

ECOCOOL

GLOBAL 10
Future Proved



LUBRICANTS.
TECHNOLOGY.
PEOPLE.



LUBRICANTS. TECHNOLOGY. PEOPLE.

In close contact with its customers, FUCHS develops holistic, innovative and custom-made solutions for the most diverse applications.

As a lubricant manufacturer, FUCHS stands for performance and sustainability, for safety and reliability, for efficiency and cost savings.

FUCHS stands for a promise: technology that pays back.



Facts and figures

Company: FUCHS LUBRICANTS (UK) plc, part of the FUCHS Group, based in Hanley, Stoke on Trent, England.

Certifications: ISO 9001, ISO/TS 16949, ISO 14001, ISO 50001, OHSAS 18001, AS 9100

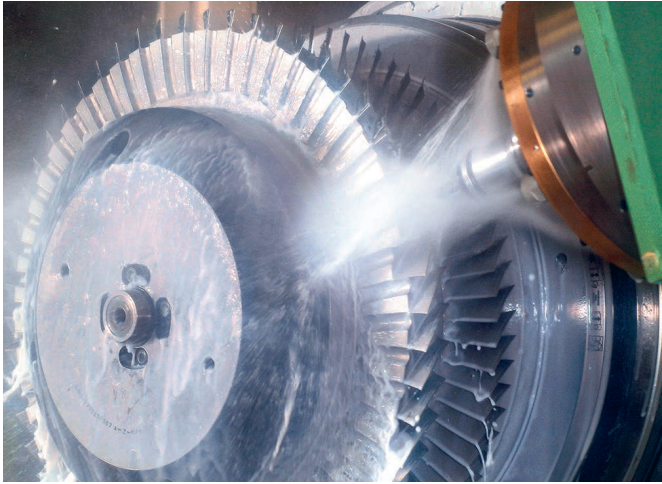
FUCHS is a global Group with German roots that has developed, produced and sold lubricants and related specialties for more than 85 years – for virtually all areas of application and sectors. With 57 companies and 5,000 employees worldwide, the FUCHS Group is the leading independent supplier of lubricants.

Across the UK, a team of more than 300 specialists works to guarantee the satisfaction of our customers. Whatever their requirements, FUCHS has the ideal lubricant for their specific applications and processes. In our technology centre we link interdisciplinary expertise in a quick and efficient way – and work on innovative lubricant solutions to meet the demands of today and tomorrow every single day.

Today, a modern cooling lubricant or metal forming lubricant is subjected to a variety of demands. Cooling lubricants for metalworking must be effective, economical and free from ingredients that are harmful to health and the environment. In the process chains that follow metalworking, customized cleaning agent solutions and process-compatible and reliable corrosion preventatives play a decisive role when it comes to production reliability and product quality. FUCHS not only boasts an excellent range of highly effective lubricants, but also possesses the process expertise needed to ideally meet the specific requirements in the field of metalworking.

GLOBAL PLATFORM

ECOCOOL GLOBAL 10, the new benchmark in cutting fluids.



Global requirement.

Metal working fluids are used throughout the machining industry for their cooling, lubricating, and corrosion resistant properties. Such fluids are typically made of complex mixtures of oils, detergents, surfactants, biocides, lubricants, anti-corrosion agents, and other ingredients.

High performance metal working fluids are essential for the metal machining industry. Growing global production is increasingly affected by national chemical registries, legislation and labeling requirements.



ECOCOOL GLOBAL 10

In response to these changing market demands FUCHS developed a novel chemical approach for a new generation of machining fluids.

ECOCOOL GLOBAL 10 is the culmination of many years of intensive research.

Approvals listed by company

FUCHS works with aircraft manufacturers, their tier-1 suppliers and material test labs to approve products against the latest specifications.

Company	Coolants	Specification No.
AIRBUS	ECOCOOL 7000	-
	ECOCOOL S 761 B	ABR 9-0204
	ECOCOOL SCIP	-
	RATAK 2324 GM	-
	SYNTOCOOL 240+	TNNT2-405-282-A0
AVIO GROUP	ECOCUT 10 G	-
	ECOCUT FE	-
	PLANTOCUT 10 SR/I	-
BAE SYSTEMS	ECOCOOL 7000	-
	ECOCOOL AERO 200	-
	ECOCOOL SCIP	-
	ECOCOOL SLF	-
BELL HELICOPTER	ECOCOOL 7830 / 7830 B	LTP 1042
	ECOCOOL S 761 B	LTP 1042
BOEING	ECOCOOL AERO 150	BAC 5008
	ECOCOOL S 761 B	BAC 5008
	ECOCUT MIKRO PLUS 20	BAC 5008
	ECOCUT MIKRO PLUS 82	BAC 5008
BOMBARDIER	ECOCOOL GLOBAL 10	BAMS 569-001 CLASS A,C,D
	ECOCOOL PHH-AL-4	BAMS 569-001 CLASS A,C,D
	ECOCOOL S 761 B	BAMS 569-001 CLASS A,C,D
	ECOCOOL 7830 B	BAMS 569-001 CLASS A,C,D
	ECOCOOL SYN 2175	BAMS 569-001 CLASS A,C,D
EMBRAER	ECOCUT MIKRO PLUS 20	MEP 08.028
LOCKHEED MARTIN	ECOCOOL S 761 B	EMAP G 34.62
	ECOCOOL S PT 45 AVQ	-
LUFTHANSA TECHNIK	ECOCOOL PHH-AL	HAM TQ/M 2011 607
MTU AERO ENGINES	ECOCOOL TN 2525-HP BFH	MTH 1108
	ECOCUT 1520	MTH 642
PRATT & WHITNEY	ECOCOOL 7830	PMC 9363
	ECOCOOL S 761	PMC 9364
	ECOCOOL S 761 B	PMC 9364
	ECOCUT 622 XAM	PMC 9259
	ECOCUT EMC 517	CPMC 79209
	ECOCUT VX-1	PMC 9239

Company	Coolants	Specification No.
ROLLS-ROYCE	ECOCOOL 0050	CSS 200
	ECOCOOL EP HS (IT/Taiwan)	CSS 200
	ECOCOOL S 761 B	CSS 129, CSS 131
	ECOCOOL S CO 5	CSS 220
	ECOCOOL TN 2525 BFH - RR	CSS 220
	ECOCUT EMC 517	CSS 200
	SYNTHACENT	CSS 202
	SYNTHACENT 130	CSS 220
SAFRAN AIRCRAFT ENGINES	ECOCOOL MG 90 BF+	D-261113-09998-012138-0
	ECOCOOL PHH-AL	455-201-0-00
	MAXICOOL 145+	455-201-0-00 indice B
SAFRAN LANDING SYSTEMS	ECOCOOL 700 NBF (M)	PCS-4001
	ECOCOOL 7330	PCS-4001
	ECOCOOL EM-E	IFC 30-850-02MD – éd3.
	ECOCOOL MC-E	IFC 30-850-02MD – éd3.
	ECOCOOL PHH-AL	IFC 30-850-02MD – éd3.
	ECOCOOL R-TN 2525 HP-RR	Doc. 455-201-0-00 indice B
	MAXICOOL 145+	YQLL/11221
	ECOCOOL GLOBAL 10	PCS 4001 indice A
ECOCOOL S 761 B	PCS 4001 indice A	

Industry Performance Tests

Scope

A series of intensive tests was conducted by a network of independent laboratories to demonstrate the unique performance characteristics of ECOCOOL GLOBAL 10. Listed below are some results.

Milling performance test

Machining performance is tested by measuring wear when milling titanium under controlled conditions. Products that perform well in this test increase tool life, improve surface quality, reduce scrap, and increase production speeds through higher metal removal rates.

Test method

A vertical CNC mill is filled with an emulsion mixed at 9 % concentration. Test blocks of Ti-6Al-4V are milled in sequential cuts using a 10 mm solid carbide end mill from a major tooling manufacturer.

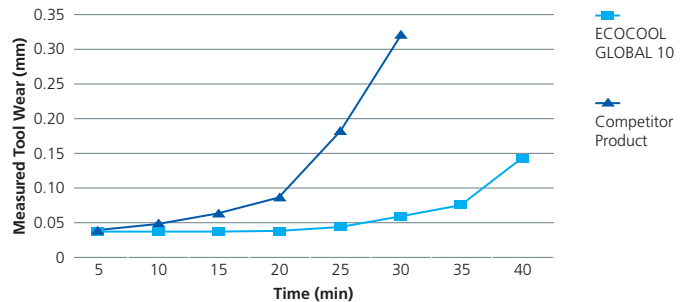
The following parameters are used:

Spindle speed: 3193 RPM
 Feed rate: 1019 mm/min
 Depth of cut: 3 mm
 Width of cut: 3 mm

Flank wear is measured every 5 min. The results are compared against a leading aerospace industry product.

Test result

ECOCOOL GLOBAL 10 provided longer tool life than a leading aerospace industry product.



Friction simulator

Lubricating characteristics are evaluated by measuring the torque required to tap metal substrates. When a low amount of torque is needed, less friction is generated between the metal and the tool. Products that perform well in this test generate lower-5,9 torque values and

protect tools against wear better than those that generate higher values. As a result, superior performing products increase tool life, improve surface quality, reduce scrap, and increase production speeds through higher metal removal rates.

Test method

A sample of emulsion at relevant concentration is applied to pre-drilled 6 mm diameter holes in Ti-6Al-4V material with a thickness of 14 mm. The holes are tapped using a microtap apparatus that measures the torque throughout the tapping operation.

The results are compared against a leading aerospace industry product.

Test result

Metal, emulsion concentration	Mean torque (N*cm)	
	ECOCOOL GLOBAL 10	Competitor
6061 Aluminium, 10%	181	197
Ti-6Al-4V, 20%	176	191



Sump life simulation

Tolerance to microbial contamination is tested by inoculating freshly prepared emulsions with microbial suspensions. Products that perform well in this test are likely to maintain their pH and emulsion stability over long drain intervals, are easy to maintain, and require minimal use of tankside additives.

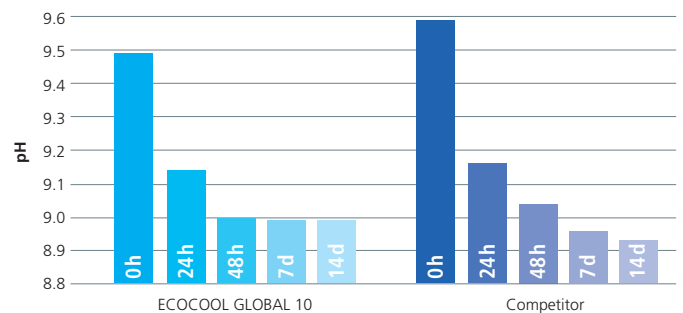
Test method

Samples of 5 % emulsions using tap water are contaminated with a single inoculation of microbial suspension then incubated at $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ throughout the 14 day test.

The pH is recorded at the start, and after 1, 2, 7 and 14 days and benchmarked against a control product.

Test result

ECOCOOL GLOBAL 10 maintained it's original pH better than a leading aerospace industry product.



Skin compatibility test

Skin compatibility is tested by applying a sample to a group of human test subjects with healthy skin aged 24 to 52 years of age. For the duration of the test, the subjects refrain from using substances and creams with active cleansing ingredients on the test areas. Products that perform well

in this test are likely to be non-irritating to the skin of production workers who come into contact with the emulsion.

Test method

A 100 µl sample of 10 % emulsion is applied to the forearm using an aluminum chamber and compared to controls of water (non-irritating) and sodium dodecylsulfate (irritating) after 24 hrs of exposure over 8 days.

Test result

ECOCOOL GLOBAL 10 (10%) is designated as "not irritating".

The test area is then observed for appearance, chromametry, and transepidermal water loss and graded from not irritating to strongly irritating.



Industry Performance Tests

Foaming characteristics simulation

The ability to control foam is tested by circulating the fluid at a high turn-over rate. Products that perform well in this test are likely to remain low foaming when mixed in low hardness water and used in high pressure through-the-tool fluid delivery systems as well as other high turn-over, high agitation systems.

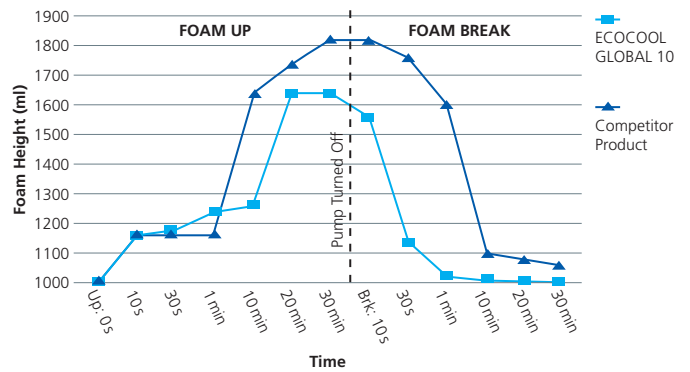
Test method

A 1000ml sample of a 7 % emulsion is prepared using de-ionized water (0ppm as CaCO₃) and added to the bottom of a water-jacketed graduated 2000ml test cylinder. Using a centrifugal pump drawing from the bottom of the cylinder, the fluid is circulated at a rate of 250l/hr (1.1 gal/min) and cascaded back upon itself from a height of 390 mm above the 1000 ml mark.

The total volume of foam + fluid is recorded at 10s, 1 min, 10 min, 20 min and 30 min after starting the pump to record "foam up", and at the same time intervals after the pump is turned off for "foam break".

Test result

ECOCOOL GLOBAL 10 shows lower foaming characteristics than a leading aerospace industry product.



Hard water emulsion stability test

The tolerance to build-up of calcium and other minerals from source water and machined alloys is tested at 3 levels of water hardness. Products that perform well in this test are less likely to exhibit coarsening of the emulsion leading to instability and residue formation on machine surfaces and parts.

Test method

Samples of 7 % emulsions are made in graduated neck flasks and left to stand. Appearance and emulsion separation are observed after 24 hrs. (Pass ≤ 0.1 ml separation).

Test result

De-ionized water (0ppm as CaCO ₃)	Soft water (40ppm as CaCO ₃)	Hard water (400ppm as CaCO ₃)
PASS Tight milky emulsion with no separation	PASS Tight milky emulsion with no separation	PASS Tight milky emulsion with no separation

Stain test

The potential to stain metals is tested at 3 levels of water hardness. Products that perform well in this test are less likely to cause staining or discoloration of machined components requiring subsequent re-work and cleaning.

Test method

Relevant metal specimens are abraded with P240 emery paper under running water until free of signs of marking. They are subsequently degreased, dried and partially immersed in samples of 7 % emulsions at relevant water hardness.

After 24 hrs, the staining is graded as no stain or from 1A (mild) to 4C (strong).

Test result

Metal	De-ionized water (0ppm as CaCO ₃)	Soft water (40ppm as CaCO ₃)	Hard water (400ppm as CaCO ₃)
7000 Series Aluminium	No Staining	No Staining	No Staining
2000 Series Aluminium	No Staining	No Staining	No Staining
Titanium	No Staining	No Staining	No Staining
Low Carbon Steel	No Staining	No Staining	No Staining
99.9% Copper	1A	1A	1A

Corrosion test

Corrosion protection is tested by combining metal substrates with millings of similar and dissimilar metals. Products that perform well in this test are less likely to exhibit corrosion on machined parts and machine surfaces.

Test method

Relevant metal specimens are abraded with P240 emery paper under running water until free of signs of marking. They are subsequently degreased and dried. 2g mounds of relevant millings (chips) are applied to the surface and 5ml of 7 % emulsion at relevant water hardness applied to the mound.

After 24 hrs, the appearance of specimens are graded according to the following key:

- A = No. of corrosion pits
- B = area of stain (0 = nil, 5 = 75+ %)
- C = intensity of stain (0 = nil, 4 = surface damage)

Rating of 0 & 1 denote minimal or no effect on metal surfaces.

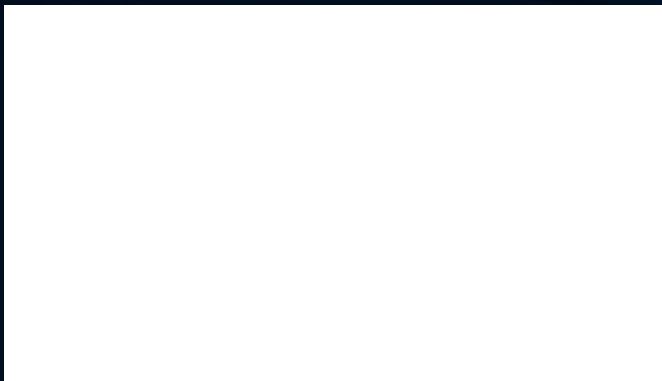
Test result

Metal	Soft water (40ppm as CaCO ₃) [A/B-C]	Hard water (400ppm as CaCO ₃) [A/B-C]
2000 AL + 2000 AL Millings	0/0-0	0/0-0
7000 AL + 2000 AL Millings	0/0-0	0/0-0
Cast Iron + 2000 AL Millings	0/1-1	0/0-0
Cast Iron + Copper Millings	0/1-1	0/0-1
Cast Iron + Low Carbon Steel Millings	0/1-1	0/0-1
7000 AL + No Millings	0/1-1	0/0-0
2000 AL + No Millings	0/0-0	0/0-0


Innovative lubricants need experienced application engineers

Every lubricant change should be preceded by expert consultation on the application in question. Only then the best lubricant system can be selected. Experienced FUCHS engineers will be glad to advise on products for the application in question and also on our full range of lubricants.


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