

Tire Sealant Impact on Wheel Balance

Test Date: 5th Apr. 2016

Test Staff: Junjie Wang, Chuankai Chen, Qu Chen

Test Purpose: wheel balance data results from different installed volume of tire sealant

Test Tire: Michelin 205/65R16 95V

Test Liquid: -40°C Anti-Freezing tire sealant

Test Machine: FLY-SPEED Wheel balancer

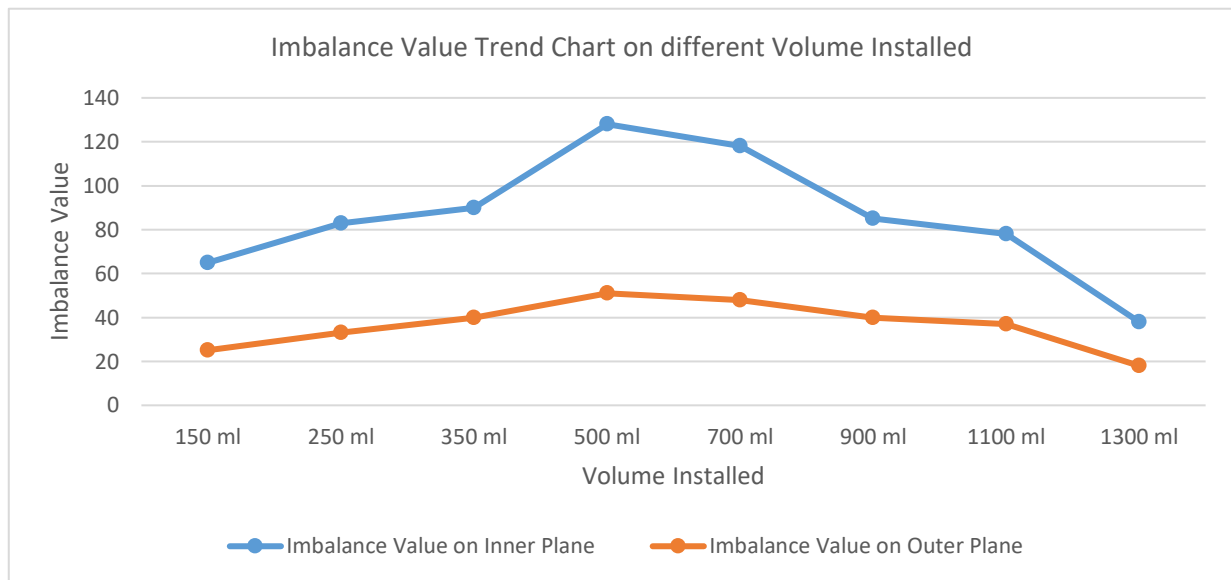
Balance test method: Dynamic Balancing

Test Explanation:

1. Tire balance, also referred to as tire unbalance or imbalance, describes the distribution of mass within an automobile tire or the entire wheel (including the rim) to which it is attached. We get imbalance data of inner and outer planes of the tested wheel imbalance tolerance of which should be under 5g for each plane.
2. The wheel is balanced to make sure imbalance tolerance under 5g on each plane.
3. Normally, wheel is a solid objects with specific imbalance value and angle can be detected in each test, while with tire sealant installed, due to its fluidity, imbalance value and angle differs much from each different test, data is only for reference.
4. On balancing machine, the wheel stops after speed reach to about 100rpm, which is far from enough for tire sealant to distribute evenly inside the tire, on the contrary, much more time is required for the tire sealant to distribute evenly during driving and imbalance value will decrease with the steady speeding up of the vehicle, so, imbalance value of a moving vehicle is normally smaller than the value test on a balancing machine. Remarks: with the volume installed added-up, tire sealant tend to distributes evenly further, imbalance value decreases accordingly.
5. To dismiss the disturbance of large variation of tested value, we omit the max and the min value, calculate the average value.

Tested Value as below table

Installed volume	planes	Imbalance value in "g" of each test							Average Value
		1 st test	2 nd test	3 rd test	4 th test	5 th test	6 th test	7 th test	
150 ml	inner	65							65
	outer	25							25
250 ml	inner	85	80						83
	outer	35	30						33
350 ml	inner	105	90	90					90
	outer	40	40	40					40
500 ml	inner	185	150	145	130	120	95	90	128
	outer	80	60	60	50	50	35	35	51
700 ml	inner	185	165	165	45	70	70		118
	outer	80	70	70	15	25	25		48
900 ml	inner	90	95	80	80				85
	outer	45	45	35	35				40
1100 ml	inner	205	90	75	70	70			78
	outer	85	40	35	35	35			37
1300	inner	110	65	10	25	30	30		38
	outer	50	30	5	10	15	15		18



Test results conclusion

*Comparison to driving imbalance test as below

Similarity: As volume added up, imbalance value increases and then decrease at a specific point in both wheel balancer test and real driving test.

Different point 1: Strongest vibration sensed when 250ml & 350ml of tire sealant installed in driving imbalance test, while on balancer machine test, strongest vibration volume point is 350ml, 500ml and 700ml.

Different point 2: In driving imbalance test, when volume added up to 1200ml, driving vibration enhanced again while on balancing machine there is no such phenomenon.

Test Results Analysis

1. With 130ml~350ml installed, tire sealant is not much enough to distribute to the entire inside of tire, weight on planes of wheel is not even, imbalance value increases as volume adds up during this phase.
2. With appropriate volume added (500~700ml), tire sealant tend to distribute evenly inside the tire, as the speed up of wheel rotation, tire sealant forms a thin and evenly distributed layer, inner tire wall balances itself, thus making the whole wheel much more balanced.
3. With added volume relatively more around 1200ml, tire sealant layer inside the tire thickened and became unstable, much imbalance occurs as the layer thickness changes suddenly when vehicle speeds up or turns. While imbalance will disappear when vehicle move straight at a steady speed (experienced by all tested staff in driving imbalance test)
4. The main reason of difference between balancing machine test and driving imbalance test lies in the speed and time, balancing machines runs at low speed for a short time, driving imbalance test features high speed at a long time, which lead to different tire sealant distribution.

Conclusion of Volume impact on imbalance

1. Appropriate volume decrease the imbalance experience
2. With high fluidity tire sealant (eg. Normal temperature series) , tire sealant tend to distribute much easily inside the tire, and layer thickness tend to change easily during speeding-up and turns, so tire sealant of high fluidity is suggested to install with a relatively less volume.
3. With appropriate volume installed, vehicles driving under 100km/h experience no noticeable vibration, and slight vibration experienced when speed raise to 100~120km/h.

Tested Date: 5th Apr. 2016

Report Date: 26th Apr. 2016

Signature & Stamp:



25th Apr. 2016 Patrick Yang