Service Training

Self-study Programme 423

The Golf 2009

The Golf is more than just a car — 34 years after the launch of the first Golf and five years after the presentation of the Golf V, Volkswagen is continuing the unique automobile story of its most successful model.

Design, comfort, economy, safety and quality are the product highlights of the Golf 2009.

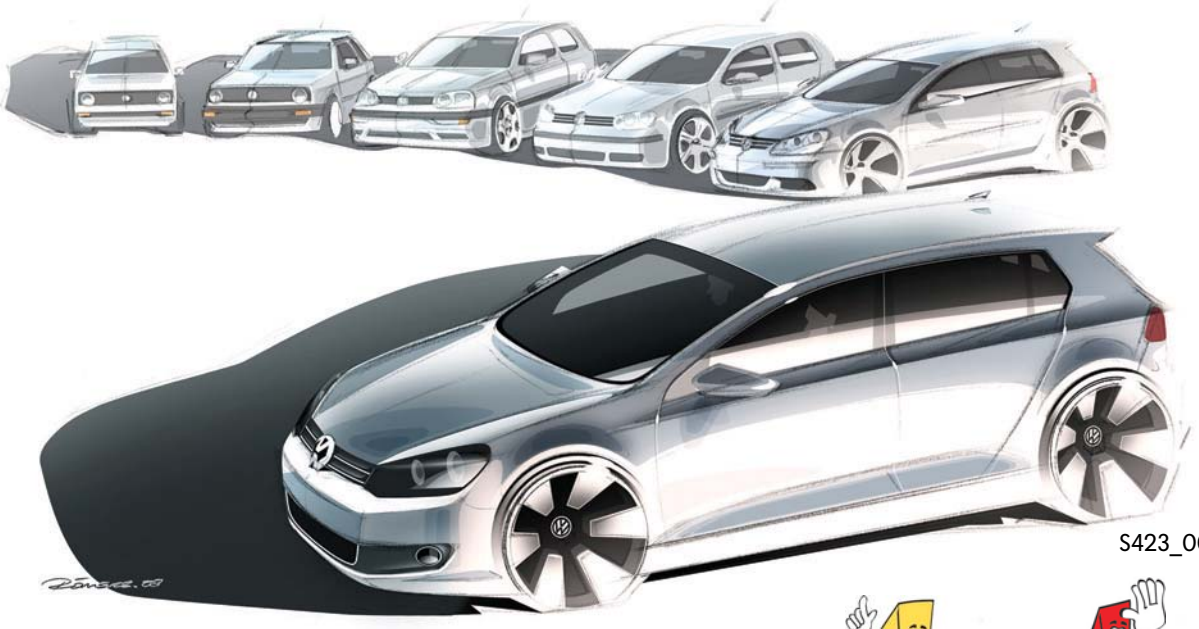
The powerful design of the Golf shows a clear form vocabulary with a high-quality, appealing and sporty appearance.

A knee airbag and daylight driving lights have been added to the standard safety equipment for the first time. The “Climatic” air-conditioning system and the multifunction display round off the convenience features in the entry-level version.

The use of turbo diesel engines with common-rail technology and other noise-reducing measures, for example, an acoustically enhanced front windscreen, makes this the quietest Golf since the birth of the range.
The optimised TSI and TDI engines ensure low consumption and meet the limits of the valid EU5 exhaust emission levels.

As a result of the consistent use of the module strategy, the Golf uses a high proportion of existing and improved basic developments with particular attention having been paid to the function and design.

As a result, a high and sustained level of quality has been reached.



S423_001

The self-study programme shows the design and function of new developments.
The contents will not be updated.

For current testing, adjustment and repair instructions, refer to the relevant service literature.

NEW

Important Note

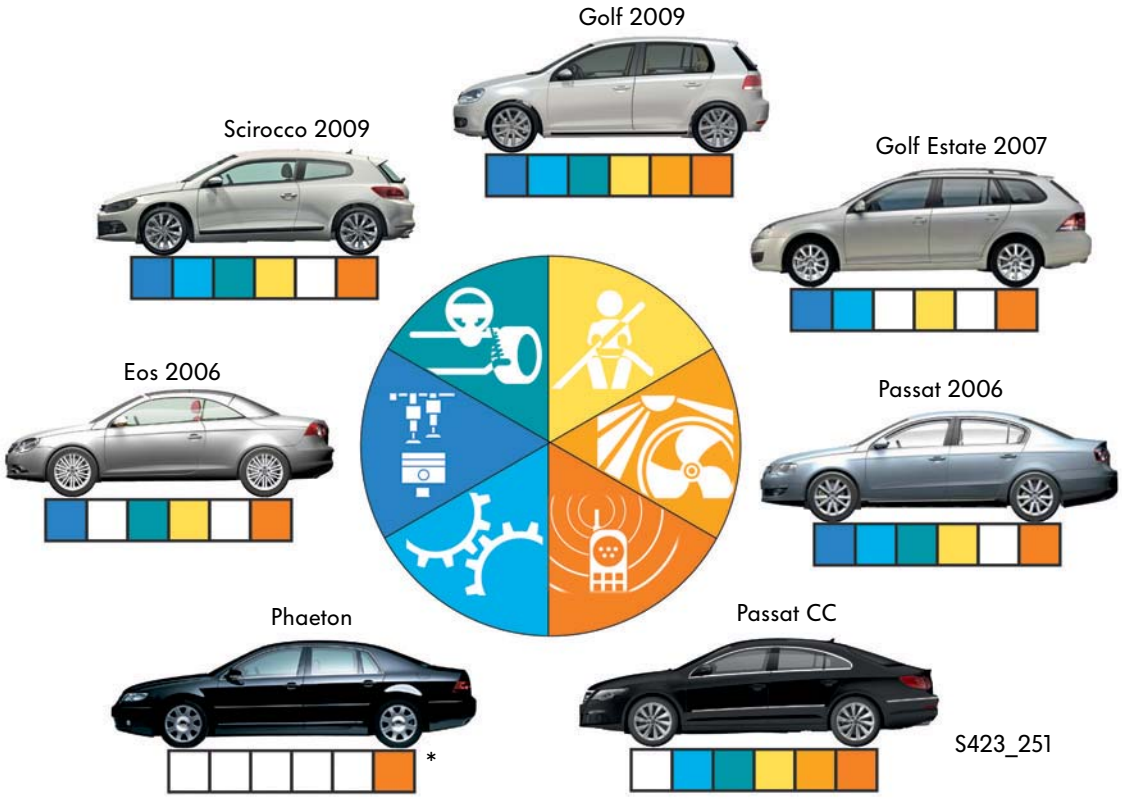
Contents

Module strategy

Function units (modules) that have identical basic functions and designs are being fitted in current and future vehicle models to an ever-increasing extent.

Unlike same-platform parts, e.g. a floor pan from the Golf vehicle class, the use of modules crosses the vehicle classes. This means that, for example, the electronics for the RNS 510 and RNS 810 navigation systems have a high proportion of same parts in the Golf and Phaeton models. This includes the hard drive, the tuner, the DVD drive and the processor that are located in the housing behind the unit fascia. The onboard power supply with standard connectors is an important requirement for fitting in different models.

In the development of new systems, in production and in service, in particular when fault finding, diagnosing and when flashing control units, this strategy is advantageous for the modules shown below.



Occupant protection
(Module: Driver airbag)

Heating and air conditioning
(Module: Climatronic, model year 2009)

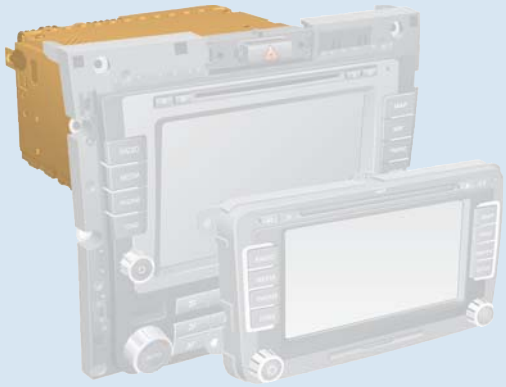
Radio, navigation and telephone
(Module: RNS 510 / RNS 810*)

Engines
(Module: 1.4l 90kW TSI engine)

Transmission
(Module: Dual clutch gearbox DQ-200-7F)

Chassis
(Module: ACC Adaptive Chassis Control)

The RNS 510 and RNS 810 radio/navigation system is a good example as a module in infotainment.
While the design of the unit front with its fascia and user interface is adapted, each unit has adapted software for different functions.

Vehicle models	**Golf 2009**  S423_247	**Phaeton**  S423_245
Unit front with fascia and user interface	**RNS 510**  S423_177	**RNS 810**  S423_241
Software and functions	The RNS 810 has the following additional functions compared with the RNS 510.	
		- Damper setting - Auxiliary heating controls - Solar ventilation - Wiper service position
Module	 The housing module used on both vehicles with hard drive, tuner, DVD driver and processor forms the same-part scope.	

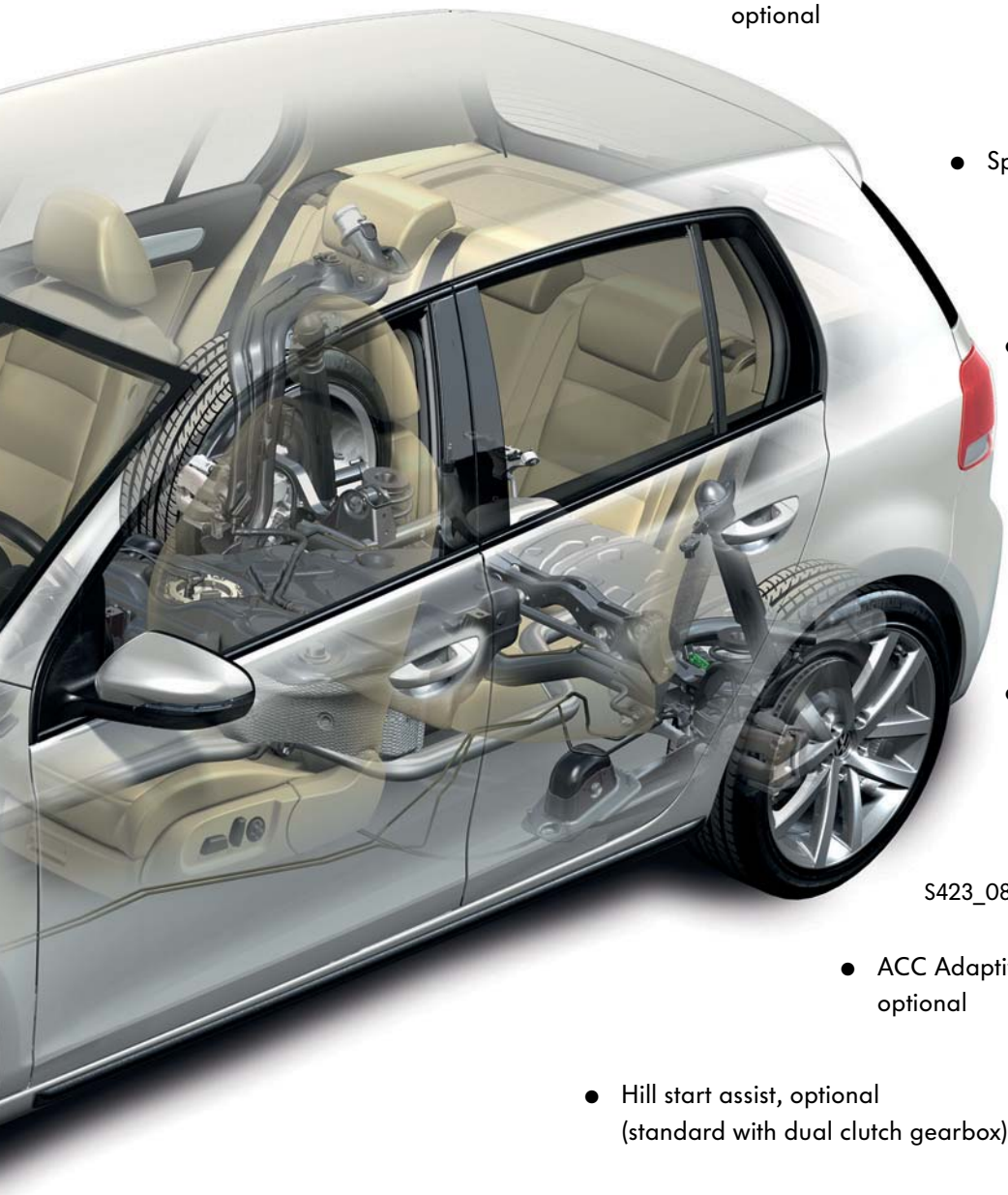
The Golf

The illustration shows important standard and optional equipment for the Golf.
There may be differences between markets.

- Electromechanical power steering with double pinion
- Front window with acoustic enhancement
- New multifunction steering wheel (MFW), optional
- High-end sound system from DYNAUDIO, optional
- "Climatic" air conditioning
- Parallel parking system, optional
- Daylight driving lights
- Fog lights with turn-off lights, optional
- Multimedia Device Interface box (MDI), optional

- Tilting sunroof, optional

- Reversing camera integrated in pivoting badge, optional



- Split folding rear bench backrest

- Optical parking system (OPS), optional

- New ESP generation with brake assist

S423_083

- ACC Adaptive Chassis Control, optional

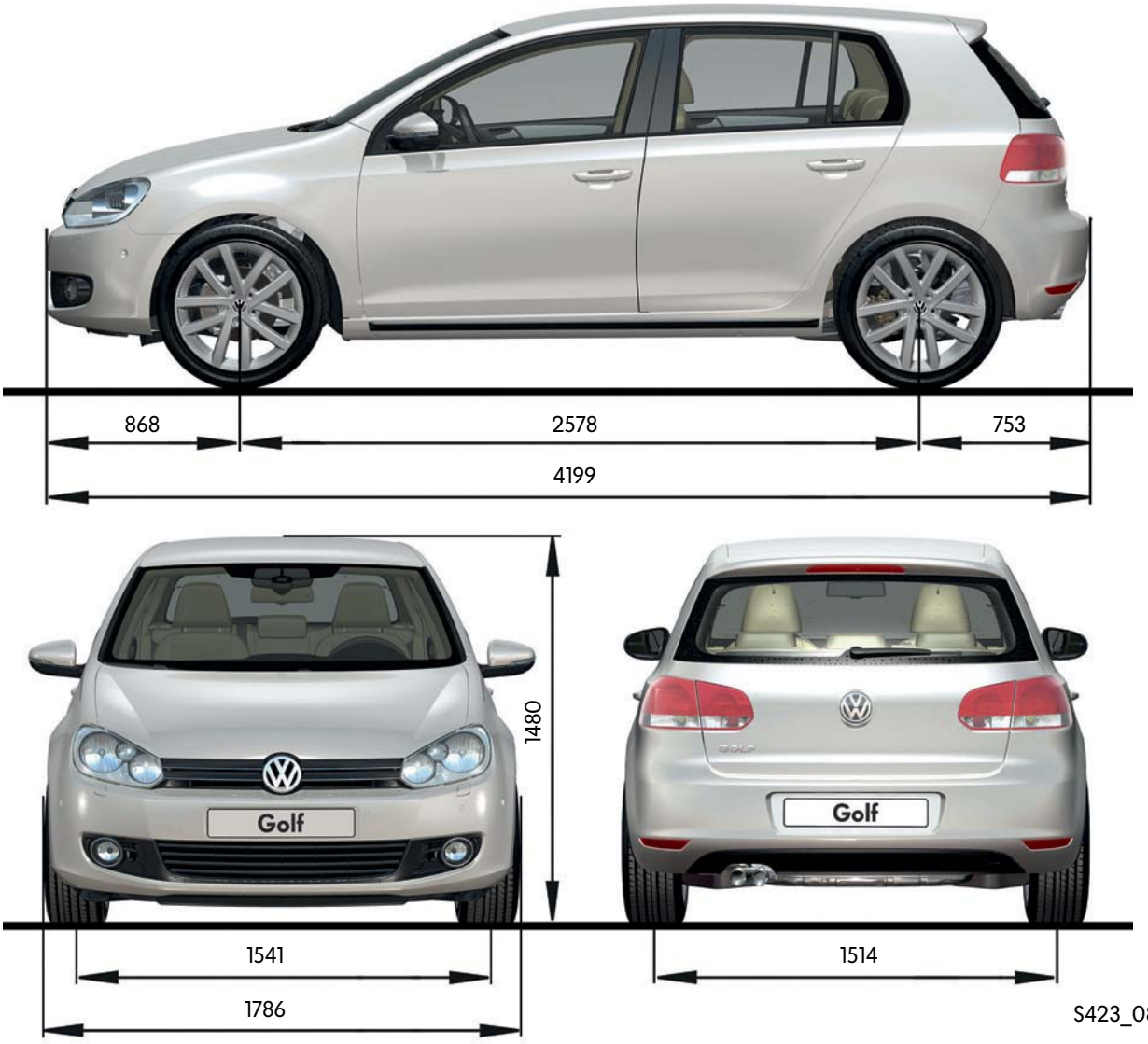
- Hill start assist, optional (standard with dual clutch gearbox)

- Knee airbag

- UMPP telephone preparation, optional

Technical data

Exterior dimensions and weights



Exterior dimensions

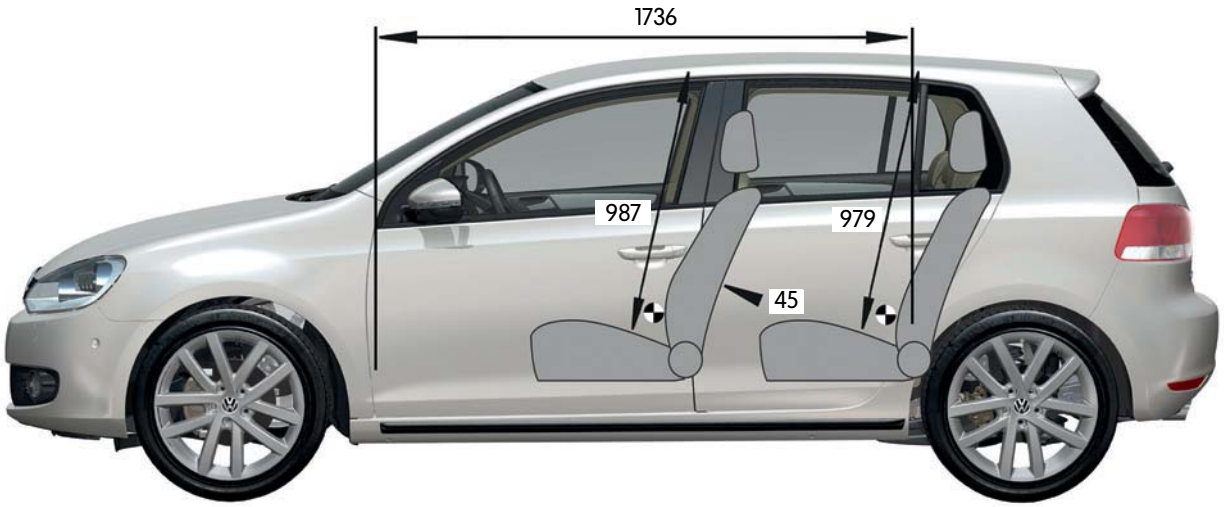
Length	4199 mm
Width	1786 mm
Height	1479 mm
Wheelbase	2578 mm
Track width at front	1540 mm
Track width at rear	1513 mm

Weights/further data

Maximum weight	1750 kg*
Curb weight without driver	1144 kg*
Max. roof load	75 kg
Tank capacity	55 l
Drag coefficient	0.312 c_w*

* when equipped with 1.4 l / 59 kW MPI engine

Interior dimensions



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S423_089

Interior dimensions and volumes

Interior length	1736 mm
Luggage compartment volume	350 l
Luggage compartment volume with rear seat backrest folded down	1305 l

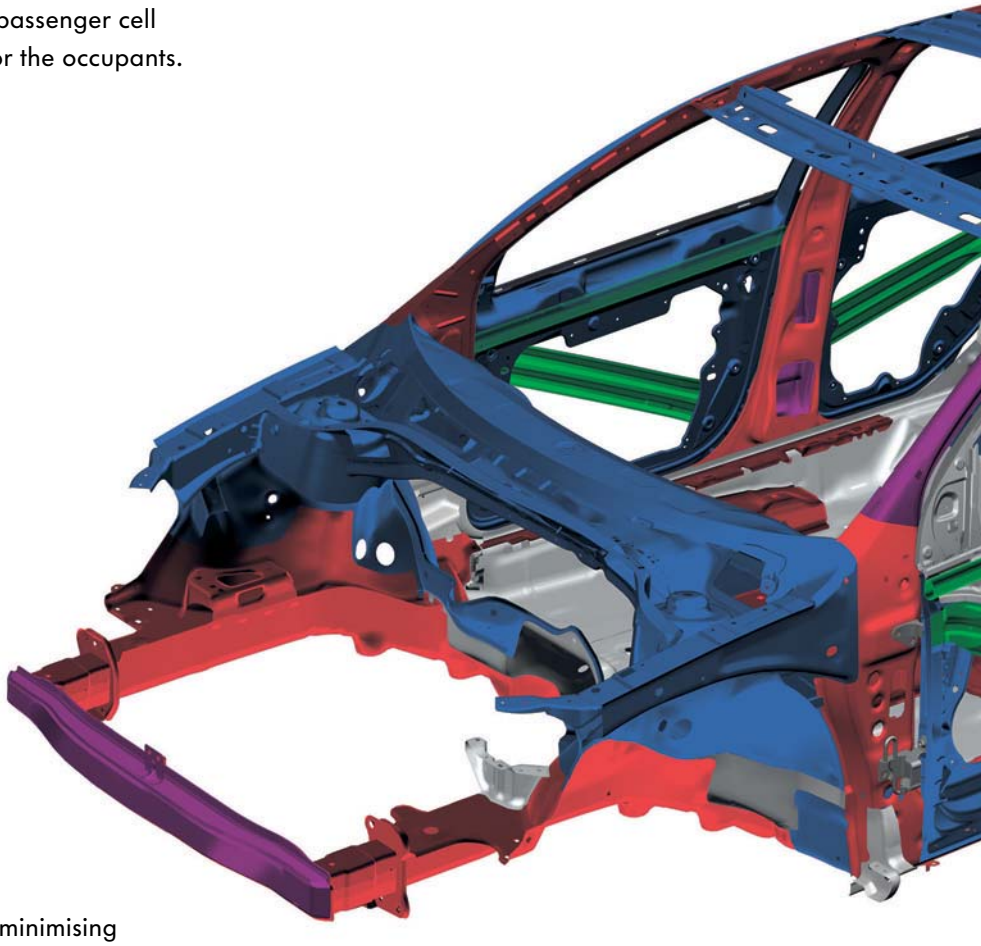
Front headroom	987 mm
Rear headroom	979 mm
Kneeroom — 2nd seat row	45 mm

Body structure

High- and highest-strength steels are used in order to meet the requirements for the vehicle structure.
The use of die-quenched parts in the areas of the passenger cell that are subject to heavy loads has reduced the body weight and increased the stability of the passenger cell in crashes. The passenger cell represents the crash survival space for the occupants.

Pedestrian safety

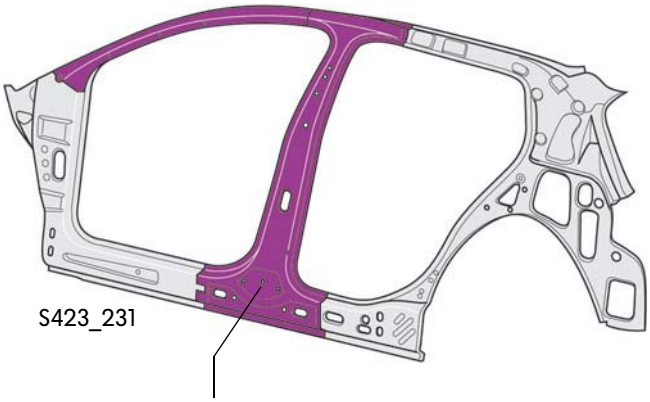
Deformation elements in the area of the bumper cross member ensure pedestrian protection.



Frontal crash

Particular attention was paid here to minimising intrusions (penetration of components) into the footwell.

In conjunction with the standard knee airbag this results in a considerably smaller injury potential for the lower extremities.



S423_231

Highest-strength, thermoformed steel panels

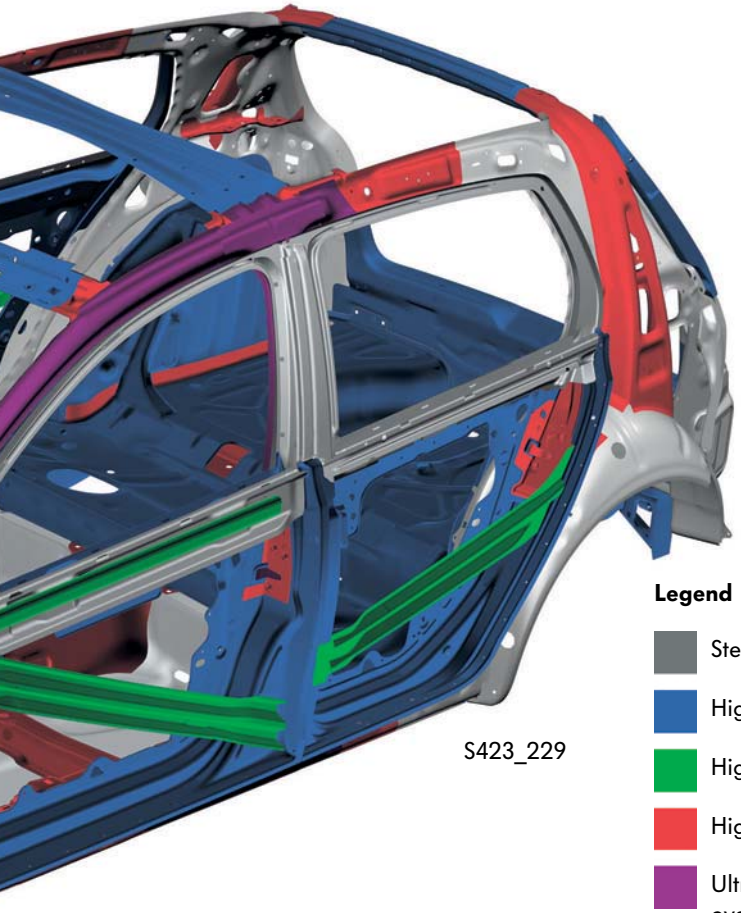
You will find further information on the body structure in self-study programme 318 “The Golf 2004”.

Rear-end collision

The rear-end crash requirements for the vehicle cover the stability of the passenger cell as well as the rear body structure.

The fuel system is protected in rear-end collisions by the rear-axle geometry as well as the placement of the fuel filler neck and the position of the tank in front of the rear-axle mounting.

The structure of the Golf VI in Europe thus also meets the stricter rear-end collision requirements of the US market.



S423_229

Legend

- Steel panels up to 140 MPa
- High-strength steel panels from 180 to 240 MPa
- Higher-strength steel panels from 260 to 320 MPa
- Highest-strength steel panels from 340 to 700 MPa
- Ultra-high-strength, thermoformed steel panels over 1000 MPa

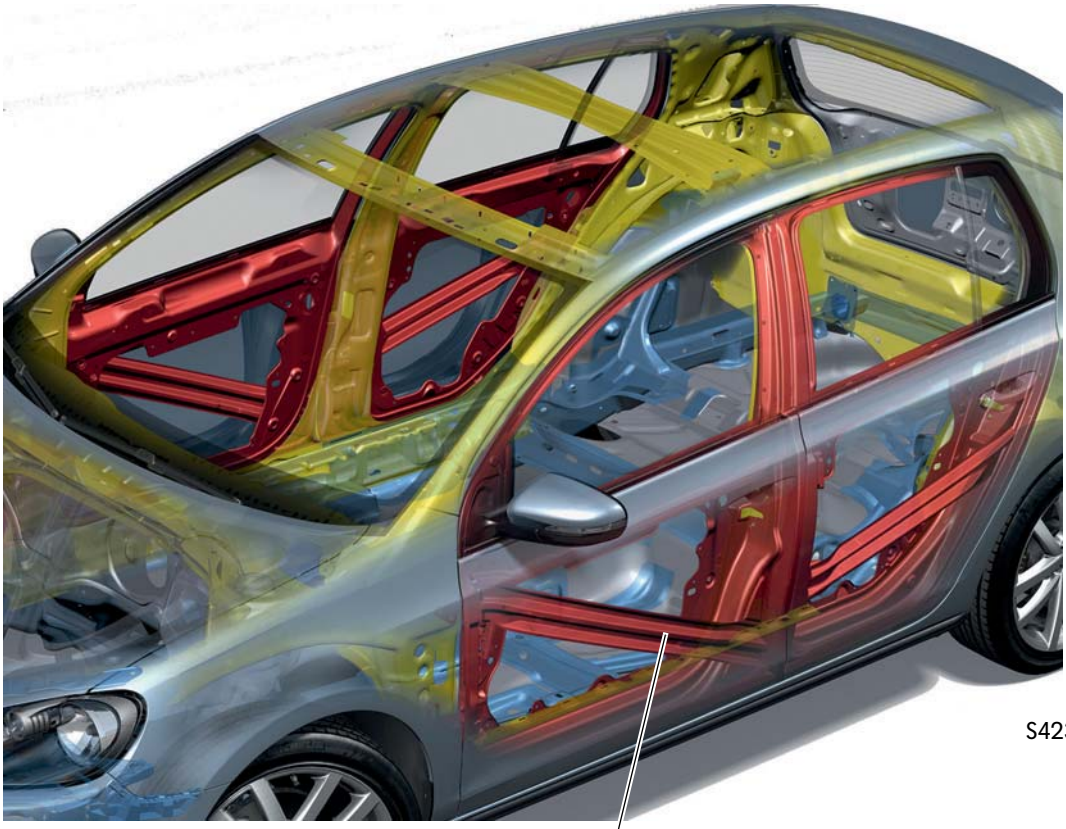
Side crash

In side collisions, the B-pillars and the doors are the most import structural components that, when combined, absorb the main load in a side collision. An efficient design in terms of weight and component scope has been created by using highest-strength materials. It permits maximum occupant protection without additional local reinforcements.

As a central load distributor, the B-pillar transmits the forces acting on the sill and upto the roof frame. The seat cross member provides additional stability in the passenger cell by providing support to the opposite side of the vehicle. In conjunction with the doors that are reinforced by diagonal impact members, the crash energy is reduced from an extremely high energy level.
In this way, both low penetration speeds and also low intrusions into the passenger compartment are achieved in side collisions. EuroNCAP

Doors

The doors have a conventional structure.
The basic door unit is a single part. An impact member is fitted in all doors.



S423_167

The front light concept

The headlights of the Golf 2009 have turn signals, side lights, dipped beam lights, daylight driving lights and main beam lights. The fog lights can be optionally integrated in the turn-off light function.
The familiar one-touch system allows the bulbs to be released and removed in one action.

S423_218

Daylight driving lights

S423_227

When the daylight driving lights are switched on, the daylight driving light is illuminated.

Side lights

S423_223

When the side lights are switched on, the side lights are illuminated.

Dipped beam

S423_221

When the dipped beam lights are switched on, the dipped beam lights and the side lights are switched on.

Main beam

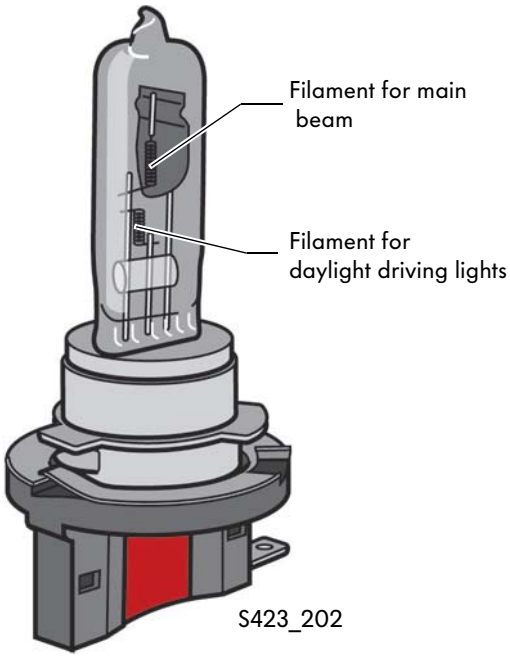
S423_225

When the dipped beam lights are switched on, the dipped beam lights and the side lights are switched on.

Daylight driving lights

The new Golf has headlights with integrated daylight driving lights as standard. The daylight driving lights are switched on automatically when the ignition is switched on. For the driver, having the lights switched on automatically provides an additional convenience feature enhances safety.

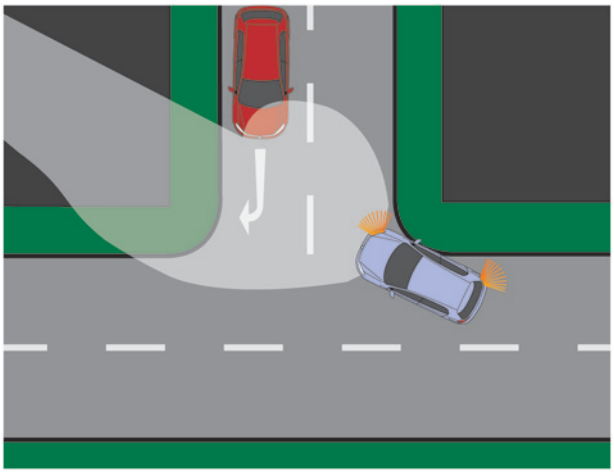
The daylight driving lights use a dual-filament bulb that combines the main beam and daylight driving lights functions with the two different filaments.
The two functions are never active at the same time.



S423_202

Turn-off light

On the new Golf, turn-off lights are optionally available for greater driving safety. This is achieved by the corresponding fog light (left or right) being switched on in addition during the turning procedure. The turn-off light is switched on when the steering wheel is turned and/or the turn signal activated to clearly illuminate the area you are turning into. The function is only active when the dipped/main beam lights are switched on, the engine is running and the car is travelling at speeds less than 40 km/h.



S423_214

The rear lights

The rear lights on the Golf 2009 are split in two.

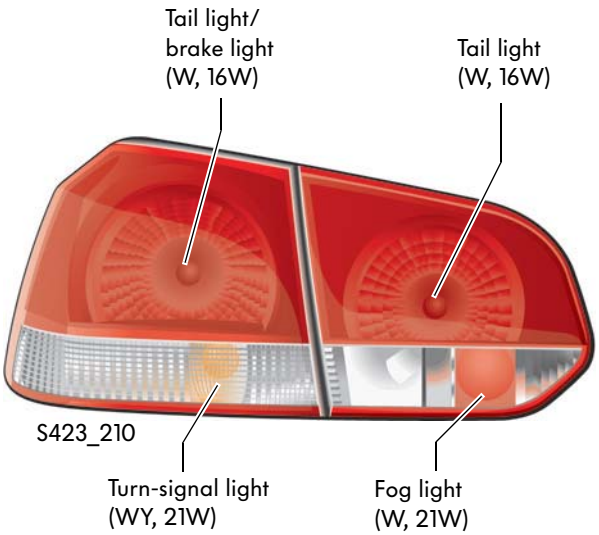
The tail lights, brake lights and turn signal are integrated in the section of the rear light mounted at the side. There is a single bulb for the tail light and for the brake light. The bulb is powered at 100 percent for the brake light and at 20 percent for the tail light.

The tail light is also powered at 20 percent for the side lights or parking lights. Only the bulbs in the side are illuminated in this case.

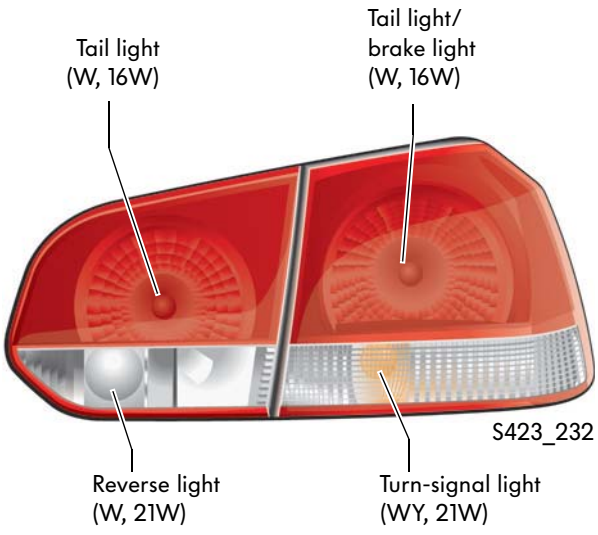
The section of the tail light on the tailgate holds the tail light, rear fog light and reversing light. The tail light bulb in the tailgate section of the light is constantly powered at 20 percent.

All bulbs are operated with the aid of a pulse width-modulated signal to obtain constant and even illumination.

Rear light left



Rear light right



The side light function is exclusively activated in the side light position of the rotary light switch. That means that, in other light positions and when the ignition key is removed, the side lights are no longer switched on automatically.

Interior

Front seats

The front seats in the Golf 2009 are either mechanically or electrically adjusted.
The 4-door Golf has four seat versions:

- The fully mechanically adjusted front seat

- The mechanically adjusted front seat with mechanically adjusted 2-way lumbar support

  One new feature here is that the rotary adjuster has been replaced by a lever. The adjustment travel is 110°.

- The mechanically adjusted driver's seat with electrically adjusted 4-way lumbar support

- The electrically adjusted driver's seat with electrically adjusted 4-way lumbar support
  (On this version, the front passenger seat is mechanically adjusted with electrically adjusted 4-way lumbar support)

On the 2-door Golf, there are no electrically adjusted seats. There is, however, an optional electrically adjusted 4-way lumbar support.

On the 2-door model, the front seats are equipped as standard with the "Easy-Entry" system with manual memory function.

S423_185

Rear seats

The Golf 2009 rear seats have a fixed seat bench with 3 seats. The rear backrest is asymmetrically split in the ratio 2:1 and can be folded down for optimum loading.

A through-load aperture is optionally available for the rear seat bench. The armrest and a flap behind it fold forward so that long, bulky objects can be pushed through from the luggage compartment.

The rear seat bench has ISO fix child seat fittings on the outer seats.

Occupant Protection

Safety equipment

The Golf 2009 has the following safety equipment as standard:

- Driver airbag
- Front passenger airbag (with deactivation switch)
- Front side airbags
- Knee airbag on driver's side
- Head airbag for front and rear occupants
- Belt tensioners for the front seats

Rear side airbags combined with belt tensioners and belt fastening recognition for the rear seats are available as optional extras.

There are pressure sensors for side crash recognition in the front doors. Acceleration sensors are fitted in the area of the C-pillar.

The Golf is fitted with a knee airbag as standard on the driver's side.

S423_091

Rear belt warning display

The belt warning display indicates to the driver whether passengers in the rear seats have fitted their belts. This additional safety function tells the driver at the start of a journey and during the journey whether his passengers on the rear seats are wearing their seat belts.

The belt warning display is integrated in the dash panel insert and is active once the ignition is switched on.

If the seat belts on the rear seats are unfastened while the car is travelling at a speed above 25km/h after the fastened status has been recognised, an acoustic signal will sound and the belt warning display will flash for a maximum of 30 seconds.

If the belt is unfastened at a speed below 25km/h, only the icon for that belt lock will be displayed for 30 seconds. There is no acoustic signal nor does the belt warning display flash.

S423_169

S423_192

Passenger with fastened seat belt

No passenger

Knee airbag

The knee airbag is located in the instrument panel below the kneeboard. It distributes and reduces the forces acting on the driver in a front collision.

In a crash, the 18-litre airbag inflates in front of the driver's knees in less than 20 milliseconds.

In conjunction with the seat belt and front airbag, it absorbs a substantial part of the energy to be reduced in the pelvis region.

The driver is subjected to the vehicle deceleration at an early stage via the upper thigh and the pelvis and is restrained.

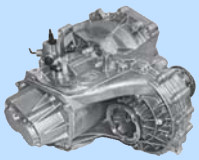
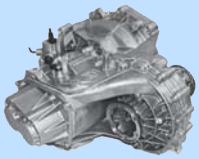
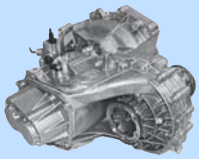
Furthermore the knee airbag protects the driver's legs against a severe collision with the steering column and the instrument panel.

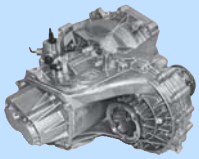
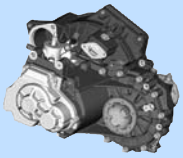
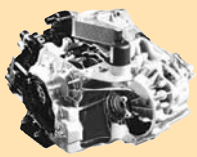
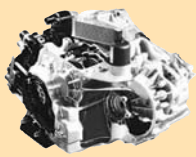
It counteracts injuries to the knee, shin and ligaments. In a diagonal collision, the feet have less chance of twisting sideways and are thus protected better against fractures or stretched ligaments.

S423_093

Engines

Engine/gearbox combinations

Petrol engine Diesel engine	1.4 l/59 kW MPI engine 	1.6 l/75 kW MPI engine 	1.6 l/75 kW MPI engine with LPG 
5/6-speed manual gearbox MQ200-5/6F 0AF/0AJ	 5-speed	 5-speed	 5-speed
5/6-speed manual gearbox MQ250-5/6F 0A4/02S			
6-speed manual gearbox MQ350-6F 02Q			
7-speed DSG direct-shift gearbox DQ-200-7F 0AM			
6-speed direct-shift gearbox DQ250-6F DSG 02E			

1.4 l/90 kW TSI engine with turbocharger	1.4 l/118 kW TSI engine with dual-charging	2.0l/81kW CR TDI engine	2.0l/103kW CR TDI engine
			
 6-speed			
	 6-speed	 5-speed	
			
			
			

The 1.4l/59 kW MPI engine

The 1.4l/59kW engine is the entry-level engine.
It has been used in various models since model year 2007 and is now featuring in the Golf.

S423_078

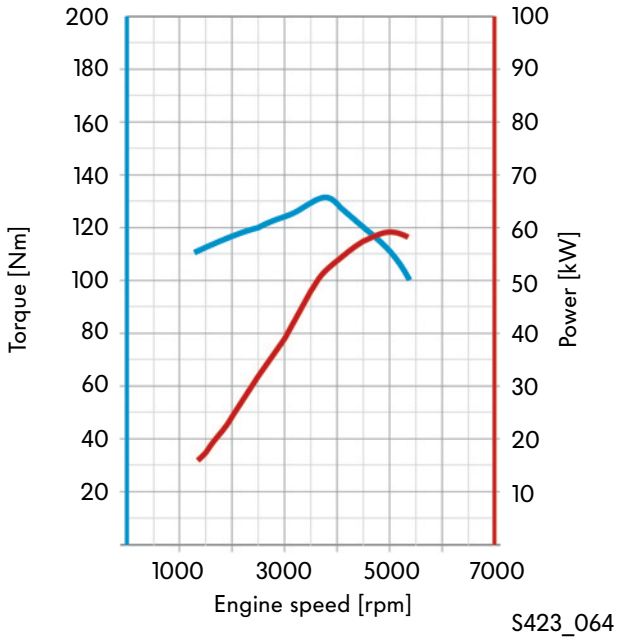
Technical features

- Toothed belt pulley on crankshaft with elliptic shape to reduce toothed belt vibrations
- Coated toothed belt
- Intake pipe with modular design
- Crankcase breather and ventilation system with diaphragm valve to regulate pressure in cylinder block
- Pre-warming for crankcase ventilation integrated in cooling system
- Exhaust manifold and three-way catalytic converter are combined in one module.

Technical data

Engine code	CGGA
Type	4-cylinder in-line engine
Displacement	1390cm³
Bore	76.5mm
Stroke	75.6mm
Valves per cylinder	4
Compression ratio	10.5:1
Maximum output	59kW at 5000 rpm
Maximum torque	132Nm at 3800 rpm
Engine management	Magneti Marelli 4HV
Fuel	Super unleaded RON 95 (Normal unleaded RON 91 with slight reduction in performance)
Exhaust gas treatment	Starter catalytic converter, main catalytic converter, a broadband lambda probe before the starter catalytic converter and a step-type lambda probe after the main catalytic converter
Emissions standard	EU5

Torque and output diagram



S423_064

The 1.6l/75 kW engine with 2-valve technology

The 1.6l/75 kW engine is based on the familiar 1.6l/75 kW engine with the code BSE, as used in the Golf 2004.

S423_058

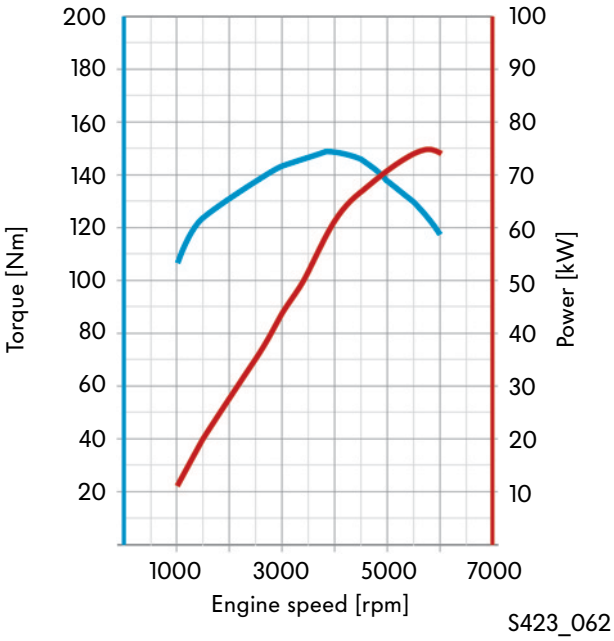
Technical features

- 2-valve roller rocker arm
- Aluminium engine block with ribbed sump
- Secondary air system
- Plastic variable intake manifold
- Due to the greater function requirements placed on the engine control unit, a faster processor (40MHz clock rate instead of 24MHz) and larger RAM memory (from 4 to 8Mbit) have been fitted.

Technical data

Engine code	BSE
Type	4-cylinder in-line engine
Displacement	1595cm^3
Bore	81mm
Stroke	77.4mm
Valves per cylinder	2
Compression ratio	10.3:1
Maximum output	75kW at 5600 rpm
Maximum torque	148Nm at 3800 rpm
Engine management	Simos 7PP
Fuel	Super unleaded RON 95 (normal unleaded at RON 91 with slight reduction in performance)
Exhaust gas treatment	Probe before catalytic converter: Linear lambda probe Probe after catalytic converter: Step-type lambda probe
Emissions standard	EU5

Torque and output diagram



S423_062

1.4l/90kW TSI engine with turbocharger

This engine has already been used in other vehicle models and has been transferred to the Golf.

S423_036

Technical features

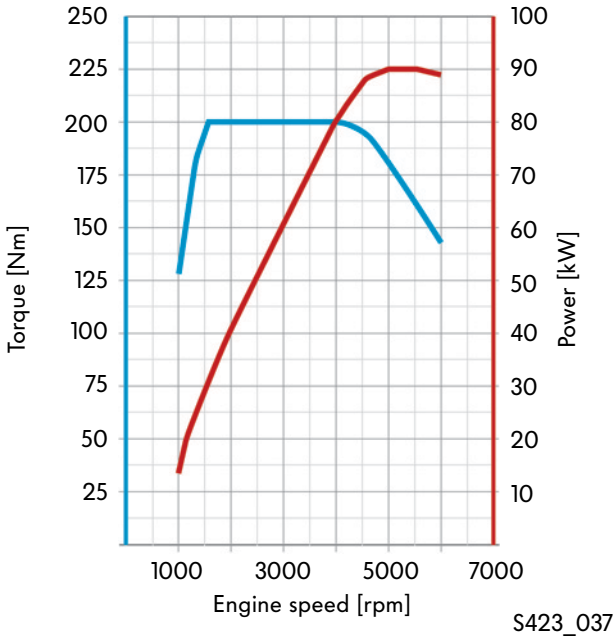
- Homogeneous mode (Lambda 1)
- Stratified high-pressure start
- Turbocharger with waste gate
- Dual-circuit cooling system
- Air-to-liquid charge-air cooling
- Intake pipe with air-to-liquid intercooler
- Regulated duo-centric oil pump
- Metal cartridge oil filter
- Fuel system regulated according to requirements
- High-pressure fuel pump with integrated pressure limiting valve

You will find further information on this engine in self-study programme no. 405 “1.4 l 90 kW TSI Engine with Turbocharger”.

Technical data

Engine code	CAXA
Type	4-cylinder in-line engine
Displacement	1390 cm³
Bore	76.5 mm
Stroke	75.6 mm
Valves per cylinder	4
Compression ratio	10:1
Maximum output	90 kW at 5000 to 5500 rpm
Maximum torque	200 Nm at 1500 to 4000 rpm
Engine management	Bosch Motronic MED 17.5.5
Fuel	Super unleaded RON 95
Exhaust gas treatment	Three-way catalytic converter, a broadband lambda probe upstream of the catalytic converter and step-type lambda probe downstream of the catalytic converter
Emissions standard	EU5

Torque and output diagram



S423_037

1.4l/118kW TSI engine with dual-charging

This engine has been transferred from the Scirocco without modifications.

S423_133

Technical features

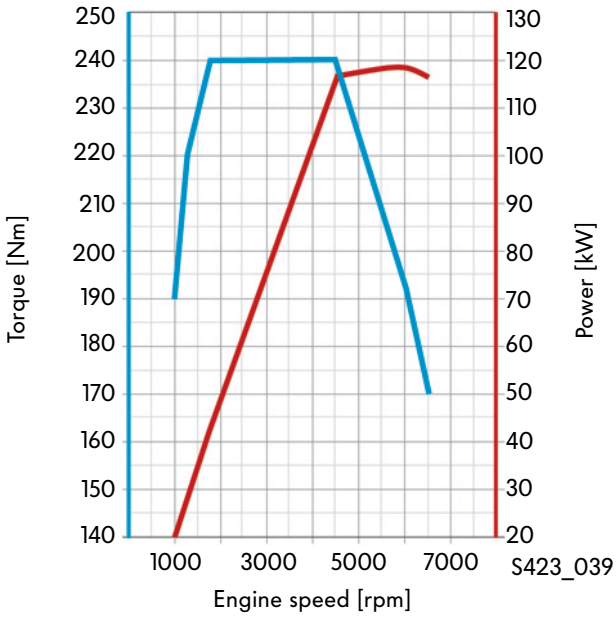
- Homogeneous mode (Lambda 1)
- Stratified high-pressure start
- Turbocharger with waste gate
- Additional mechanical supercharger
- Intercooler
- Dual-circuit cooling system
- Fuel system regulated according to requirements
- High-pressure fuel pump with integrated pressure limiting valve
- Intake manifold flap change-over omitted
- Regulated duo-centric oil pump
- Metal cartridge oil filter

You will find further information on this engine in self-study programme no. 359 “The 1.4l TSI Engine”.

Technical data

Engine code	CAVD
Type	4-cylinder in-line engine
Displacement	1390cm³
Bore	76.5mm
Stroke	75.6mm
Valves per cylinder	4
Compression ratio	10:1
Maximum output	118kW at 5900 rpm
Maximum torque	240Nm at 1750 to 4500 rpm
Engine management	Bosch Motronic MED 17.5.5
Fuel	Super unleaded RON 95
Exhaust gas treatment	Three-way catalytic converter, a broadband lambda probe upstream of the catalytic converter and step-type lambda probe downstream of the catalytic converter
Emissions standard	EU5

Torque and output diagram



The 2.0l/81kW CR TDI engine

The new 2.0l/81kW CR TDI engine with common rail injection system is being used for the first time in the Golf 2009.
It is a reduced-performance version of the 2.0l/103kW CR TDI engine.

Technical features

- Common rail injection system with piezo injectors
- Diesel particulate filter with upstream oxidation catalytic converter
- Plastic intake pipe with swirl flap adjustment
- Throttle valve module with plastic throttle valve
- Electric exhaust gas recirculation valve
- Adjustable turbocharger with travel feedback
- Low-temperature exhaust gas recirculation cooling

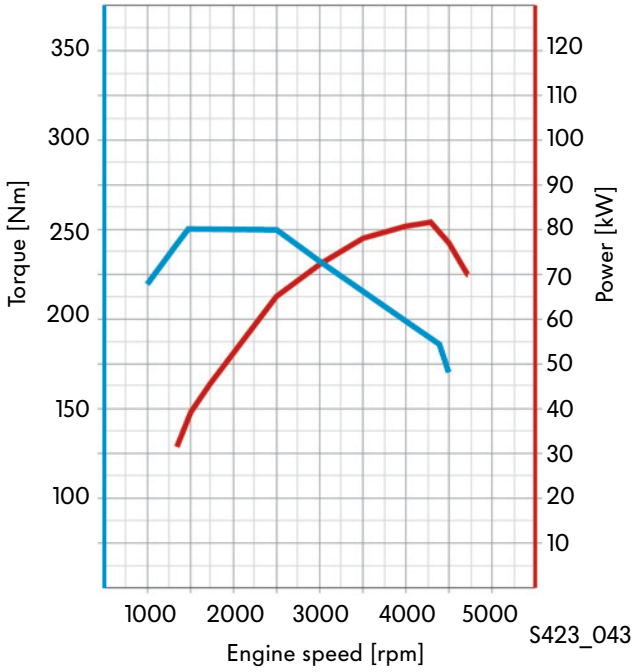
S423_041

You will find further information on this engine in self-study programme no. 403 “The 2.0 l TDI Engine with Common Rail Injection System”.

Technical data

Engine code	CBDC
Type	4-cylinder in-line engine
Displacement	1968 cm^3
Bore	81mm
Stroke	95.5mm
Valves per cylinder	4
Compression ratio	16.5:1
Maximum output	81kW at 4200 rpm
Maximum torque	250Nm at 1500 to 2500 rpm
Engine management	Bosch EDC 17 (common rail fuel injection system)
Fuel	Diesel, in accordance with DIN EN 590
Exhaust gas treatment	Exhaust gas recirculation, oxidation catalytic converter and diesel particulate filter
Emissions standard	EU5

Torque and power diagram



S423_043

The 2.0l 103 kW CR TDI engine

The 2.0l/103kW CR TDI engine with common rail injection system was used for the first time in the Tiguan.
A balancer shaft module reduces vibrations and noise.

Technical features

- Common rail injection system with piezo injectors
- Diesel particulate filter with upstream oxidation catalytic converter
- Plastic intake pipe with swirl flap adjustment
- Throttle valve module with plastic throttle valve
- Electric exhaust gas recirculation valve
- Adjustable turbocharger with travel feedback
- Low-temperature exhaust gas recirculation cooling
- Balancer shaft module

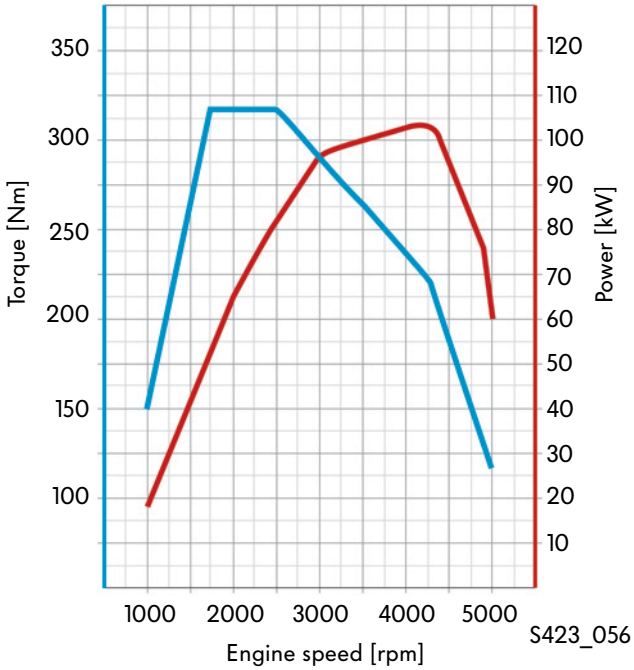
S423_041

You will find further information on this engine in self-study programme no. 403 “The 2.0l TDI Engine with Common Rail Injection System”.

Technical data

Engine code	CBAB
Type	4-cylinder in-line engine
Displacement	1968cm^3
Bore	81mm
Stroke	95.5mm
Valves per cylinder	4
Compression ratio	16.5:1
Maximum output	103kW at 4200 rpm
Maximum torque	320Nm at 1750 to 2500 rpm
Engine management	Bosch EDC 17 (common rail fuel injection system)
Fuel	Diesel, in accordance with DIN EN 590
Exhaust gas treatment	Exhaust gas recirculation, oxidation catalytic converter and diesel particulate filter
Emissions standard	EU5

Torque and power diagram



S423_056

System overview of liquid gas supply

For the first time, Volkswagen is offering the Golf 2009 with the 1.6l 75kW MPI engine and liquid gas drive straight from the factory. In gas operation, the engine reaches an output of 72kW. The engine is based on the Flex Fuel (E85) engine with the engine code: CCSA that is based on the technology from the 1.6l 75kW BSE engine. Liquid gas/autogas is also known as LPG. LPG stands for “Liquefied Petroleum Gas”.

The normal petrol operation is maintained as usual. All components that are required for gas operation are assembled during production. The petrol engine can be switched to liquid gas operation without mechanical modifications. In addition to a liquid gas mixer, a tank is installed in the spare wheel well from which the gas is supplied to the converter. This component converts the gas from liquid to gaseous state and generates the pressure required to form the gas.

The additional gas control unit obtains all necessary parameters that are required for liquid gas operation from the engine control unit. These are:

- Engine load
- Injection time
- Engine speed
- Petrol/gas switch off during deceleration
- Coolant temperature

The following parameters are recorded by the gas control unit:

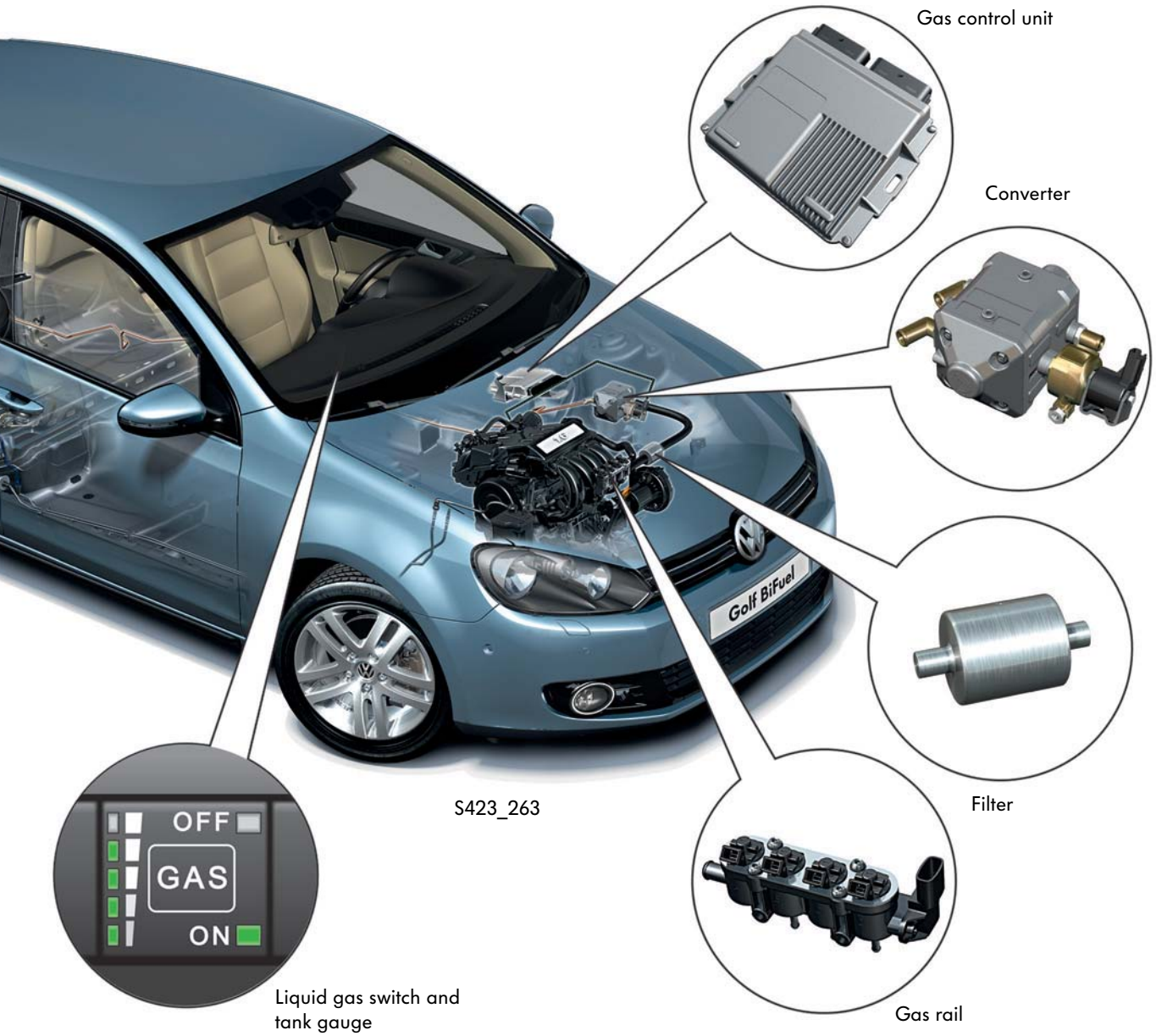
- Gas pressure in rail
- Gas temperature
- Gas level in tank
- Battery voltage

The engine is started in petrol mode. Once the necessary engine temperature has been reached, the gas control unit switches automatically to gas mode.

You will find further information on liquid gas in self-study program no. 427.

The liquid gas, whose pressure in the gas tank depends on the kind of composition (propane-butane ratio) and on the ambient temperature, is turned into vapour in the converter. The starting pressure is 1 bar above the pressure present in the intake manifolds.

The liquid gas used is similar to the gas that we use in gas cigarette lighters. The gas is liquid at a pressure of at least 10 bar (at 20 to 30°C). It consists of a pure propane/butane mixture and is a high-octane fuel without lead additives (RON, research octane number from 101 to 111). The consumption depends on the propane/butane mixture ratio.



S423_263

Manual gearboxes – Overview

Manual gearbox	Technical features	See also SSP no.:
5-speed manual gearbox MQ200-5F 0AF 	• Developed from 02T • Reinforced case • Gearbox adapted to modified mounting position • Without speedometer sender • CO2-optimised ratio • Torque capacity up to 170 Nm	
6-speed manual gearbox MQ200-6F 0AJ 	• Developed from 0AG gearbox • Adapted for 1.4l 90kW TSI engine, greater spacing between drive shaft and differential, sheet metal mounting replaced with cast mounting for greater torque, ground gear teeth • Axle drive reinforced • Without speedometer sender • CO2-optimised ratio • Torque capacity up to 200 Nm	306
5-speed manual gearbox MQ250-5F 0A4 	• Developed from 02J gearbox • Improved shifting • CO2-optimised ratio • Without speedometer sender • Torque capacity up to 250 Nm	
6-speed manual gearbox MQ250-6F 02S 	• Further development from 0A4 • Longer shafts with additional bearings, additional gear pair, new longer aluminium housing lid • CO2-optimised ratio • Torque capacity up to 250 Nm	306
6-speed manual gearbox MQ350-6F 02Q 	• Developed from 02M gearbox • Changes to selector shaft, selector fork with stops in housing, new bearings • Without speedometer sender	306