Requirements for Verifying Usability of Chain Lubricants
Version 2017

1.	Basics		
	Basic requirements for awarding the environmental label RAL-UZ 178, Para .3.6.3		Dated July 2014
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 s at -15°C < 15 s at -10°C only applies to water-based products *) *) Only permitted if every container provides information specifically describing the lower cold stability of the product.	
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: < 85 °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 lubricant and its fumes do not produce obnoxious (acrid, pungent, intolerable) smells	
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		
	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. 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. The legitimacy of the test confirmation is bound to the validity period of the environmental label awarding principles.		

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Appendix 1: Cold temperature flow characteristics

Laboratory test

Test equipment

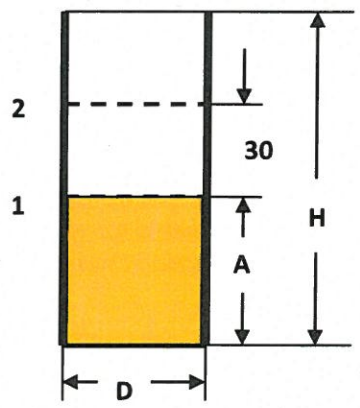
- Cold chamber, adjustable to -30°C (243 K)
- 3 Pourpoint vessels with marked as indicated (sketch)
- Thermometer
- Stopwatch

Method

The cleaned Pourpoint vessels are filled with the test liquid to mark 1 and placed without a lid in a cold chamber set to –15°C for 100 hours. After this period the flow time is measured immediately after removal. *)In the case of water based products the minimal requirements can be reduced to -10°C, if every container provides information specifically describing the lower cold stability of the product.

Measurement/requirement

immediately following the cold phase, the Pourpoint vessels are tipped from the vertical to the horizontal and the time recorded for the liquid to reach mark 2. The flow time at -15°C [*) -10°C] must not exceed 15 s over the initial flow time (T_0) ($t < 15$ sec + T_0).



D =32 +/- 2 mm
A = 50 – 55 mm
H = 115 – 125 mm
"1" = fill mark
"2" = measuring mark

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Appendix 2: Ageing resistance

Laboratory test

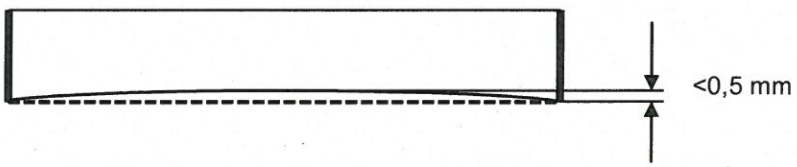
Test equipment

- Heat chamber: Temperature range 50°C – 120°C (323 – 373 K)
- 3 Petri dishes Ø 90 ± 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 ± 0.2 g of the test liquid.

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

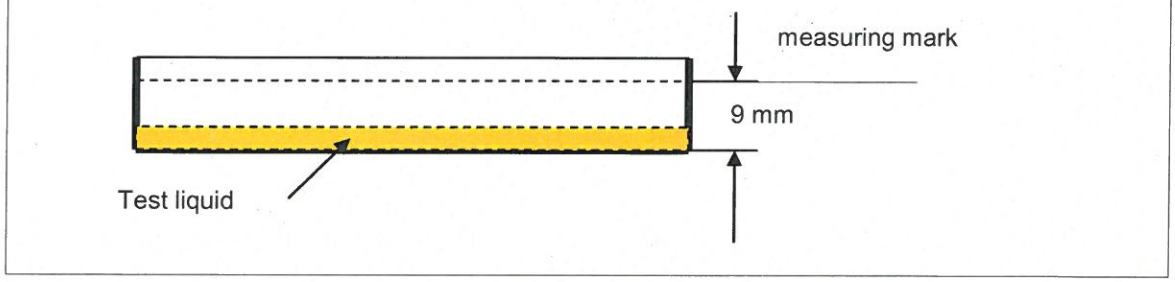


Sketch 1

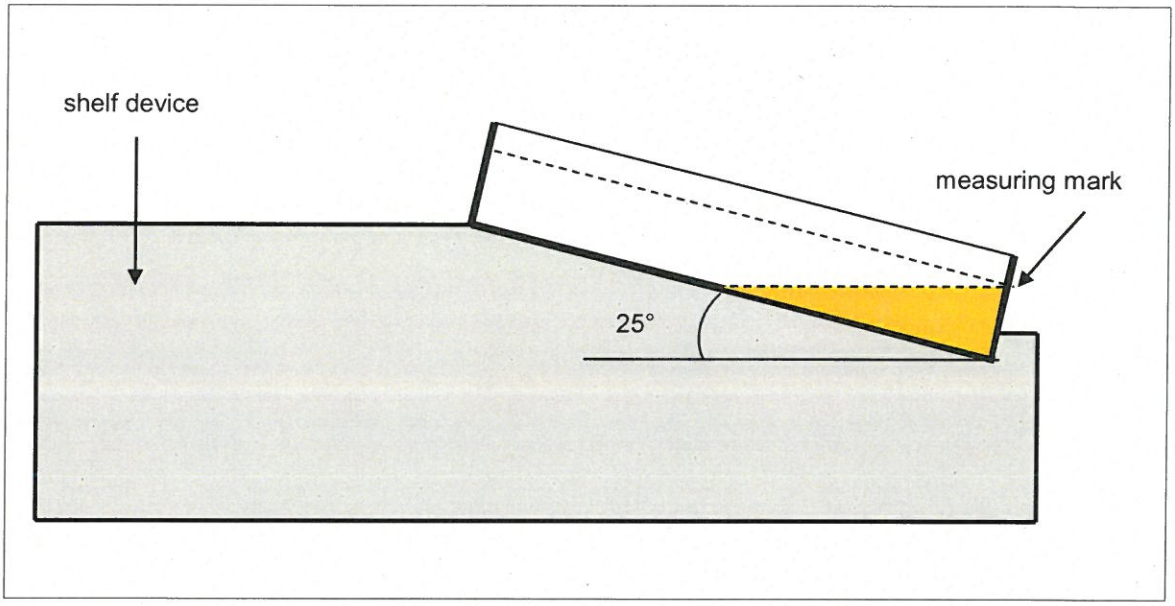
Measurement / requirements

The petri dishes are removed after a time interval of 200 hours and left to cool to room temperature (20°C +/- 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

This test method is applicable for all liquids where temperature related evaporation losses during the ageing period do not result in a separation of the active components. In this case, a comparable test method must be used to simulate the ageing process more realistically. A useful test in this case would be to compare chain braking times.

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Appendix 3: Phase separation

Laboratory test

Equipment

- Test tube Ø 12 ± 2 mm
- Rack

Method

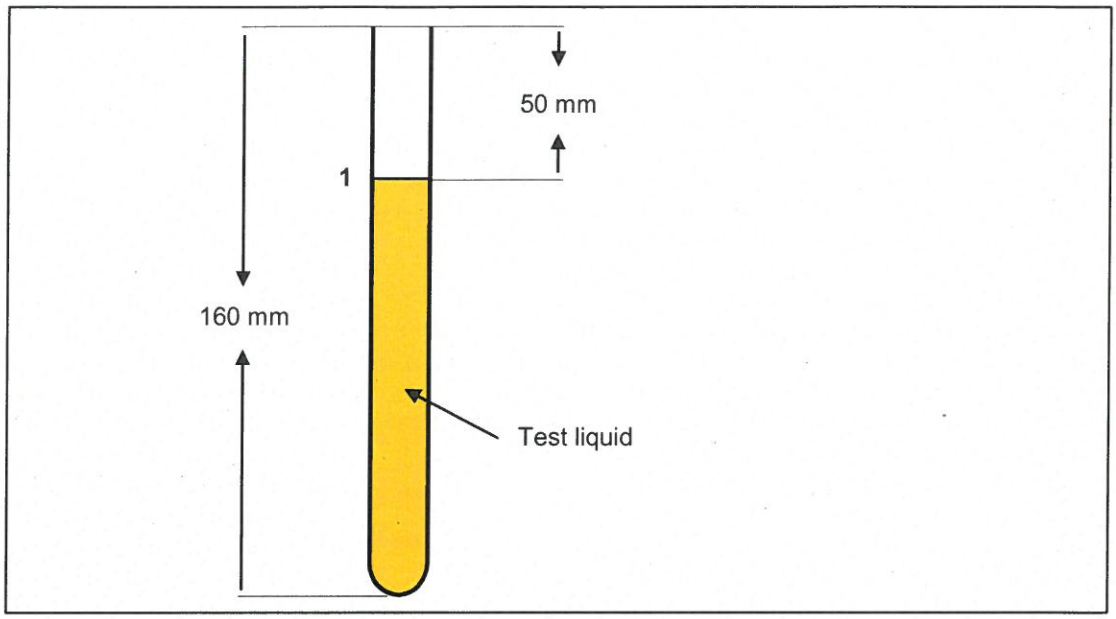
The test tube is filled to mark 1 with the test liquid and stored in the dark at room temperature without a lid. The visual inspection follows after an interval of 500 and 1000 hours.

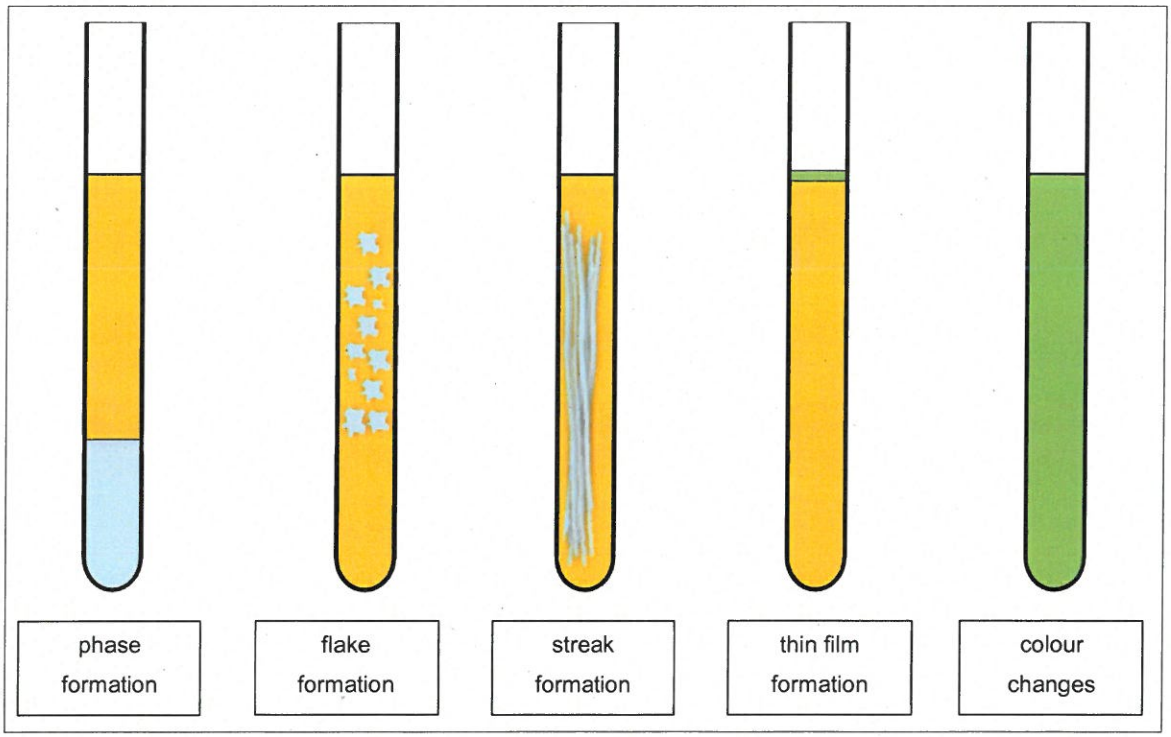
Measurement / requirements

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:
  - coated surfaces
  - plastic parts
  - rubber parts
  - 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°C ± 2°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°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.