

**Requirements for Verifying  
 Usability of Chain Lubricants  
 Version 2 – June 2016**

1.	Basics	
	Basic requirements for awarding the environmental label RAL-UZ 178, Para .3.6.3	Dated July 2014
	Criteria for awarding the EU environmental label, criterion 6b	Dated June 2011
2.	Test criteria	Test methods
2.1	Viscosity / density	
	Kinematic viscosity at 40°C and 100°C	DIN 51562
	Viscosity index VI	DIN ISO 2209
	Density at 15°C	DIN EN ISO 12158
	Requirements:	Tolerance limits are not defined
2.2	Flash point	
	Requirements	> 200°C DIN 2592
2.3	Cold temperature flow characteristics	
	Laboratory test; cold and warm intervals according to DIN ISO 23016	KWF- Method Appendix 1
	Requirements	Flow time < 15 sec
2.4	Ageing resistance	
	Laboratory test; 1000 h-storage at 80°C	KWF-Method Appendix 2
	Requirements	Flow time < 15 sec
2.5	Lubrication characteristics	
	Laboratory test; test stand: evaluation of the lubrication characteristics of chainsaw lubricants	ISO/TS 19858:2015-08-15
	Requirements	Overall chain extension: < 2 mm Wear (depth) of the guide bar: < 1.5 mm Surface temperature after 180 minutes: < 80 °C
2.6	Phase separation	
	Field and laboratory test; low temperature test	KWF-Method Appendix 3
	Requirements	No visible formation of phases, colour mixing, flakes and deposits
2.7	Contact materials	
	Field test	KWF – Method Appendix 4
	Requirements	No colour alteration when applied to surface, material alteration, rust formation on coated surfaces, plastic, rubber and metal surfaces
2.8	Staining clothes	
	Field and laboratory test	KWF- Method Appendix 5

	Requirements	No bonding of cut protection materials by lubricant splashes
2.9	Chainsaw soiling	
	Field and laboratory test	KWF- Method Appendix 6
	Requirements	No permanent stains on the engine unit and cutting equipment after a three-day period
2.10	Odour development	
	Field and laboratory test	KWF- Method Appendix 7
	Requirements	Fresh oil and oil aerosols without objectionable (pungent, irritating, obnoxious) odours
2.11	Labelling	
	Field test and visual inspection	KWF- Method Appendix 8
	Requirements	Easy-to-read instructions for using the product and expiry date
3	Test results	
	<p>Once the product has fulfilled each individual criterion, the applicant will receive confirmation of compliance with the requirements for the basic criteria listed under item 2.</p> <p>Retests are possible should the product fail to fulfil one or more criteria. The scope of the retests will be decided by the test centre, depending on the degree of deviation from the target value.</p> <p>The legitimacy of the test confirmation is bound to the validity period of the environmental label awarding principles.</p>	

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### Appendix 1: Cold temperature flow characteristics

#### Laboratory test

##### Test equipment

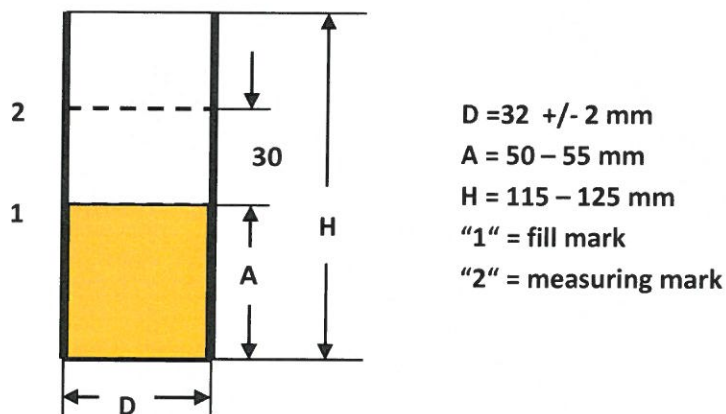
- Cold chamber, adjustable to  $-30^{\circ}\text{C}$  (243 K)
- 3 Pourpoint vessels with marked as indicated (sketch)
- Thermometer
- Stopwatch

##### Methods

The cleaned Pourpoint vessels are filled to line 1 with the test liquid and placed without a lid into a cold chamber set to  $-9^{\circ}\text{C}$  (264 K) for 100 h. Flow time is measured immediately after removal. The cold phase is followed by a 48-hour warming period at  $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ . This cycle is repeated at  $-12^{\circ}\text{C}$  (261 K) and  $-15^{\circ}\text{C}$  (258 K).

##### Measurement / requirements

Immediately after the cold phase, the Pourpoint vessels are tipped from vertical to horizontal and the time measured for the liquid to reach line 2. Flow time at  $-15^{\circ}\text{C}$  must not exceed the initial flow time ( $T_0$ ) by more than 15 s ( $t < 15 \text{ sec} + T_0$ ).



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### Appendix 2: Ageing resistance

#### Laboratory test

##### Test equipment

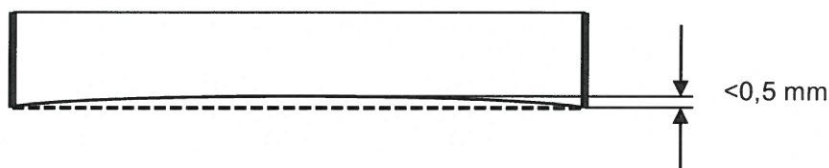
- Heat chamber: Temperature range 50°C – 120°C (323 – 373 K)
- 3 Petri dishes  $\varnothing 90 \pm 3$  mm, with marked as indicated (sketch)
- Rack inclined at 25°
- Stopwatch
- Laboratory scales with readability  $d = 0.1$  g

##### Methods

The curvature of the bases of three Petri dishes are measured and marked permanently according to sketch 2. The acceptable curvature may not exceed 0.5 mm (see sketch 1).

Petri dishes must be cleaned thoroughly before filling. Fill dishes with  $6 \pm 0.2$  g of the test liquid.

Place filled petri dishes without lid into a heat chamber set to 80°C without air circulation.

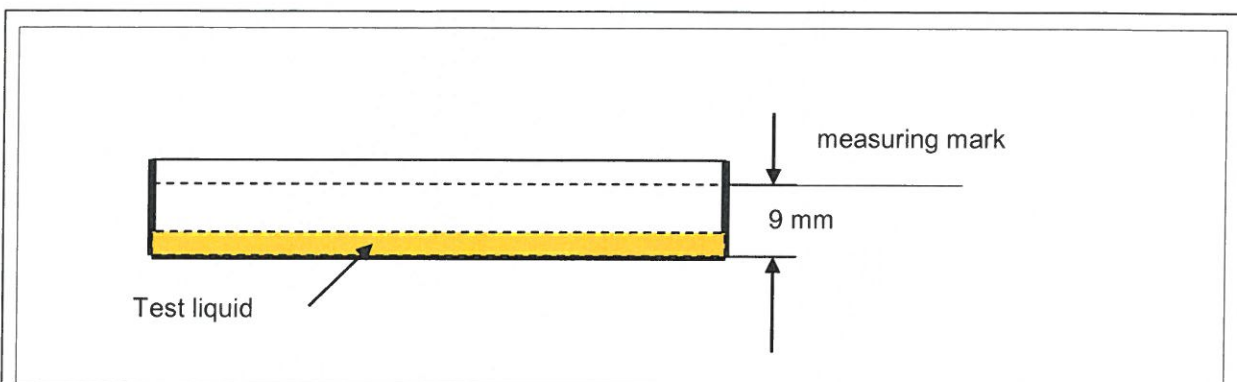


Sketch 1

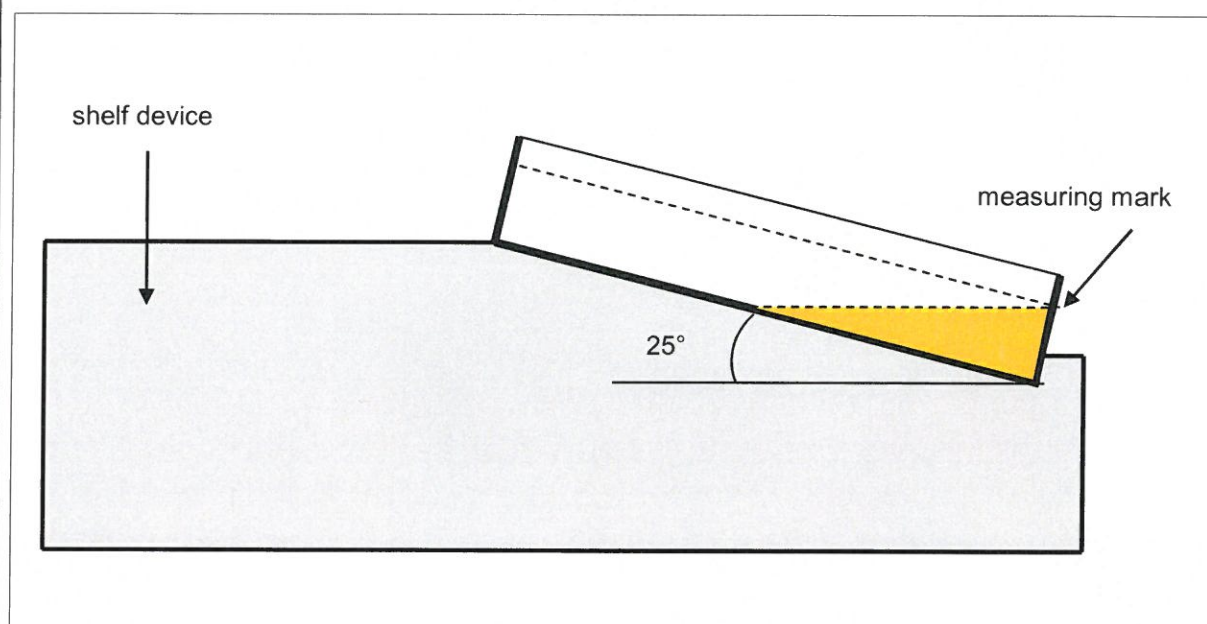
##### Measurement / requirements

The petri dishes are removed after a time interval of 200 hours and left to cool to room temperature (20°C  $\pm$  2°C). Now the flow time is measured by placing the dishes onto a rack inclined at 25° (see sketch 3).

The time is measured for the test liquid to reach the measuring point on the lateral surface of the petri dish. Flow time after 1000 hours warm storage must not exceed initial flow time ( $T_0$ ) by more than 15 s ( $t < 15 \text{ sec} + T_0$ ).



Sketch 2



Sketch 3

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**Appendix 3: Phase separation**

**Laboratory test**

**Equipment**

- Test tube  $\varnothing 12 \pm 2$  mm
- Rack

**Method**

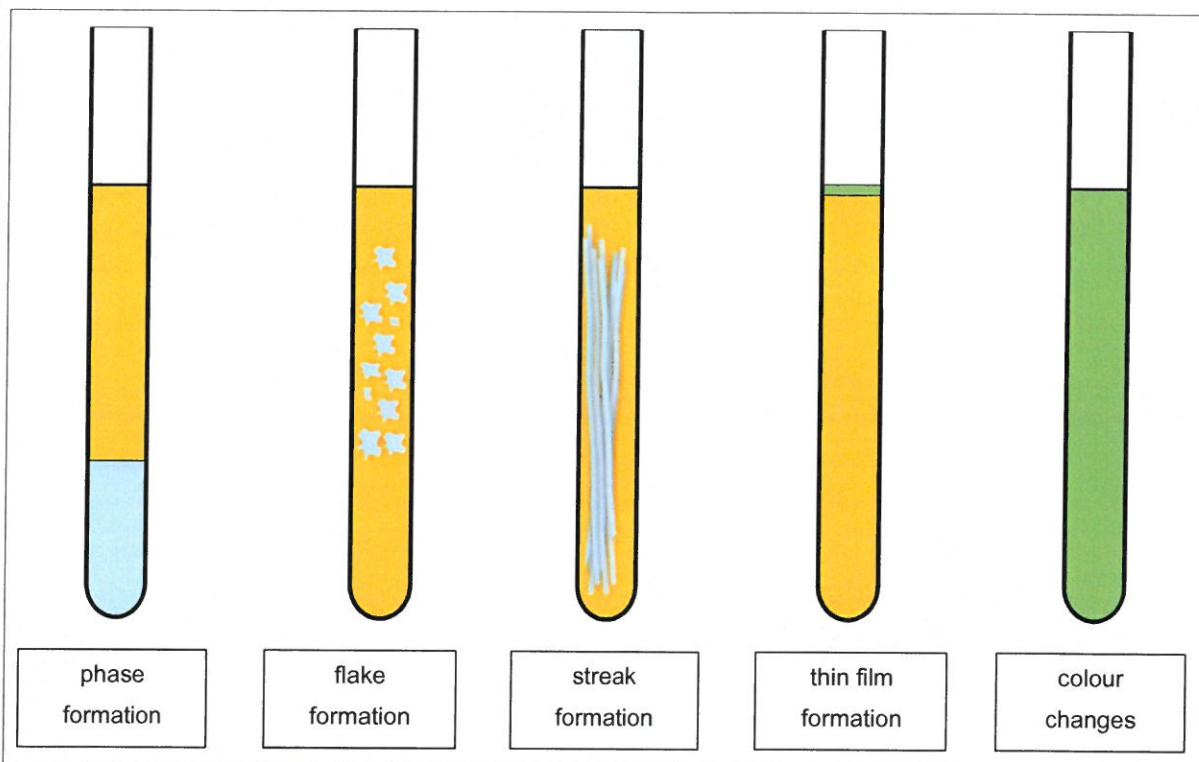
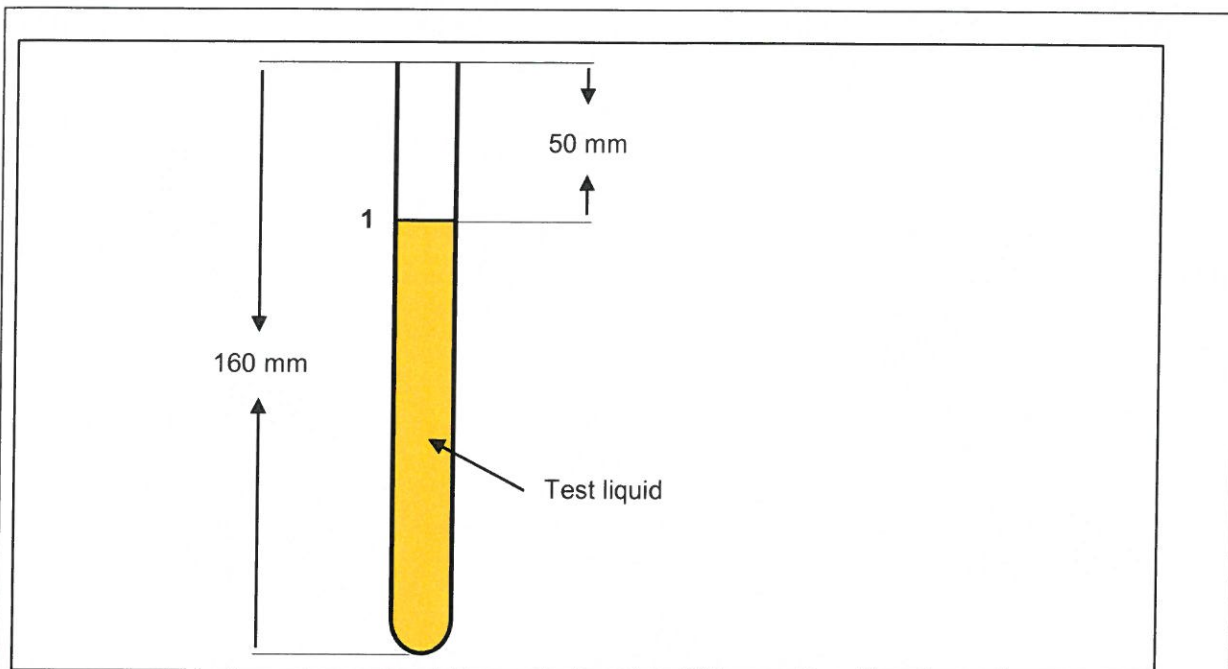
The test tube is filled to mark 1 with the test liquid and stored in the dark at room temperature without a lid. The visual inspection follows after an interval of 500 and 1000 hours.

**Measurement / requirements**

The following criteria are examined during visual inspection:

- phase formation
- irreversible phases (two or more phases that cannot be mixed again)
- flake formation
- streak formation
- thin film on surface
- colour changes

Following a test period of 1000 hours, the liquid should not show any visible signs of change.



#### Cold test

The test liquid is also checked for signs of phase separation during the low temperature flow characteristics test (*appendix 1*). The same criteria are assessed as in the laboratory test (see above). The liquid should not show any visible signs of change.

**Field test**

Two forestry operations centres are supplied with 20 l of the test liquid for field-testing. The liquid is examined visually for signs of phase separation during tank filling. The field test assesses the same criteria as the laboratory test (see above). The liquid should not show any visible signs of change.



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**Appendix 4: Contact materials**

**Field test**

**Methods**

Two forest operations centres receive 20 l test liquid for field-testing. During the test period the chainsaws are cleaned and maintained according to manufacturer's instructions at the prescribed intervals.

**Measurement / requirements**

The contact materials are visually inspected during cleaning and maintenance of the chainsaw. The following criteria are examined:

- Signs of changes of colour and material on:
  - o coated surfaces
  - o plastic parts
  - o rubber parts
  - o metal components
- corrosion of metal components
- gumming of contact materials

There should be no signs of visible changes.

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**Appendix 5: Effect on clothes**

**Laboratory test**

**Test equipment**

- Standard cut protection sample

**Methods**

The outer layer of the standard cut protection sample is removed to expose the cut protection material (DIN EN 381-1 : 1993). 5 ml of the test liquid are applied to the upper cut protection material layer. The treated sample is stored openly at room temperature ( $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ).

**Measurement / requirements**

The treated cut protection material must not show any signs of gumming.

**Field test**

**Equipment**

- Washing machine
- All-purpose laundry detergent

**Method**

Two forestry operations centres are supplied with 20 litres of the test liquid for the field test. After a test period of two weeks, the soiled clothing is washed at a maximum temperature of  $60^{\circ}\text{C}$  in a household washing machine using an all-purpose laundry detergent. If possible, avoid spinning the laundry.

**Measurements / requirements**

Work garments should be clean after washing without visible permanent stains.

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**Appendix 6: Chainsaw soiling**

**Laboratory test**

**Test equipment**

- Test stand for evaluating the lubricating characteristics of saw chain lubricants
- Ultrasonic bath

**Methods**

The soiling of the cutting equipment is tested using a test stand for evaluating the lubricating characteristics of saw chain lubricants. The requirements for this test method are described in detail under test criterion 2.5 Lubricating characteristics in the norm ISO/TS 19858.

**Measurement / requirements**

At the end of each test run, the cutting equipment is examined and photographed to ascertain the degree of soiling. The high temperatures achieved during the test runs may cause scorching of the cutting equipment coating and insoluble lubricant stains. This soiling is especially prevalent near the chain guide and the tip of the bar. To evaluate this test criterion it is necessary to cleanse the cutting equipment in an ultrasonic bath to remove loose residues after each test run.

**Practical test**

**Equipment**

- Household detergent
- Warm water (50-60°C)
- Scrubbing brush/ paintbrush

**Method**

The chain lubricant is tested under field conditions. The soiled chainsaw is then stored for three days. Following this period, the cutting equipment and the chainwheel cover are removed. The soiled parts of the engine unit, chainwheel cover and cutting equipment are cleaned with a scrubbing brush or paintbrush and a mixture of household detergent and water.

**Measurements / requirements**

After three days of non-use and subsequent thorough cleaning, there should not be any signs of permanent staining on engine unit, chainwheel cover and cutting equipment.

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**Appendix 7: Odour development**

**Laboratory test**

**Test equipment**

- Test stand for evaluating the lubricating characteristics of saw chain lubricants

**Methods**

Odour development of the lubricant during operation is assessed using a test stand for evaluating the lubricating characteristics of saw chain lubricants. The requirements for this test method are described in detail under Test criterion 2.5 Lubricating characteristics in the ISO-method.

**Measurement / requirements**

Odour development of the chain lubricant is assessed during the test runs. There should be no indication of objectionable (pungent, irritating, obnoxious) odours emanating from the fresh oil and oil aerosols.

**Field test**

**Method**

Two forestry operation centres are supplied with 20 litres of the test liquid for field-testing. Odour development is assessed during the filling of the tanks as well as during operation.

**Measurements / requirements**

There should be no indication of objectionable (pungent, irritating, obnoxious) odours during filling and chainsaw operation.

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**Appendix 8: Labelling**

**Laboratory test**

The labelling of the product is assessed by visual inspection. The following criteria must be fulfilled:

- Product must be labelled as chainsaw lubricant
- The product shelf life must be visibly indicated on the label (production or expiry date)
- Instructions for use

**Field test**

An additional assessment of readability and durability of the label is carried out under working conditions in the forest. The label must retain readability and remain fixed to the container even during wet weather conditions.