Zero Friction Cycling

Single Appliation Longevity - New test protocol as of October 2020 - Much work to be done to re-test existing lubricant test list

ZFC receives many emails from around the world seeking advice on what lubricant for what event. These range from a key road time trial, to 24 hour mtb to cross continent events to stage races.

What lubricant for what event can depend on many factors. Not only from how long does lubricant X last in conditions Y, but a persons budget, race strategty (flag to flag or able to swap to fresh chain/s), mechanical confidence and more.

The new test assess single application longevity for dry road conditions, dry gravel / mtb / cx conditions, and extreme conditions (wet, muddy etc).

The test follows a similar protocol as main lubricant test, alternating between larg ring and cogs 4 through six and small chain ring and cogs 1 through 3, with check measures every 150km.

A new chain is used for single application longevity test, and the lubricant is applied via immersive application. This acts as a double check re initial penetration issues in the main test where the lubricant is applied as per manufacturer instructions.

Initial test is dry road conditions. After stripping factory grease the chain is check measure for start measure point for that chain (chains do not always come from the factory exactly the same length).

For the test block, the chain is given a wear rate allowance of 0.1% (normal recommended chain wear replacment mark is 0.5%, so it is given 20% of the recommended wear replacement mark.

Two key points are highlighted from the check measures. The obvious one is how many Km's until the chain reached its wear allowance. **The second and more important is the "JUMP POINT"**. This is the moment in the test where the chain wear rate measures change from zero or minimal wear, to a notable wear jump. This signifies when the lubricant treatment is effectively done. Whilst it may continue for some hundreds of km's from that point until it reaches wear rate limit, this JUMP POINT denotes when there will be a marked increase in friction losses for that lubricant. Once hardened steel parts begin to wear at a noticeable rate - friction losses have jumped.

How long it takes from the JUMP POINT to the end of wear allowance indicates characteristics of that lubricant. Some lubricants remain extremely low friction even in harsh conditions for an impressive time (ie chain coating type lubricant) followed by a very sharp increase once that treatment is done. Other lubricants can show a slow increase in wear from fairly early on but may not exhibit a clear jump point (ie some wet lubricants) - they just slowly continue to degrade. Such lubricants do not have point of sudden friction increase, but instead steadily increase in friction from - sometimes - kilometre zero.

After dry road conditions test, chain is ulltrasoncially cleaned, re-lubed via immersive application, and subjected to dry contamination test. Chain is given a 0.1% wear allowance from end of test measure at end of dry road test

After dry contamination test, chain is ultrasonically cleaned, re-lubed via immersive application, and subjected to extreme contamination test. Chain is given a 0.1% wear allowance from end of test measure from dry contamination block test.

Depending on the lubricant, it may demonstrate very different performance results in from one test type to another. Some will excell in dry contamination resistance but fall over in wet, or vice versa. This will be key to helping you decide what to prep for your personal event based on length and expected conditions, and if you need to have a back up in case the conditions are different to what you expected.

TO THE DATA!

Single Application Longevity - Dry road conditions test

*Note - despite the test being 250w, which is greater than most average on training rides, the smooth nature of machine run seems to deliver much longer treatment lifespans vs real riding where the sinosoidal loading of pedalling action delivers much greater peak forces even for the same avg power, and the environment - like riding your ergo - has less airborne contamination. Real world road riding vs lab testing tends to indicate that lab test claims for treatment longevity may be around double to triple vs what may be assessed in field testing. Ie in a lab test lubricant may hold its efficiency for 600km before notably increasing, yet on road the chain feels and sounds very dry by 300km and not pleasurable to ride past that point without relubricating / re-waxing. For the Single application test, based on when some clear is beginning, real world training where treatment has moved from silky smooth zone etc, I would suggest real world results treatment lifespan at approx 1/3rd of wear jump point km's attained on test machine. Note ZFC is always conservative re treatment lifespans - real world results will vary depending on your power, riding style, environment - conservative estimate is best as a guide just in case.

Lubricant	Km's to Wear Rate Jump Point	Km's to reach total Wear allowance	Real world KM's Adjusted - Wear rate Jump Point	Real World Km's to reach total Wear allowance
Silca Synerg-E	9,412	9412	3,138	3138
CB trade Titanium Armour	6,750	7287	2,250	2429
Rex Black Diamond	5,602	5602	1,867	1867
Rex Wax Race Blend (4+1)	4,300	5000	1,433	1667
Hot Wax X	4,050	4050	1,350	1350
Revolubes	3,416	3416	1,139	1139
Rex Black Diamond + Race Day Spray	3,415	3415	1,138	1138
Rex Wax - Training blend (11+1)	3,300	3750	1,100	1250
Rex Domestique	3,210	3210	1,067	1067
AB Graphene Lube	3,254	3254	1,000	1085
Silca Synergetic	2,333	2333	778	778
Allied Grax	2,089	2089	696	696
Effetto Mariposa Flower Power Wax	1,950	3088	650	1029
Mspeedwax New Formula	1,800	3063	600	1021
Silca Hot Melt	1,300	1595	433	531
Ceramic Speed UFO Drip All conditions	900	1182	300	394
Boeshield T9 -Aerosol	513	513	171	171
AB Graphene Wax	300	420	100	140

Single Application Longevity - Dry Gravel / Mtb / CX

*Note - despite the test being 250w, which is greater than most average on training rides, the smooth nature of machine run seems to deliver much longer treatment lifespans vs real riding where the sinosoidal loading of pedalling action delivers much greater peak forces even for the same avg power, and the environment - like riding your ergo - has less airborne contamination. Real world road riding vs lab testing tends to indicate that lab test claims for treatment longevity may be around double to triple vs what may be assessed in field testing. Ie in a lab test lubricant may hold its efficiency for 600km before notably increasing, yet on road the chain feels and sounds very dry by 300km and not pleasurable to ride past that point without relubricating / re-waxing. For the Single application test, based on when some clear is beginning, real world training where treatment has moved from silky smooth zone etc, I would suggest real world results treatment lifespan at approx 1/3rd of wear jump point km's attained on test machine. Note ZFC is always conservative re treatment lifespans - real world results will vary depending on your power, riding style, environment - conservative estimate is best as a guide just in case.

Lubricant	Km's to Wear Rate Jump Point	Km's to reach total Wear allowance	Real world KM's Adjusted - Wear rate Jump Point	Real World Km's to reach total Wear allowance
Hot Wax X	4,050	4050	1,350	1350
Rex Black Diamond + RDS	2,642	3071	880	1023
Rex Wax Race Blend (4+1)	1,800	1800	600	600
Mspeedwax New Formula	1,650	1848	550	616
Rex Black Diamond	1,476	1476	489	489
AB Graphene Lube	1,449	1449	483	483
Silca Synerg-E	1,440	1440	480	480
Effetto Mariposa Flower Power Wax	1,350	1571	450	524
Allied Grax	1,265	1551	421	517
Rex Domestique	1,154	1154	385	385
Revolubes	1,100	1588	367	529
Rex Wax - Training blend (11+1)	900	1200	300	400
Silca Hot Melt	900	1030	300	343
Silca Synergetic	500	690	167	230
Ceramic Speed UFO Drip All conditions	450	1078	150	360
AB Graphene Wax	300	420	100	140
Boeshield T9 -Aerosol	150	279	50	93

Single Application Longevity - Extreme Conditions

*Note - despite the test being 250w, which is greater than most average on training rides, the smooth nature of machine run seems to deliver much longer treatment lifespans vs real riding where the sinosoidal loading of pedalling action delivers much greater peak forces even for the same avg power, and the environment - like riding your ergo - has less airborne contamination. Real world road riding vs lab testing tends to indicate that lab test claims for treatment longevity may be around double to triple vs what may be assessed in field testing. Ie in a lab test lubricant may hold its efficiency for 600km before notably increasing, yet on road the chain feels and sounds very dry by 300km and not pleasurable to ride past that point without relubricating / re-waxing. For the Single application test, based on when some clear is beginning, real world training where treatment has moved from silky smooth zone etc, I would suggest real world results treatment lifespan at approx 1/3rd of wear jump point km's attained on test machine. Note ZFC is always conservative re treatment lifespans - real world results will vary depending on your power, riding style, environment - conservative estimate is best as a guide just in case.

Lubricant	Km's to Wear Rate Jump Point	Km's to reach total Wear allowance	Real world KM's Adjusted - Wear rate Jump Point	Real World Km's to reach total Wear allowance
AB Graphene Lube	600	807	200	270
Silca Synergetic	500	690	167	230
Hot Wax X	450	450	150	150
Silca Hot Melt	300	637	100	212
Rex Wax - Training blend (11+1)	300	604	100	201
Mspeedwax New Formula	300	588	100	196
Rex Black Diamond	300	538	100	179
Rex Black Diamond + RDS	300	525	100	175
Effetto Mariposa Flower Power Wax	300	480	100	160
Allied Grax	300	450	100	150
Rex Wax Race Blend (4+1)	300	450	100	150
Rex Domestique	300	427	100	143
AB Graphene Wax	200	344	66	115
Ceramic Speed UFO Drip All conditions	150	357	50	119
Silca Synerg-E	150	330	50	110
Revolubes	150	300	50	133
Ceramic Speed Wet Conditions	150	262	50	87
Boeshield T9 -Aerosol	150	193	50	64