

## Which? Car review

TESLA

## Tesla Model S (2013-)

ON SALE: **Nov 2013** CLASS: **Luxury cars**NEW PRICE: **£54,955 - £79,255** USED PRICE: -

## PERFORMANCE:



## RIDE COMFORT:



## HANDLING:



## BOOT &amp; STORAGE:



## SAFETY:



## RELIABILITY:



## TOTAL SCORE:

**69%**Recommended models  
in the range

- ✓ Extremely good acceleration.
- ✓ Good ride comfort.
- ✓ 258-mile range.
- ✗ High purchase price.
- ✗ Very long charging times.
- ✗ Touchscreen may be difficult for less tech-savvy people to get used to.



## WHICH? CAR TOP CHOICE MODEL

**85kWh 5dr**New price: **£62,355**

Used price: -

## FASTEST MODEL

**85kWh Performance Plus 5dr**New price: **£79,255**

Used price: -

0-62mph: **4.4 secs**

## MOST EFFICIENT MODEL

-

New price: -

Used price: -

Combined fuel economy: -

## CHEAPEST MODEL TO BUY NEW

**60kWh 5dr**New price: **£54,955**

## CHEAPEST MODEL TO BUY USED

-

Used price: -

## CHEAPEST MODEL TO RUN (NEW)

-

New price: -

Running costs: -

**(3 YEARS/36,000 MILES)**

## Overview

When you think of an American performance car, you think of brutal V8 powerplants. But while the Tesla Model S will out run most Porsches to 60mph it's powered by electric batteries alone.

The Model S is a luxury family-sized saloon powered entirely by batteries. It's around the same size as a BMW 7 Series, weighs the same as a Range Rover, can outrun a Porsche 911 Carrera to 62mph and is just as efficient as a Nissan Leaf. This all sounds too good to be true so far, right? And you're probably waiting for the traditional pitfall of all electric-powered cars: a limited range. However, Tesla boasts a range of 311 miles, humiliating every other electric car currently on the market.

Three versions are available: the Model S 60kWh offering 298bhp, the Model S 85kWh with 362bhp and the Model S Performance packing 416bhp. All three have zero tailpipe CO2 emissions, all can be charged from a home socket, wall-mounted charger or public fast-charge system and benefit from free car tax and London Congestion Charge exemption.

Inside, it's a five-seater with the option of two additional seats bolted into the boot floor. Taking centre stage in the cabin is the colossal 17-inch touchscreen. This is the main control centre for pretty much all the non-driving functions of the car - it doesn't just operate the radio and heating controls, it can also be used to deactivate the front passenger airbag and engage the parking brake, although the latter also activates automatically when you put the car in Park. There are two boot compartments - one front and one back - offering more than enough space for any family requirements, though there are some weight restrictions for safety purposes.

As you might expect, all of this technology doesn't come cheap. The entry-level Model S 60kWh is £55,000, although you can knock £5,000 off all Tesla Model S list prices thanks to the Plug-in Government Grant scheme.



## OWNER'S VIEW

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## On the road

The Model S we tested was the range-topping Performance Plus. This boasts a massive 416bhp, which means supercar-rivaling acceleration from a standstill. But that's not the most impressive part. The big Tesla not only handles well, the brakes are strong and the ride is composed, if not a little firm. What isn't good is visibility or the cabin operation - the 17-inch touchscreen could take some time getting used to for those who aren't tech savvy.

### Performance



The Tesla Model S comes with three different power outputs: the entry-level 60kWh battery provides 302bhp, the 85kWh model puts out 362bhp and 85kWh Performance versions are good for 416bhp, thanks to the inclusion of a modified drive inverter to boost power. We've tested the latter, most powerful, version, the 85kWh Performance.

Acceleration is up to supercar standards, with a 0-62mph count of just 4.4 seconds. We also test the overtaking time, accelerating from 35-62mph to replicate passing slow-moving traffic, and the Model S covers this in a very useable 2.1 seconds.

Just as impressive as the figures is how the Model S responds to acceleration input from the driver, with no lag between hitting the pedal and the car gathering speed. The acceleration is unrelenting up to 81mph, but performance tails off after this point. A top speed of 130mph is achievable, though.

The battery and electric motor combines with the single-speed transmission to provide a very smooth and quiet driving experience - there's no vibration whatsoever but some motor noise does creep into the cabin above 75mph.

The fixed-ratio one-speed transmission means no delay in acceleration or rev steps between gears, offering a very wide power band of performance.

The selection between drive, neutral, reverse and park is operated by a selector stalk on the steering column. Finding neutral can be a little difficult, we found.

There's a creep function once you pull away, allowing the car to pull forwards and backwards without surging (this tends to happen with electric cars as the torque, or pulling power, is available instantly, meaning lots of power from very low speeds). You can also prevent the car rolling instantly after releasing the brake using a function in the touchscreen system.

Our expert test time did find that you have to take care when turning to look back when reversing, as if you support yourself against the backrest and lift your bottom off the seat, the car senses that there isn't a driver operating the car and automatically returns to park.

Model tested	Acceleration (37-62mph)	Rating
Electric (416bhp) automatic 4-door (2014)	2.1 secs	★★★★★

### Ride comfort



The Model S provides a good level of comfort thanks to an active air suspension system. It absorbs bumps in the road extremely well, although potholes and badly rutted road surfaces can be felt quite a bit in the cabin, especially with the massive 21-inch wheels on the Performance model we tested.

One advantage of the air suspension is that you can adjust the ride height at the push of a button on the touchscreen - this can only be used at low speeds to help you manoeuvre over raised kerbstones and speed bumps and resets to the standard height a short time after. The ride height also automatically lowers at higher speeds to improve wind resistance.

Model tested	Rating
Electric (416bhp) automatic 4-door (2014)	★★★★★

## How we test

### Performance



We use the sophisticated electronic timing equipment to record standing-start and in-gear acceleration, and repeat each test several times.

### Ride comfort



Ride comfort is assessed by our laboratory experts who have driven hundreds of thousands of miles in a myriad of different models.

## Which? Car review

# TESLA Tesla Model S (2013-)

Luxury cars



## On the road continued...

### Handling

★★★★★

The Model S Performance Plus version we tested comes with wider rear wheel rims and tyres, adaptive suspension dampers and stabiliser bars, all of which should give it an advantage over lower spec versions. In fact, the result is near impeccable driving stability. There's very prompt and safe reaction to sudden steering input, precise and controlled mid corner grip and effective and incremental stability control that intervenes early to offer extra assistance to any driver who is a little too aggressive in the bends. The low centre of gravity also gives a good sensation of cornering grip at speed.

Even with the wider sports tyres, there is a bit of wheel spin, especially when it's wet or icy, but standard-fit traction control soon sorts this out.

Our only criticism of the Model S here is that it can be prone to following lane ruts, but this is because of the wider tyres.

Steering is also exceptionally good. There are three levels of power steering support: Normal, Comfort and Sport. These can be selected using the touchscreen, but we were a little disappointed there wasn't an 'Auto' function that could adapt to current conditions.

Sport mode is the setting we preferred, as it provides the most communication. In Comfort mode, the steering is incredibly light, even when at a standstill.

We did think the steering lacked feel at the centre point, meaning the crisp responses to turning the wheel can be surprisingly rapid. The steering response is so sharp that you do feel you have to correct your steering during a turn. We were also a little disappointed that a car without an engine restricting front-wheel movement had such a wide turning circle.

#### Model tested

Electric (416bhp) automatic 4-door (2014)

#### Rating

★★★★★

### Brakes

★★★★★

The Model S has four-pot fixed calipers, which are highly responsive and incremental. The regenerative brakes (which deliver charge back to the batteries) are not pedal controlled, so the synthetic feel you usually get from electric and hybrid cars when you initially press the brakes isn't there in the Tesla. There is throttle-off energy recuperation too, which slows the car more rapidly than traditional engine braking when you come off the throttle - this does take some to get used to.

The brakes are reliable and didn't show any sign of fade or overheating under heavy use in our test.

#### Model tested

Electric (416bhp) automatic 4-door (2014)

#### Braking distance (62-0mph)

34.1m

#### Rating

★★★★★

### Refinement and noise

★★★★★

Interior noise in electric cars is a funny thing - with the removal of a combustion engine noise, road and wind noise is perceived as being louder. That's the case for the Tesla, with the rolling noise of the tyres being the most audible note inside, until you hit around 62mph when wind noise blocks it out. At around 75mph, you also get some powertrain noise from the motor.

#### Model tested

Electric (416bhp) automatic 4-door (2014)

#### Cruising noise

69dB

#### Rating

★★★★★

### How we test

#### Handling



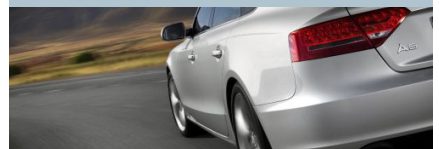
On-the-limit handling is explored well away from public roads to ensure a fair test. Our obstacle avoidance test is one of the harshest tests in the industry..

#### Brakes



The Which? Car braking test measures stopping distance from 62-0mph and is repeated ten times in quick succession to highlight any brake fade issues.

#### Refinement and noise



The Which? Car experts use a decibel meter to record interior sound levels at common UK motorway speeds, and combine this with subjective assessments to arrive at an overall score.

## Which? Car review

# TESLA Tesla Model S (2013-)

Luxury cars



## On the road continued...

### Cabin and controls



The Tesla Model S is like no other car we've driven when it comes to operation. Unlocking the doors and sitting in the driver's seat automatically starts the ignition (provided you have the key in your pocket). Within a few seconds, all the systems are operational and you can drive away.

The 17-inch touchscreen used for all the Model S's multimedia, comfort and operation functions is the same size as a laptop screen; our experts recommend laptops of this size to replace home desktop computers - it is that big. This touchscreen might be fun-to-use for tech buffs, but it can be overwhelming for someone who isn't so tech savvy.

There are no main function buttons outside of the touchscreen, so you have to go through all the sub menus to find what you want, meaning it may take a lot of time to familiarise yourself and a lot of distraction and eyes off the road if you try to make changes on the move. And the length of the screen is considerable, so you have to look quite low down to see some controls, again meaning less time with your eyes on the road.

The steering wheel is electrically height and reach adjustable and the power seat controls are also easy to reach. A digital display is used for the driver's instrument cluster, which also shows the battery status, remaining energy range and energy consumption at that time along with the normal readouts, like speed and rpm. Various pieces of information can also be selected to run alongside the instruments, along with navigation instructions and multimedia information. The only issue with this is that the screen isn't clear in direct sunlight and becomes hard to read.

Automatic running lights are standard, but if you want to control the lights manually, you can do this by navigating through the touchscreen system. The same applies to the rear fog lamps.

Inside, there are very few storage bins - up front, all you get is two cup holders and a large open tray between the seats. There isn't even any storage in the door panels. The glovebox could be larger, too, and there is no storage whatsoever for rear-seat passengers.

#### Model tested

Electric (416bhp) automatic 4-door (2014)

#### Rating



### Visibility and parking



The coupe-like shape of the Model S means visibility isn't one of its strong points. It's hard to predict the front and rear edges of the car, so the optional parking sensors and reversing cameras become essential for the driver - we certainly recommend them.

#### Model tested

Electric (416bhp) automatic 4-door (2014)

#### Turning circle

12.4m

#### Rating



### How we test

#### Cabin and controls



We penalise cars with difficult controls, and we look for things like backlit light switches and easy-to-use heating and ventilation adjustments.

#### Visibility and parking



Visibility is a major issue for motorists today, so each car gets a 360-degree swivel view test to reproduce the driver's eye view and any obscured areas.

## Which? Car review

# TESLA Tesla Model S (2013-)

Luxury cars



## Comfort and practicality

The Model S is surprisingly practical for an all electric car. The interior space is pretty good for a car in this class, and the two storage options (front and rear boot) means you should have plenty of loading capacity.

### Getting in and out



Getting in and out of the Model S isn't overly convenient. The door sills are high and wide, meaning you have to step quite far over them. The seats are also positioned very low, so you have to lever yourself up to get out. This is made more difficult by the lack of grab handles.

Getting in and out of the back is helped by wide door apertures, but the door sills are still wide too, and the wheel arches protrude into door opening.

The unlocking and locking system of the Model S is somewhat difficult to get your head around. The remote locks and unlocks the car, but there are separate keys to control the tailgate and bonnet lock. The keys aren't clear, either, so it's hard to tell them apart. Apart from the highest spec cars, keyless entry is an option within a Tech Pack - this retracts the door handles automatically when you near the car, and locking is initiated once you leave the vehicle.

#### Model tested

Electric (416bhp) automatic 4-door (2014)

#### Rating



### Seat space and comfort



Up front, the Model S feels roomy. With the seats setting in their furthest most back position, there's enough room for someone up to 6ft 2in. There's lots of interior width, and the spacious feel is helped by the low centre console. The very slanted A-pillars do make it feel more cramped than it should though.

The front seats themselves are comfortable enough, but there is room for improvement. The backrests are high but lack support. The front lip of the seat base is narrow and can't be extended to give more thigh support. Rather thin padding also makes the seat feel a little hard. The seats are electrically adjustable from the steering wheel, which is a bonus.

In the back, there's no such spacious feeling. There's generous knee room - with the front seats set for a driver of 6ft, there's enough leg room for a passenger up to 6ft 6in. Unfortunately, someone this tall will struggle with headroom, especially if you opt for a panoramic sunroof. Interior width is fine for two adults, but probably not three.

Rear seats are again too thinly padded, and a lack of support and slippery leather means rear passengers could find they slide around a bit.

There's also an optional third row of seats - there are two seats that fold out of the floor and bolt directly onto the back of the second row seats (which many people will think is too dangerous in case of a rear-end collision). That means the occupants face backwards, and the headroom is extremely limited.

#### Model tested

Electric (416bhp) automatic 4-door (2014)

#### Rating



### How we test

#### Getting in and out



We take measurements all around the driver and passenger's door apertures and note the height of the seat, door sills and step down onto the car floor. The best cars don't require too much bending or stretching to get in and out.

#### Seat space and comfort



We assess seat comfort subjectively, using our road testers' expert knowledge and experience from thousands of different cars. And we measure the head-, leg- and elbowroom on offer in every seat, to see how well the car caters for people of all shapes and sizes.



## Comfort and practicality continued...

### Boot and storage



The Model S comes with two storage compartments - a regular boot in the rear and a front compartment under the bonnet. The latter offers 240 litres of space, although you can only have a manufacturer-recommended maximum weight of 136kg in there if you do use it. Up to the bottom of the parcel shelf, the rear boot has 435 litres of space, and loaded up to the ceiling it can offer 545 litres. Fold the rear seats and the capacity increases to 845 litres.

A hatch-style boot door means a generous loading aperture for the boot, and you can also set a maximum opening height to prevent the auto opening boot lid hitting the roof of a garage or multi-story car park. The large flat floor gives plenty of surface area for storage.

Both the front and rear storage compartments lack storage bins, with the rear boot having just one storage bin in the boot.

Model tested	Boot space (seats up/down)	Rating
Electric (416bhp) automatic 4-door (2014)	435 litres / 845 litres	★★★★★

### Heating and ventilation



The controls for the fan settings, both temperature and fan speed, are the same for front and rear passengers and controlled using the 17-inch touchscreen. Automatic mode works well to heat and cool the car in good time. The front cabin heats up very quickly on a cold day, while the rear takes a little longer. Heated front seats can be added to with the option of heated rear seats.

Model tested	Rating
Electric (416bhp) automatic 4-door (2014)	★★★★★

### How we test

#### Boot and storage



Carmakers give official stats for boot space, but our tests are more realistic. We load the boot up with measuring blocks only as far as the rear window line, so that luggage is well secured and won't obscure rear visibility. We repeat the test with the rear seats up, and folded down (where possible).

#### Heating and ventilation



Feel sorry for the tester who has to warm each car up from a frosty -10 degrees in our climate chamber. Starting with a cold engine, we measure how long it takes to warm up the front and rear of the cabin. Diesel cars usually take longer. We also check the effectiveness of air conditioning, where fitted.

## Which? Car review

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## Running costs and depreciation

The Model S has the best range of any electric car we've ever tested. However, some models can take up to 36 hours to charge if you're using a standard 230V home socket. Until Tesla's own supercharging points are brought to the UK, it will take some time keep the Model S topped up with battery charge.

## Fuel consumption

We put the Tesla Model S through the same fuel efficiency test cycle as we do all our cars, with urban, extra urban and motorway cycles to cover all kinds of driving. The result, from a full battery charge, was a range of 257.9 miles, which is massively impressive for any electric car. We calculate that the 65kWh battery will decrease range by a third, meaning 172 miles of range, which is still very good. Range will be dependent on where you do the majority of your driving, though.

The downside is how long it takes to charge. Tesla intends to have a network of supercharger stations, which can recharge the battery to 80% in just 20 minutes. However, these aren't due in the UK until the end of 2014 at the very earliest, meaning you have to make-do with the charging infrastructure currently available here.

A single charger (11kW) connected to the standard home power outlet (230V) will charge the car in 36 hours. Higher voltage outlets (400V) will do the same in nine hours.

With a type-2 plug, the charging time depends on the power supply available: 230V will take 29 hours and approximately nine hours using a 400V outlet.

The twin charger (22kW) available on Performance models can reduce charging time with a 400V outlet to just four and a half hours.



**Petrol** (combined mpg, claimed) -



**Diesel** (combined mpg, claimed) -

## How we test

### Fuel consumption



We test fuel economy under strict lab conditions – using realistic test cycles – to reveal the facts behind the figures. Our figures rarely match manufacturer claims as, unlike the official mpg test, we measure economy with both a hot and cold engine, and on the motorway.



## Running costs and depreciation continued...

### Emissions

Zero tailpipe emissions means you not only benefit from free car tax, you also have London Congestion Charge exemption, too. We use well-to-wheel CO2 emissions measurements to show the differences between electric and combustion engines, which works out to be 136g/km for the Model S, based on our calculations.



**Petrol** (CO2, claimed)

**Diesel** (CO2, claimed)

Model tested	Emissions (claimed/tested)
Electric (416bhp) automatic 4-door (2014)	0g per km/136g per km

### Safety and security

While the Model S is such an innovative car in terms of powertrain, it feels a little behind the times when it comes to safety. There's no autonomous braking system or lane-keep- or blind-spot assist available. A number of active safety features are said to be on the way, though, according to Tesla.

Stability control and brake assist both come as standard, and a direct, sensor-based, tyre pressure monitoring system comes on all versions.

We don't like that the parking brake is touchscreen operated, especially as it takes too long to find the function button in the menu.

Eight airbags come as standard (front, side, curtain and knee for both front passenger), and because there is no engine up front, the bonnet has been optimised for crash protection, though it hasn't been Euro NCAP tested yet. The headrests are integrated into the backrests of the front seats, so they offer really good support. However, the rear headrests offer little to no support if you have a rear-end shunt - Tesla claims to be developing new headrests that are integrated into the backrests of the rear bench, too.

Two third-row seats can optionally be added that fit into the boot floor; they can only be used to seat children weighing 15-36kg. Tesla claims to not have encountered any problems regarding the third row seats in a crash test, despite them being rear facing, although there are no official tests to back this claim up yet.

The three regular rear seats all have Isofix mounting points and top tethers, meaning all sizes of child seats can be fitted easily and securely. You can deactivate the front passenger seat airbag via the touchscreen if you want to fit a child seat in the front.

### Euro NCAP score

No results available.

### Which? safety rating

Active (crash avoidance)	57%
Passive (crash safety)	62%
Child	75%
Pedestrian	62%

### Security



**Theft of car:**

-



**Theft from car:**

-

### How we test

#### Emissions



While testing fuel economy, we also collect exhaust gases to enable us to measure the amount of carbon dioxide (CO2) emitted. We also check whether particulate filters are effective at removing sooty emissions from diesel engines.

#### Safety



We rate cars for safety using Euro NCAP crash test scores (where available), alongside our own comprehensive safety checklist. Uniquely, we also feed in results from our accident avoidance test – after all, it's far better to steer around a crash than rely on the airbags...

#### Security



Security scores come from the security experts at Thatcham, who break into hundreds of cars each year. Most modern cars are very difficult to drive away, but are still too easy to steal from.





## Which? Car Survey results

The Which? Car Survey is the UK's biggest and best reliability and owner satisfaction survey. In 2013, drivers told us about 57,182 cars, covering more than 450 million miles in the previous 12 months (that's equivalent to driving 18,398 times around the world). This unique feedback allows us to rate satisfaction and reliability for hundreds of new and used cars.

Note Star ratings below are from 1-5 (1 is very poor and 5 is very good). Percentages shown under 'Most common faults' indicate the proportion of owners reporting each problem in the past 12 months.

Brand	Sample size: - people
<b>Tesla ratings</b>	<b>Overall owner satisfaction for this brand -</b>
Brand reliability	-
Dealer Sales Service	-
Dealer Servicing & repair	-

Model: Tesla Model S (2013-)	Sample size: - people
<b>Ownership ratings</b>	<b>Overall owner satisfaction for this range -</b>
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-

### About our survey

#### Brand ratings



Everyone who takes part in the Which? Car survey tells us about their car and the dealers who sell and service it. We analyse this feedback across all cars to give top-level satisfaction ratings for each brand, including the brand's reliability record over the last eight years. All star ratings are out of five.

#### Model ownership ratings



These show how owners score this car in 12 different areas, from performance to heating. Owners' ratings are subjective – so may differ from Which? Car test scores – but they give a good idea of what the car is like to live with. Where relevant, cars are scored against other cars in the same class (e.g. for space).

#### OWNER'S VIEW

#### OWNER'S VIEW



## Which? Car Survey results continued...

### Reliability ratings

		Overall Reliability -	
		Up to 3 years old	3-8 years old
Petrol cars	Reliability	-	-
	Breakdowns	-	-
	Average annual repair cost	-	-
Diesel cars	Reliability	-	-
	Breakdowns	-	-
	Average annual repair cost	-	-
All cars	Reliability	-	-
	Breakdowns	-	-
	Average annual repair cost	-	-

**Breakdowns:** Percentage of cars suffering a breakdown in last 12 months

**Average annual repair cost:** Average annual cost of repairs (not servicing), in past 12 months

### Most common faults

	Up to 3 years old
-	-
-	-
-	-
-	-
-	-

	3-8 years old
-	-
-	-
-	-
-	-
-	-

**Failure rate:** The proportion of owners reporting this problem in the last year

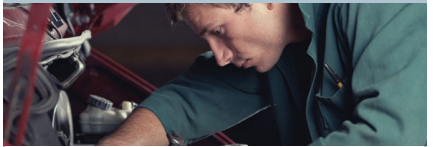
### About our survey

#### Reliability ratings



We split reliability into breakdowns (including failure to start), faults (where parts need replacing) and problems (minor issues e.g. squeaks and loose trim). Where the car has been on sale for some time, and we have numerous survey responses from owners, we also split scores by the age of car and fuel type. Star ratings are out of five – the more stars, the more reliable the car.

#### Most common faults



Want to know what's most likely to go wrong as the car gets older? These are the five most common faults reported by owners, grouped by age into new, recent and older cars. A score of 40% means four out of 10 owners reported problems with that part of the car over the previous 12 months. Engine electrics and non-engine electrics (e.g. windows, stereo) cause more headaches than mechanical parts in most modern cars.