

Customer Complaint "High Engine Oil Consumption" (41 / 11)



Information

This Technical Information replaces the Quick Information releases **10/11** (23.03.2011) and **26/11** (23.02.2011) as well as the "High Engine Oil Consumption" Checklist.

The Technical Information contains **specifications relating to customer communication, measures and documentation for dealing with the complaint "high engine oil consumption"** and summarises the contents of the previous Quick Information releases **in one document**.

From now on, **customer statements and measured values are documented** directly in the **related PQIS job** as described below.

As a result, the "High Engine Oil Consumption" checklist no longer needs to be filled out.

Vehicle type: **Panamera S/Panamera GTS/Panamera Turbo/Panamera Turbo S**

Model Year: **As of 2010 up to 2013**

Subject:

- **Customer complaint "High engine oil consumption"**
- **Warning message "Oil level minimum reached / below minimum" in the instrument cluster**

Situation: **Customer communication and measures for dealing with the complaint "high engine oil consumption".**

This Technical Information contains specifications relating to customer communication and measures for dealing with the customer complaint "high engine oil consumption".

Contents: **This Technical Information is divided into the following sections:**

Section	Content
Overview of measures / customer communication specifications <i>⇒ Technical Information 'Overview of measures/customer communication specifications'</i>	• Definition of measures to be carried out depending on the extent of the oil consumption problem • Customer communication specifications • Specifications for documenting the problem in the PQIS job • Invoicing specifications This section defines the measures to be carried out, depending on the extent of the engine oil consumption problem reported by the customer, and the customer communication specifications as well as the specifications for documenting the problem in the PQIS job and invoicing.

You will find detailed information on measures and customer communication in the following sections:	
Determining oil consumption based on the customer statement ⇒ Technical Information 'Determining oil consumption based on the customer statement'	Description of how to determine oil consumption based on the customer statement The oil consumption determined based on the customer statement forms the basis for defining further measures.
Information on engine oil consumption ⇒ Technical Information 'Information on engine oil consumption'	Detailed information on why the engine may be using oil or using an increased amount of oil Please use this information when communicating with customers who have complained about engine oil consumption, but whose oil consumption level corresponds to technical requirements.
Information on displaying and measuring the engine oil level ⇒ Technical Information 'Information on displaying and measuring the engine oil level'	Detailed information on displaying and measuring the engine oil level Please use this information when communicating with customers who have complained about implausible oil level warning messages or if the "high engine oil consumption" complaint is caused by implausible oil level warning messages.
Measuring oil consumption ⇒ Technical Information 'Measuring oil consumption '	Description of how to determine the actual oil consumption by measuring oil consumption The specifications relating to the conditions and requirements for measuring oil consumption are defined in the overview of measures.

Overview of measures / customer communication specifications



Information

The following points must always be checked first before carrying out the measures specified below:

- Is the engine oil leaking?
- Are there traces of oil on the vehicle (engine, underbody panelling, etc.)?
- Is there "blue smoke"?

If the answer to one of the questions listed above is "Yes", check these issues out first in order to establish the cause of the increased engine oil consumption.

Action required:

1	Determine oil consumption based on the customer statement ⇒ <i>Technical Information 'Determining oil consumption based on the customer statement'.</i> The following information and values are required in order to determine the oil consumption : • Total amount of engine oil already added by the customer • Mileage of the vehicle • The oil level measured using PIWIS Tester II • Type of oil level sensor installed in the vehicle	
2	Decide what to do next depending on the oil consumption determined based on the customer statement.	
	Determined oil consumption per 1,000 km / 620 miles	Action required
	• less than 0.5 l (US: less than 0.53 qt; UK: less than 0.44 qt)	Talk to the customer: • Inform the customer that the oil consumption corresponds to technical requirements. Action required: • Inform the customer about possible causes of increased engine oil consumption; see ⇒ <i>Technical Information 'Information on engine oil consumption'</i>. • In the event of complaints relating to the oil level display or oil level warning, tell the customer how the oil level is measured and advise him/her to measure the oil level while driving; see ⇒ <i>Technical Information 'Information on displaying and measuring the engine oil level'</i>. • If necessary, give the customer the Driver's Manual Supplement "General information on displaying and measuring the engine oil level". The Driver's Manual Supplement is available as a PDF file under Technical Information – Main group 1, 1701 – "General information on displaying and measuring the engine oil level" in the PIWIS information system. Documentation in the PQIS job: • Document the customer statement in the PQIS job as follows: "Location" 10010 (Engine), "Symptom" 5071 (Oil consumption too high). • Document the technical evaluation in the PQIS job as follows: "Location" 10010 (Engine), "Symptom" 5072 (Oil consumption in accordance with specifications).

		• Answer the PQIS question about oil consumption. • Tick the "Concept quality" field. • Close the PQIS job. ⇒ End of action required
	• 0.5 – 0.8 l (US: 0.53 – 0.84 qt; UK: 0.44 – 0.7 qt) and • vehicle mileage is less than 10,000 km (6,200 miles)	Talk to the customer: • Inform the customer that the oil consumption corresponds to technical requirements. • Inform the customer that new vehicles use more oil in the first 10,000 km/6,200 miles (running-in phase) than vehicles with engines that have already been run in. Action required: • Correct the engine-oil level and fill in engine oil up to the MAX level. • Inform the customer about possible causes of increased engine oil consumption, making particular reference to the running-in phase; see ⇒ <i>Technical Information 'Information on engine oil consumption'</i>. • In the event of complaints relating to the oil level display or oil level warning, tell the customer how the oil level is measured and advise him/her to measure the oil level while driving; see ⇒ <i>Technical Information 'Information on displaying and measuring the engine oil level'</i>. • If necessary, give the customer the Driver's Manual Supplement "General information on displaying and measuring the engine oil level". The Driver's Manual Supplement is available as a PDF file under Technical Information – Main group 1, 1701 – "General information on displaying and measuring the engine oil level" in the PIWIS information system. • Instruct the customer to monitor oil consumption. If the oil consumption is still 0.5 – 0.8 l per 1,000 km (620 miles) even with a mileage of more than 10,000 km (6,200 miles), the oil consumption must be measured. Documentation in the PQIS job: • Document the customer statement in the PQIS job as follows: "Location" 10010 (Engine), "Symptom" 5071 (Oil consumption too high).

	• Document the technical evaluation in the PQIS job as follows: "Location" 10010 (Engine), "Symptom" 5072 (Oil consumption in accordance with specifications). • Answer the PQIS question about oil consumption. • Document the cause in the PQIS job as follows: "Location" 10010 (Engine), "Symptom" 5072 (Oil consumption in accordance with specifications). • Close the PQIS job. Invoicing: Invoice the amount of engine oil that was added under ⇒ Damage Code 1001 50 000, Repair Code 1. ⇒ End of action required
• 0.5 – 0.8 l (US: 0.53 – 0.84 qt; UK: 0.44 – 0.7 qt) and • vehicle mileage is more than 10,000 km (6,200 miles)	Talk to the customer: • Inform the customer that the actual oil consumption must be measured as a precautionary measure. Action required: • Measure the oil consumption, see ⇒ <i>Technical Information 'Measuring oil consumption'</i>. Documentation in the PQIS job: • Document the customer statement in the PQIS job as follows: "Location" 10010 (Engine), "Symptom" 5071 (Oil consumption too high). • Document the technical evaluation in the PQIS job as follows: "Location" 10010 (Engine), "Symptom" 5071 (Oil consumption too high). • Answer the PQIS question about oil consumption. • Document the cause in the PQIS job as follows: "Location" 99000 (Test drive), "Symptom" 9737 (Verify customer complaint). • Then close the PQIS job. Invoicing: Invoice work and materials (engine oil) for preparing for measuring oil consumption under ⇒ Damage Code 9900 97 000, Repair Code 1. Further measures:

		Perform other measures depending on the actual oil consumption determined by measuring oil consumption in accordance with ⇒ Step 3 .
	• more than 0.8 l (US: more than 0.84 qt; UK: more than 0.7 qt)	Talk to the customer: • Inform the customer that the actual oil consumption must be measured as a precautionary measure. Action required: • Measure oil consumption ⇒ <i>Technical Information 'Measuring oil consumption'</i>. Documentation in the PQIS job: • Document the customer statement in the PQIS job as follows: "Location" 10010 (Engine), "Symptom" 5071 (Oil consumption too high). • Document the technical evaluation in the PQIS job as follows: "Location" 10010 (Engine), "Symptom" 5071 (Oil consumption too high). • Answer the PQIS question about oil consumption. • Document the cause in the PQIS job as follows: "Location" 99000 (Test drive), "Symptom" 9737 (Verify customer complaint). • Then close the PQIS job. Invoicing: Invoice work and materials (engine oil) for preparing for measuring oil consumption under ⇒ Damage Code 9900 97 000, Repair Code 1. Further measures: Perform other measures depending on the actual oil consumption determined by measuring oil consumption in accordance with ⇒ Step 3.

3	Decide what to do next depending on the result of the oil consumption measurement.	
Actual oil consumption per 1,000 km / 620 miles		Action required
up to 0.8 l (US: up to 0.84 qt; UK: up to 0.7 qt)	Talk to the customer: - Inform the customer that the oil consumption determined by measuring the actual oil consumption corresponds to technical requirements. Action required: - Inform the customer about possible causes of increased engine oil consumption; see ⇒ <i>Technical Information 'Information on engine oil consumption'</i>. - In the event of complaints relating to the oil level display or oil level warning, tell the customer how the oil level is measured and advise him/her to measure the oil level while driving; see ⇒ <i>Technical Information 'Information on displaying and measuring the engine oil level'</i>. - If necessary, give the customer the Driver's Manual Supplement "General information on displaying and measuring the engine oil level". The Driver's Manual Supplement is available as a PDF file under Technical Information – Main group 1, 1701 – "General information on displaying and measuring the engine oil level" in the PIWIS information system. Documentation in the PQIS job: Document the customer statement in the PQIS job as follows: "Location" 10010 (Engine), "Symptom" 5071 (Oil consumption too high). Document the technical evaluation in the PQIS job as follows: "Location" 99000 (Test drive), "Symptom" 5072 (Oil consumption in accordance with specifications). Answer the PQIS question about oil consumption. Document the cause in the PQIS job as follows: "Location" 10010 (Engine), "Symptom" 5072 (Oil consumption in accordance with specifications). - Close the PQIS job. Invoicing: Invoice work involved in determining oil consumption under ⇒ Damage Code 1001 50 000, Repair Code 1.	

		⇒ End of action required
	• more than 0.8 l (US: more than 0.84 qt; UK: more than 0.7 qt)	Talk to the customer: • Inform the customer that the oil consumption measurement has confirmed an excessively high level of oil consumption and a more thorough examination of the vehicle is therefore required. Documentation in the PQIS job: • Document the customer statement in the PQIS job as follows: "Location" 10010 (Engine), "Symptom" 5071 (Oil consumption too high). • Document the technical evaluation in the PQIS job as follows: "Location" 99000 (Test drive), "Symptom" 5071 (Oil consumption too high). • Answer the PQIS question about oil consumption. • Document the cause in the PQIS job as follows: "Location" 10010 (Engine), "Symptom" 5071 (Oil consumption too high). • Close the PQIS job. Invoicing: Invoice work involved in determining oil consumption under ⇒ Damage Code 1001 50 000, Repair Code 1. Further measures: • Check the vehicle for blue smoke and traces of oil (on the underbody panelling) • Visually check the engine for oil leaks • Perform engine/combustion chamber endoscopy • Carry out other measures in consultation with your importer Documentation and invoicing of further measures: A separate PQIS job must be created for documenting further measures (determining cause of high engine oil consumption, carrying out repair measures). The work must be coded and invoiced by specifying the component responsible for causing the problem.

Determining oil consumption based on the customer statement

Procedure: 1 **Check the engine-oil level** as described in ⇒ *Workshop Manual '170101 Checking engine-oil level using the PIWIS Tester'* using the **PIWIS Tester**.

2 Determine engine oil consumption based on the customer statement.

The following information and values are required in order to determine the oil consumption:

- Amount of oil already added by the customer
- Mileage of the vehicle
- The oil level measured using PIWIS Tester II
- Type of oil level sensor installed in the vehicle
- DME data record identifier

Examples of determining oil consumption

- **Cayenne S, model year 2011** – DME data record identifier **less than '1545'**

	Engine oil level sensor without PR number S35	Engine oil level sensor with PR number S35
Oil level measured using PIWIS Tester II (example)	68 mm	68 mm
• MAX value	76 mm (+/- 3 mm)	72 mm (+/- 3 mm)
• Conversion factor for millimeters to milliliters	1 mm = 37 ml	
Determine total oil consumption (example)		
Difference between MAX value and measured oil level (example)	76 mm – 68 mm = 8 mm	72 mm – 68 mm = 4 mm
= Refill quantity up to MAX oil level	8 x 37 ml = 296 ml	4 x 37 ml = 148 ml
+ Amount of oil already added by the customer (example)	2000 ml	2000 ml
= Total oil consumption	2296 ml	2148 ml
Determine average oil consumption per 600 miles (1,000 km) (example)		
Mileage of the vehicle	3750 miles (6,000 km)	3750 miles (6,000 km)
Total oil consumption	2296 ml	2148 ml
Average oil consumption / 600 miles (1,000 km)	2296 ml : 6 = 383 ml	2148 ml : 6 = 358 ml

- **Cayenne S, model year 2011** – DME data record identifier **'1545'** or higher

**Information**

Please note that the values for vehicles with a **DME data record identifier '1468', '1545' or higher (Cayenne S) or '1473', '1546' or higher (Cayenne Turbo)** will not be published within the **workshop manual (WM)**. Please **always refer to this Technical Information** when **checking the oil level** and **determining the engine-oil quantity to be added** on these vehicles.

	Engine oil level sensor without PR number S35	Engine oil level sensor with PR number S35
Oil level measured using PIWIS Tester II (example)	68 mm	68 mm
• MAX value	81 mm (+/- 3 mm)	82 mm (+/- 3 mm)
• Conversion factor for millimeters to milliliters	1 mm = approx. 52 ml	1 mm = approx. 54 ml
Determine total oil consumption (example)		
Difference between MAX value and measured oil level (example)	81 mm – 68 mm = 13 mm	82 mm – 68 mm = 14 mm
= Refill quantity up to MAX oil level	13 x 52 ml = 676 ml	14 x 54 ml = 756 ml
+ Amount of oil already added by the customer (example)	2000 ml	2000 ml
= Total oil consumption	2676 ml	2756 ml
Determine average oil consumption per 600 miles (1,000 km) (example)		
Mileage of the vehicle	3750 Miles (6,000 km)	3750 Miles (6,000 km)
Total oil consumption	2676 ml	2756 ml
Average oil consumption / 600 miles (1,000 km)	2676 ml : 6 = 446 ml	2756 ml : 6 = 459 ml

- **Cayenne Turbo – DME data record identifier less than '1546'**

	Engine oil level sensor without PR number S35	Engine oil level sensor with PR number S35
Oil level measured using PIWIS Tester II (example)	68 mm	68 mm

• MAX value (in accordance with the Workshop Manual)	80 mm (+/- 3 mm)	72 mm (+/- 3 mm)
• Conversion factor for millimeters to milliliters	1 mm = 35 ml	1 mm = 44 ml
Determine total oil consumption (example)		
Difference between MAX value and measured oil level (example)	80 mm – 68 mm = 12 mm	72 mm – 68 mm = 4 mm
= Refill quantity up to MAX oil level	12 x 35 ml = 420 ml	4 x 44 ml = 176 ml
+ Amount of oil already added by the customer (example)	2000 ml	2000 ml
= Total oil consumption	2420 ml	2176 ml
Determine average oil consumption per 600 miles (1,000 km) (example)		
Mileage of the vehicle	3750 miles (6,000 km)	3750 miles (6,000 km)
Total oil consumption	2420 ml	2176 ml
Average oil consumption / 600 miles (1,000 km)	2420 ml : 6 = 403 ml	2176 ml : 6 = 363 ml

- **Cayenne Turbo** – DME data record identifier '**1546**' or higher



Information

Please note that the values for vehicles with a **DME data record identifier '1468', '1545' or higher (Cayenne S) or '1473', 1546' or higher (Cayenne Turbo)** will not be published within the workshop manual (WM). Please **always refer to this Technical Information** when **checking the oil level** and **determining the engine-oil quantity to be added** on these vehicles.

	Engine oil level sensor without PR number S35	Engine oil level sensor with PR number S35
Oil level measured using PIWIS Tester II (example)	68 mm	68 mm
• MAX value	80 mm (+/- 3 mm)	85 mm (+/- 3 mm)
• Conversion factor for millimeters to milliliters	1 mm = approx. 50 ml	1 mm = approx. 46 ml
Determine total oil consumption (example)		

Difference between MAX value and measured oil level (example)		80 mm – 68 mm = 12 mm	85 mm – 68 mm = 17 mm
=	Refill quantity up to MAX oil level	12 x 50 ml = 600 ml	17 x 46 ml = 782 ml
+	Amount of oil already added by the customer (example)	2000 ml	2000 ml
=	Total oil consumption	2600 ml	2782 ml
Determine average oil consumption per 600 miles (1,000 km) (example)			
Mileage of the vehicle		3750 miles (6,000 km)	3750 miles (6,000 km)
Total oil consumption		2600 ml	2782 ml
Average oil consumption / 600 miles (1,000 km)		2600 ml : 6 = 433 ml	2782 ml : 6 = 464 ml

Information on engine oil consumption

Information: Causes of engine oil consumption

Every combustion engine uses a normal, system-conditioned amount of lubricating oil. Engine oil is mainly used in the following areas:

- **Pistons with piston rings** (interaction with cylinder liners)/**valve-stem seals in the cylinder head** (lubricating oil used in the valve guide)

Minute amounts of engine oil stick to the cylinder walls during each piston stroke. Some of the engine oil is used during combustion and is expelled together with exhaust gases. The effect increases as engine speed increases. For this reason, high-speed engines and turbocharged engines tend to use more engine oil than low-speed engines.

- **Positive crankcase ventilation**

Positive crankcase ventilation carries oil spray (thoroughly atomised fuel) and feeds combustion air back in again. Here, the oil spray passes the oil separator, the main function of which is to filter the oil from the blow-by gases. Oil separation systems work best at a defined gas volume. Oil consumption can increase if the volume is different.

- **Turbocharger status**

Engine oil is supplied to the turbocharger's turbine shaft while the engine is running. During operation, varying amounts of oil get into the combustion gases, depending on the turbocharger status and the driver profile.

Causes of increased engine oil consumption

Complaints relating to excessively high oil consumption can generally be attributed to the following causes:

1 Customer's subjective opinion:

The customer's gut feeling is telling him/her that the oil consumption is too high, but the vehicle's actual oil consumption corresponds to technical requirements.

Porsche AG confirms that engine oil consumption of

up to 0.8 l per 1,000 km (US: up to 0.53 qt per 620 mls; UK: up to 0.44 qt per 620 mls) under normal conditions **does not indicate a technical fault.**

It is important to bear in mind here that new vehicles use more oil **in the first 10,000 km** (6,200 miles) than vehicles with engines that have already been run in as the components are "run in" during the first 10,000 kilometres/6,200 miles (even in modern engines). After 10,000 km/6,200 miles, oil consumption should level off to a lower level.

Other causes of increased engine oil consumption include:

- Sporty driving
- Frequent cold starts and frequent short journeys
- High engine load when pulling a trailer, long motorway journeys or driving over high mountain passes
- Poor fuel quality

2 Technical fault, which results in increased oil consumption or oil loss:

The customer notices that the oil consumption or oil loss is too high and this is caused by a technical fault on the engine or peripheral equipment.

If the customer **continually** finds that (even on a vehicle with a mileage of more than 10,000 km/6,200 miles) **oil consumption is more than 0.8 litres per 1,000 km (US: more than 0.84 qt per 620 mls; UK: more than 0.7 qt per 620 mls)**, the Porsche partner should examine the vehicle again.

3 Technical fault with the oil level display / oil level warning

If the driver sees a warning indicating that the oil level is too low despite having sufficient oil in the engine, this can be caused by a measurement error during oil level measurement or a system fault.

- **Incorrect measurement:** The system measures an excessively low oil level, which was influenced by the measurement environment (e.g. not waiting long enough after stopping the engine, inclined position of the vehicle, tyre inflation pressure is very different, vehicle's center of gravity is not consistent due to unbalanced load, etc.).
- **System fault:** The driver is incorrectly warned that the oil level is too low due to a hardware/software-related problem.

In the event of an incorrect measurement or system fault, it is not immediately possible for the customer to differentiate the difference from an actual 'low oil level' situation.

Information on displaying and measuring the engine oil level

Information: In the event of complaints relating to the oil level indicator or the warning messages “Oil level minimum reached” or “Oil level below minimum”, please provide the customer with the following information:

- To ensure safe driving and to protect the vehicle from damage due to excessively low oil levels, the oil levels in the system are continually updated and compared with the previous measured values in the electronic control system while driving: **Measuring the oil level while driving thus ensures a reliable measurement result.**
- If a warning message appears **while driving** due to the fact that the engine oil level is too low, the required amount of oil must be added as described in the Driver's Manual.
- If a warning message indicating that the oil level is too low appears **when the vehicle is stopped**, Porsche AG recommends that you **check the oil level while driving again in the instrument cluster after driving a distance of at least 50 km (30 miles)**. It is important to ensure that the engine is at operating temperature and an engine oil temperature of at least 90 °C/194 °F is displayed.

This information is summarised again in a **Driver's Manual Supplement**. The purpose of the Supplement is to inform the customer of the possibility of an **implausible oil level display or warning**, while at the same time providing an effective method of measuring the oil level. In the event of a complaint, please give the Driver's Manual Supplement – **“General information on displaying and measuring the engine oil level”** to your customer.

You will find the **Driver's Manual Supplement** for the Cayenne S and Cayenne Turbo (92A) as a PDF file in PIWIS > Information media >> TI Technical Information releases >>> Group 1, 1701 – General information on displaying and measuring the engine oil level.

Measuring oil consumption



Information

The oil consumption must only be measured under the following conditions:

- **Oil consumption** as per customer statement **0.5 l – 0.8 l / 1,000 km** (US: 0.53 – 0.84 qt/620 mls); **UK: 0.44 qt – 0.7 qt/620 mls)** and **vehicle mileage of more than 10,000 km / 6,200 miles**

or

- **Oil consumption** as per customer statement **more than 0.8 l / 1,000 km** (US: more than 0.84 qt/620 mls; **UK: more than 0.7 qt/620 mls)** – irrespective of vehicle mileage.

Tools and materials:

Clean oil collection container (capacity of at least 10 litres)

Oil measuring cup

Engine Oil Consumption Measurement Sheet (PIWIS Information System > Standard forms >> “Engine Oil Consumption Measurement Sheet” (PDF file)

Work
Procedure:

To measure engine oil consumption, complete the following steps one after the other:

- Check engine-oil level (on the instrument cluster and using PIWIS Tester II)
- Create vehicle analysis log (VAL)
- Drain engine oil and measure existing engine oil quantity
- Correct the engine-oil level
- Measure reference oil quantity
- Perform oil consumption test drive over 1,000 km/620 miles
- Drain engine oil and measure oil quantity
- Determine oil consumption
- Create vehicle analysis log (VAL)



Information

To document the

- reference oil quantity
- amount of oil added during the test drive
- amount of oil drained after the test drive

and to determine the **actual oil consumption**, use the “**Engine Oil Consumption Measurement Sheet**” (PIWIS Information System > Standard forms >> “Engine Oil consumption Measurement Sheet” (PDF file)).

Attach the measurement sheet to the related PQIS job.

1 Check engine-oil level.

1.1 Check engine-oil level on the multi-function display in the instrument cluster.

Dynamic measurement (= an oil level stored while driving is displayed).

1.1.1 Park the vehicle horizontally and on a level surface. Do not open the engine compartment lid because if you do, the dynamic oil level value will be deleted.

1.1.2 Switch off engine and ignition.

1.1.3 Switch on ignition; do not start engine.

1.1.4 Display the oil level on the multi-function display in the instrument cluster.

1.1.5 Document the oil level (in segments) in the corresponding field in the ⇒ “**Engine Oil Consumption Measurement Sheet**”.

1.2 **Check the engine-oil level** as described in ⇒ *Workshop Manual '170101 Checking engine-oil level using the PIWIS Tester' using the PIWIS Tester* and document the measured engine-oil level (in mm) in the corresponding field in the ⇒ “**Engine Oil Consumption Measurement Sheet**”.

2 Create vehicle analysis log (VAL) and attach it to the PQIS job.

3 Drain engine oil.

**Information**

When draining the engine oil, the engine and engine oil must have an operating temperature of at least 90°C (194°F).

The engine temperature and engine oil temperature can be read out of the DME control unit using the PIWIS Tester (DME control unit > 'Actual values/input signals' menu).

- 3.1 Drain engine oil into a **clean** container.
- 3.2 Remove oil filter; pour any remaining oil into the container.
- 3.3 Make sure that the oil pan and oil-filter housing drain completely (**allow to drain for 15 minutes**).
- 3.4 Allow oil in the container to **cool down to room temperature (approx. 20°C/68°F)**.
- 3.5 Measure the exact amount of oil collected using a measuring cup. .
- 3.6 Enter the amount of oil drained in the corresponding field in the ⇒ **"Engine Oil Consumption Measurement Sheet"** and evaluate it.

Determined oil quantity	Evaluation
less than 8.1 l (US: less than 8.5 qt/UK: less than 7.1 qt) = Oil level minimum reached	MIN warning message plausible
8.1 l – 9.5 l (US: 8.5 – 9.9 qt/UK: 7.1 – 8.4 qt) = Oil level OK	MIN warning message implausible
more than 9.6 l (US: more than 10.1 qt/UK: more than 8.5 qt) = Engine is overfilled	MIN warning message implausible

- 3.7 Dispose of engine oil and oil filter.
- 3.8 Install new oil filter.

4 Correct the engine-oil level.

- 4.1 At **room temperature (approx. 20°C/68°F)**, measure the exact amount of oil to be filled in - **9.0 l** (US: 9.5 qt; UK: 7.9 qt) - and pour it into the engine.
- 4.2 Perform a test drive to bring the **engine and engine oil** to an **operating temperature of at least 90°C/194°F**.
The engine temperature and engine oil temperature can be read out of the DME control unit using the PIWIS Tester (DME control unit > 'Actual values/input signals' menu).

5 Measure reference oil quantity.



Information

When draining the engine oil, the engine and engine oil must have an operating temperature of at least 90°C (194°F).

The engine temperature and engine oil temperature can be read out of the DME control unit using the PIWIS Tester (DME control unit > 'Actual values/input signals' menu).

- 5.1 Drain engine oil into a **clean** container. Make sure that the oil pan drains completely (**allow to drain for 15 minutes**).
- 5.2 Allow oil in the container to cool down to **room temperature (approx. 20°C / 68°F)**.
- 5.3 Measure the exact amount of oil collected (= **reference oil quantity**) using a measuring cup and enter it in the corresponding field in the ⇒ **"Engine Oil Consumption Measurement Sheet"**.
- 5.4 Pour amount of oil collected back into the engine.

6 Oil consumption test drive by the customer.

- 6.1 Before starting the oil consumption test drive, read off the vehicle mileage and document it in the corresponding field in the ⇒ **"Engine Oil Consumption Measurement Sheet"**.
- 6.2 Inform the customer that he/she should check the following during the test drive (approx. 1,000 km/620 miles):
 - Are relevant warning messages relating to the oil level displayed? If yes, which warning message?
 - When and how often were warning messages displayed?
 - If a warning message is displayed: Do not add oil.
 - If a warning message is displayed continuously/permanently, inform the workshop immediately and make an appointment.
 - Otherwise, arrange an appointment with the workshop after driving the vehicle approx. 1,000 km/620 miles.
- 6.3 After the oil consumption test drive, complete the following steps:

7 Check engine-oil level.

7.1 Check engine-oil level on the multi-function display in the instrument cluster.

Dynamic measurement (= an oil level stored while driving is displayed).

- 7.1.1 Park the vehicle horizontally and on a level surface. Do not open the engine compartment lid because if you do, the dynamic oil level value will be deleted.
- 7.1.2 Switch off engine and ignition.
- 7.1.3 Switch on ignition; do not start engine.

- 7.1.4 Display the oil level on the multi-function display in the instrument cluster.
 - 7.1.5 Document the oil level (in segments) in the corresponding field in the ⇒ **“Engine Oil Consumption Measurement Sheet”**.
 - 7.2 **Check the engine-oil level** as described in ⇒ *Workshop Manual '170101 Checking engine-oil level using the PIWIS Tester'* **using the PIWIS Tester** and document the measured engine-oil level (in mm) in the corresponding field in the ⇒ **“Engine Oil Consumption Measurement Sheet”**.
- 8 **Determine oil consumption.**
- 8.1 Drain engine oil into a **clean** container. Make sure that the oil pan drains completely (**allow to drain for 15 minutes**).
 - 8.2 Allow oil in the container to cool down to room temperature (approx. 20°C/68°F).
 - 8.3 Measure the exact amount of oil collected using a measuring cup and document it in the corresponding field in the ⇒ **“Engine Oil Consumption Measurement Sheet”**.
 - 8.4 Pour amount of oil collected back into the engine.
 - 8.5 Measure and document the actual engine oil consumption based on
 - reference oil quantity
 - amount of oil added during the test drive
 - distance driven during the test drive
 - amount of oil drained after the test drive

in accordance with the specifications in the ⇒ **“Engine Oil Consumption Measurement Sheet”**.
 - 8.6 Attach the Engine Oil Consumption Measurement Sheet to the PQIS job.
- 9 **Create vehicle analysis log (VAL)** and attach it to the PQIS job.

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