges had to undergo comprehensive re-testing under WLTP before they could be sold in Europe.

WLTP also accompanies the introduction of on-road emissions testing – Real Driving Emissions or RDE – designed to ensure compliance with Euro 6 pollutant limits. In the UK, WLTP-derived CO_2 figures have replaced the NEDC system since April 1 2020 for Vehicle Excise Duty and April 6 2020 for Benefit-in-Kind tax.

This FCA Guide to WLTP explains the implications and detail of the changes for fleet decision-makers and company car drivers.

Concept Centoventi points to the future of Fiat's electric car future with an innovative modular approach to its Battery Electric drivetrain and a modern reinterpretation of Fiat's styling language

WHAT IS WLTP?

The full adoption of WLTP in the UK marks the end of a decade-long process to reform the way vehicles are homologated. It follows the analysis of a working group, established by the United Nations Economic Commission for Europe (UN ECE), which concluded that the NEDC – based on a system developed in the 1970s – was no longer fit for purpose, and set out a timetable for its replacement.

WLTP was introduced on September 1 2017, from which point all new passenger model types have been assessed under the new system. The phase-in process for commercial vehicles followed 12 months later.

Testing is still undertaken under controlled laboratory conditions, but the process has been revised to reflect real-world driving more accurately than the NEDC. Vehicles cover around twice as much distance, at a higher average speed, and with more aggressive acceleration and braking than under the outgoing regime. A comparison of the two test cycles is shown (right).

Testing encompasses four cycles, each with unique acceleration and braking intensities to simulate different road conditions. Manufacturers also have to produce figures recognising the weight, aerodynamic and rolling resistance effects of optional equipment – such as bigger wheels and tyres, bodykits and panoramic sunroofs.

Despite this complexity, deadlines have been tight. All except run-out vehicles were required to be WLTP-tested by August 31 2018, and since September 1 2019 models without WLTP-derived fuel consumption and CO_2 data cannot be sold new in Europe.

WLTP AND NEDC TEST CONDITIONS

	NEDC	WLTP
Duration	20 minutes	30 minutes
Distance	6.8 miles (11km)	14.6 miles (23.25km)
Time spent stationary	25%	16%
Test phases	Urban and extra-urban with calculated 'combined' average	Low, Medium, High, Extra High, City (EV/PHEV only) with calculated 'combined' average
Average speed	21.1mph (34km/h	29mph (46.5km/h)
Maximum speed	74.6mph (120km/h)	81mph (131km/h)
Start temperature(s)	20-30°C	14°C and 23°C
Optional equipment	Wheels and tyres	Individually assessed
Gear shifts	Fixed	Different for each vehicle

The Renegade 4xe is the first Plug-in Hybrid Electric Vehicle (PHEV) from Jeep to reach the UK and blends its innovative Hybrid drivetrain with class-leading 4x4 ability

REAL DRIVING EMISSIONS (RDE)

The Real Driving Emissions (RDE) test appeared on many fleets' radars when it became part of the UK's car tax system in 2018.

Phased in alongside WLTP, RDE introduces the first on-road tests for vehicle homologations, proving emission control systems are as effective in use as they are under laboratory conditions.

RDE adds a second stage to the test process, where vehicles are required to meet Euro 6 emission limits under WLTP conditions in strictly controlled laboratory conditions, followed by a separate on-road test in real traffic. This uses a Portable Emissions Measurement System (PEMS) which analyses the particulate matter and nitrogen oxide (NOx) content of their exhaust emissions.

On-road testing takes between 90 and 120 minutes, evenly split between urban, rural and motorway conditions, and vehicles must meet Euro 6 pollutant limits in all three situations.

As the process and equipment are new, RDE is being launched in phases with progressively stricter limits. Cars certified to RDE1 (Euro 6d-Temp) must emit less than 2.1 times the Euro 6 NOx limit of 80mg/km for diesel and 60mg/km for petrol engines, tightening to 1.43 times for RDE2-compliant (Euro 6d) vehicles.

In 2023, it's expected that conformity factors will be removed, aligning laboratory and on-road emissions limits.

All new cars must meet RDE1 limits, while RDE2 compliance becomes mandatory from January 1 2021. Incentives in place to encourage fleets to opt for RDE2 compliant diesel vehicles include exemption from the 4% company car tax charge and a one-band reduction in first-year vehicle excise duty.

COMPANY CAR TAX

The more dynamic driving style of WLTP affects vehicles' combined fuel consumption and CO_2 figures, usually despite there being limited or no mechanical changes involved.

According to a report by the European Union Joint Research Committee, petrol, diesel and hybrid (excluding Plug-in Hybrid and Battery Electric) vehicles emit an average 21% more CO_2 than under NEDC testing. Variations can be anywhere between 10% and 30%.

In the UK, where company car tax is based on a car's CO_2 emissions, fleet operators and drivers are particularly exposed to additional liability due to this change.

Proposals for the reform of company car tax were published by HM Treasury in July 2019 to accommodate WLTP changes, following a consultation process with fleet operators, and these became law in April 2020. The changes introduce a two-tiered company car tax system based on the vehicle's date of registration. Cars registered before April 6 2020 are taxed according to the bands announced in 2017, with their rates frozen until the end of the 2022/23 tax year.

Registrations after this date have a WLTP-derived CO_2 figure, with a 2% reduction in company car tax bands for 2020/21, rising by 1% in the two subsequent financial years. The two tiers align in 2022/23.

New bands for cars emitting 50g/km CO_2 or less, and the 4% BIK tax charge for non-hybrid diesels which don't meet Euro 6d/RDE2 requirements, also apply under the new system. Budget 2020 confirmed the 2022/23 rates will continue unchanged for tax years 2023/24 and 2024/25. BIK tax bands are shown in the table (right).

COMPANY CAR TAX

		2020/21		2021/22		2022/23
CO_2 emissions (g/km)	Electric range (miles)	BIK% NEDC[1]	BIK% WLTP[2]	BIK% NEDC[1]	BIK% WLTP[2]	BIK% All
0	All	0	0	1	1	2
1-50	>130	2	0	2	1	2
1-50	70-129	5	3	5	4	5
1-50	40-69	8	6	8	7	8
1-50	30-39	12	10	12	11	12
1-50	<30	14 (18)	12 (16)	14 (18)	13 (17)	14 (18)
51-54	-	15 (19)	13 (17)	15 (19)	14 (18)	15 (19)
55-59	-	16 (20)	14 (18)	16 (20)	15 (19)	16 (20)
60-64	-	17 (21)	15 (19)	17 (21)	16 (20)	17 (21)
65-69	-	18 (22)	16 (20)	18 (22)	17 (21)	18 (22)
70-74	-	19 (23)	17 (21)	19 (23)	18 (22)	19 (23)
75-79	-	20 (24)	18 (22)	20 (24)	19 (23)	20 (24)
80-84	-	21 (25)	19 (23)	21 (25)	20 (24)	21 (25)
85-89	-	22 (26)	20 (24)	22 (26)	21 (25)	22 (26)
90-94	-	23 (27)	21 (25)	23 (27)	22 (26)	23 (27)
95-99	-	24 (28)	22 (26)	24 (28)	23 (27)	24 (28)
100-104	-	25 (29)	23 (27)	25 (29)	24 (28)	25 (29)
105-109	-	26 (30)	24 (28)	26 (30)	25 (29)	26 (30)
110-114	-	27 (31)	25 (29)	27 (31)	26 (30)	27 (31)
115-119	-	28 (32)	26 (30)	28 (32)	27 (31)	28 (32)
120-124	-	29 (33)	27 (31)	29 (33)	28 (32)	29 (33)
125-129	-	30 (34)	28 (32)	30 (34)	29 (33)	30 (34)
130-134	-	31 (35)	29 (33)	31 (35)	30 (34)	31 (35)
135-139	-	32 (36)	30 (34)	32 (36)	31 (35)	32 (36)
140-144	-	33 (37)	31 (35)	33 (37)	32 (36)	33 (37)
145-149	-	34 (37)	32 (36)	34 (37)	33 (37)	34 (37)
150-154	-	35 (37)	33 (37)	35 (37)	34 (37)	35 (37)
155-159	-	36 (37)	34 (37)	36 (37)	35 (37)	36 (37)
160-164	-	37 (37)	35 (37)	37 (37)	36 (37)	37 (37)
165-169	-	37 (37)	36 (37)	37 (37)	37 (37)	37 (37)
170+	-	37 (37)	37 (37)	37 (37)	37 (37)	37 (37)

[1]Vehicles registered before April 6 2020, using NEDC CO_2 figures. [2]Vehicles registered on or after April 6 2020, using WLTP CO_2 figures. Figures in brackets relate to non-hybrid diesels which are not certified RDE2-compliant.

PRACTICAL CONSIDERATIONS

FUEL CONSUMPTION

Most WLTP-tested vehicles are no less economical than those using NEDC data. In fact, WLTP's tougher test conditions enable more accurate whole-life cost modelling as it uses data which better reflects real-world use.

COMPANY CAR TAX AND VED

HM Treasury's proposed two percentage-point reduction for vehicles with WLTP CO_2 figures might not be enough to protect operators and drivers from increased tax liability. Choosing models which are certified Euro6d/RDE2 compliant will avoid the 4% BIK tax charge applied since 2018, while re-examining CO_2 choice list caps will help drivers continue to select appropriate vehicles. From April 1 2020 Vehicle Excise Duty became based on WLTP CO_2 data.

CAPITAL ALLOWANCES

WLTP could also affect capital allowances for vehicles purchased or leased by businesses, as bands are based on CO_2 emissions and are not being modified. In 2020/21, for vehicles emitting 110g/km CO_2 or less, businesses can write down 18% of the depreciation cost or 100% of their lease payments against tax. This falls to 6% and 85% respectively for models emitting 111g/km or more.

Ultra-low emission vehicles (emitting 50g/km or less) purchased outright qualify for a 100% first-year allowance (FYA). From April 2021, the 100% FYA will apply only to zero-emission vehicles. The 18% write-down allowance (WDA) will apply to cars with CO_2 emissions of 50g/km or less, with the 6% WDA applying to cars with CO_2 emissions of 51g/km or more. Leasing companies are excluded from claiming the first-year allowance.

BUSINESS REASONS TO PLUG-IN

Fleets account for half of all new vehicles registered in the UK, and HM Treasury sees them playing a vital role in the ongoing transition to low-emission drivetrains.

WLTP has a specific test cycle for plug-in vehicles, with a unique 'City' phase designed to represent urban-area driving and weighted average fuel consumption and CO_2 figures calculated according to the car's zero-emission electric range, which underpins its ability to be driven on battery power for a large proportion of its journeys. As a result, CO_2 figures for Plug-In Hybrid Electric Vehicles are often no higher than they were under NEDC.

HM Treasury first announced a staged set of Benefit-in-Kind tax bands for cars emitting 50g/km of CO_2 or less in 2017, based on CO_2 emissions and electric range. The WLTP tax reforms from April 2020 extend the two-band reduction to these vehicles, and re-introduces the 0% band for fully-electric models, which was withdrawn on April 6 2015.

Drivers of cars emitting 50g/km of CO_2 or less and offering a zero-emission electric range of more than 130 miles qualify for the 0% BIK tax rate from April 6 2020, even if they were registered before that date.

*The plug-in vehicle grant will be taken off the purchase price of the vehicle. For private, business, fleet or demonstration models this means the actual price paid by the customer, including any discount, not the recommended retail price. This definition of purchase price includes: number plates, vehicle excise duty, VAT (as applicable) and excludes any optional extras, delivery charges and first registration fee.

GRANT FUNDING

Budget 2020 extended the Government Plug-in Grant scheme to 2022/23. Cars with a price of £50,000* or less with zero CO_2 emissions are eligible for a Grant of up to £3,000* against the purchase price. Homeowners and businesses can also claim up to £350 towards the installation cost of a charging point.

BENEFIT-IN-KIND

Drivers choosing a zero-emission electric car benefit from zero BIK tax in 2020/21, with VED also zero-rated. Drivers charging at work also do not pay BIK tax on the electricity used.

CAPITAL ALLOWANCES

Businesses can claim a 100% first-year allowance for vehicles emitting 50g/km CO_2 or less, or for the cost of installing workplace charging points. From April 2021, the 100% FYA will apply only to zero-emission vehicles. The 18% WDA will apply to cars with CO_2 emissions of 50g/km or less, with the 6% WDA applying to cars with CO_2 emissions of 50g/km or more. Leasing companies are excluded from claiming the first-year allowance.

*The plug-in vehicle grant will be taken off the purchase price of the vehicle. For private, business, fleet or demonstration models the purchase price is the price paid by the customer, including discount, not the recommended retail price. Purchase price includes: number plates, vehicle excise duty, VAT and excludes optional extras, delivery charges and Government first registration fee.

FCA HYBRID AND ELECTRIC RANGE

Fiat Chrysler Automobiles' vision of an electrified future is already here, with the Fiat 500 and Fiat Panda Mild Hybrids and the Jeep Renegade PHEV now available to order.
The exciting Concept Centoventi and Fiat eDucato commercial vehicles give further insight into an electrified model range that embraces innovation and environmental awareness.

JEEP RENEGADE 4xe

With its all-new 4xe Plug-in Hybrid system, the Jeep Renegade PHEV is available in Longitude, Limited and Trailhawk trim levels, with up to 240hp available from its petrol/electric drivetrain.

FIAT 500 M/HYBRID

Sharing its powertrain with the Panda MHEV, the Fiat 500 MHEV system recovers energy from braking and deceleration and uses it to restart the engine in Stop&Start mode, and to assist it during acceleration.

FIAT PANDA M/HYBRID

The Panda Mild Hybrid Electric Vehicle (MHEV) has an all-new 70hp 1.0-litre engine combined with a 12-volt Belt-integrated Starter Generator (BSG), to offer 49.6mpg and CO_2 emissions as low as 89g/km.

FIAT eDUCATO

The 100% electric Fiat eDucato is available in van, chassis cab and – in 2021 – people mover body styles. A choice of two battery packs gives a range of up to 136 or 220 miles (NEDC) with zero tailpipe emissions.

FIAT 500 ELECTRIC

The completely new Fiat 500, the first fully electric car from Fiat Chrysler Automobiles (FCA), is available for pre-order now, offering a range of up to 199 miles on the WLTP cycle, with 85kW fast charge capability.

FIAT CENTOVENTI

The Fiat Concept Centoventi introduces a modular battery system: the standard battery gives up to 62 miles but if more is needed up to three extra units adding 62 miles each can take total range of up to 310 miles.