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# TÜV SÜD - Tire Test 2021

## 225/40 R18 – MICHELIN PILOT SPORT 5

(Excerpt of report no. 713209665-PS-02)

### **Test Results:**

New condition: Wet & dry braking, wet & dry handling

Worn\* condition: Wet braking, wet handling

Test Period: May – July 2021

\*) Explanation see page 2

TÜV SÜD Product Service GmbH

Report No. 713209665-PS-02(en)

TÜV®

## TIRE DETAILS

DIMENSION: 225/40 R18

TIRE BRANDS & PATTERNS IN THE TEST: MICHELIN

### NEW CONDITION:



**MICHELIN PILOT SPORT 5**

92Y

DOT: HC CR 084X 0521 - 0921

### WORN\* CONDITION:



**MICHELIN PILOT SPORT 5**

92Y

DOT: HC CR 084X 0721 - 0821

- The above listed test samples of Michelin Pilot Sport 5 were provided by Michelin.
- From the available lot of tires, TÜV SÜD PS selected the samples for each test randomly.
- Tire buffing had been done by Michelin.

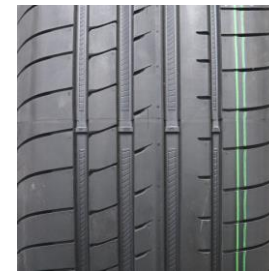
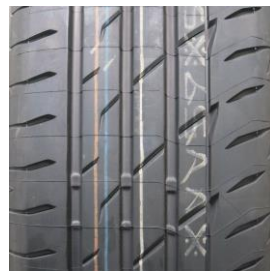
\*) to reach the desired worn condition, the tires were buffed on a special machine to the depth range of the tread wear indicator according to UN-ECE regulation R30 Rev3. (1.6mm +0.6/-0.0mm)

## TIRE DETAILS

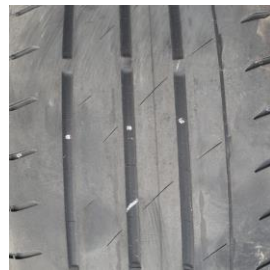
DIMENSION: 225/40 R18

TIRE BRANDS & PATTERNS IN THE TEST: COMPETITORS

### NEW CONDITION:



### WORN\* CONDITION:



**MICHELIN**

**BRIDGESTONE**

**BRIDGESTONE**

**CONTINENTAL**

**GOODYEAR**

**PIRELLI**

**PILOT SPORT 4**

**POTENZA ADRENALIN RE004**

**POTENZA SPORT**

**PREMIUMCONTACT 6**

**EAGLE F1 ASYMMETRIC 5**

**PZERO PZ4**

92Y, DOT: FT CR 051X 0421

92W, DOT: C8 T7 DEB 1121

92Y, DOT: 1VR 1005ER 4920

92Y, DOT: AF5N 075F 0321

92Y, DOT: DM5N MT1R 0321

92Y, DOT: XB 4U 017H 0421

- All competitor test samples were purchased by TÜV SÜD PS on the free market.
- From the available lot of tires, TÜV SÜD PS selected the samples for each test randomly.
- Tire buffing had been done by Michelin.

\*) to reach the desired worn condition, the tires were buffed on a special machine to the depth range of the tread wear indicator according to UN-ECE regulation R30 Rev3. (1.6mm +0.6/-0.0mm)



## TEST DETAILS

### ▪ TEST LOCATIONS

- Wet braking “high  $\mu$ ” (higher friction), dry braking: FAKTmotion, Memmingen (D)
- Wet braking “low  $\mu$ ” (lower friction): ATP, Papenburg (D)
- Dry handling: ATP, Papenburg (D)
- Wet handling: ÖAMTC Wachauring, Melk (A)

### ▪ TEST VEHICLE

- VW Golf VIII 2.0TDI 150hp, VW Golf VIII GTI 245hp

### ▪ PROCEDURE AND EVALUATION

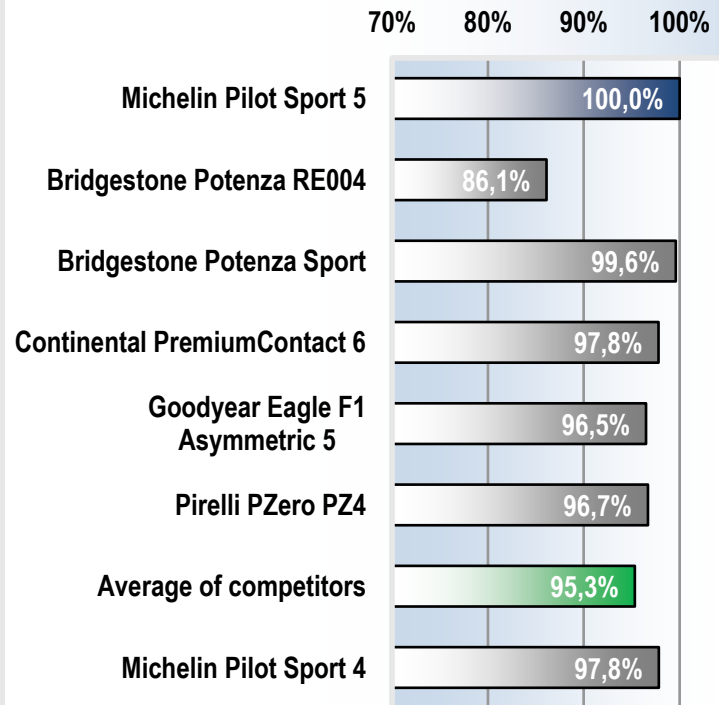
- In all tests, the reference/control tire was tested repeatedly in order to detect and consider possible changes of the ambient test parameters and to adapt the corresponding performance by linear interpolation.
- All tires in the test were evaluated in relation to the performance of the reference/control tire.
- The performance is displayed as a percentage value, calculated on the basis of the measured and corrected test data.
- In the present evaluation the reference tire (new condition: Michelin Pilot Sport 5, worn condition: Michelin Pilot Sport 5 (worn)) represents the 100% performance baseline.
- In all evaluations, a percentage  $>100\%$  means better and  $<100\%$  means worse.

## TEST RESULTS

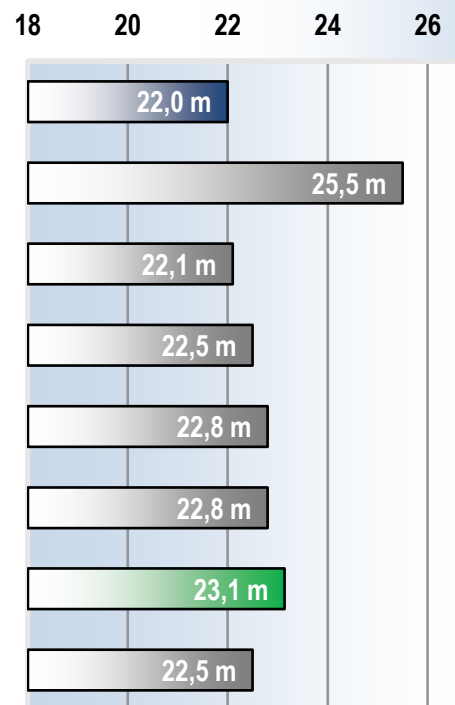
### WET BRAKING IN NEW CONDITION

- ABS-emergency stop on wet high and low  $\mu$  surfaces (within the permitted range of ECE R117):
- $T_{\text{surface}} = 17.6$  to  $25.0^{\circ}\text{C}$      $T_{\text{air}} = 14.8$  to  $20.2^{\circ}\text{C}$
- Relevant test speed range: 80 to 20 km/h

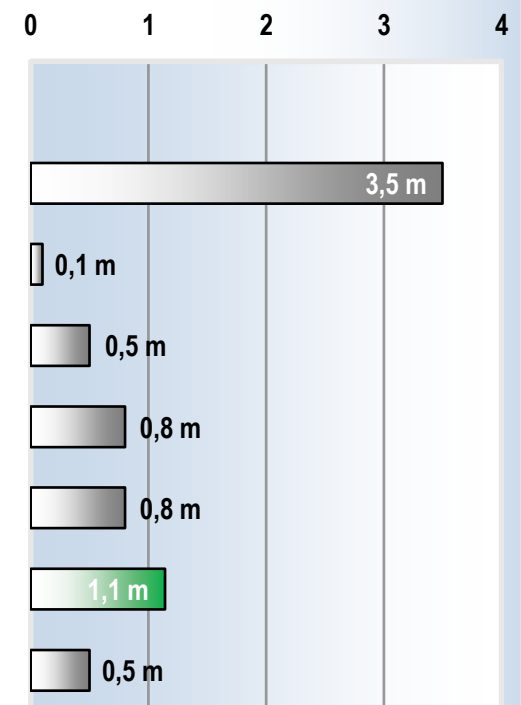
#### WET BRAKING PERFORMANCE\* [%]



#### STOP. DISTANCE\* [m], 80-20 km/h



#### $\Delta$ [m] REF. TO MICHELIN PS5\*



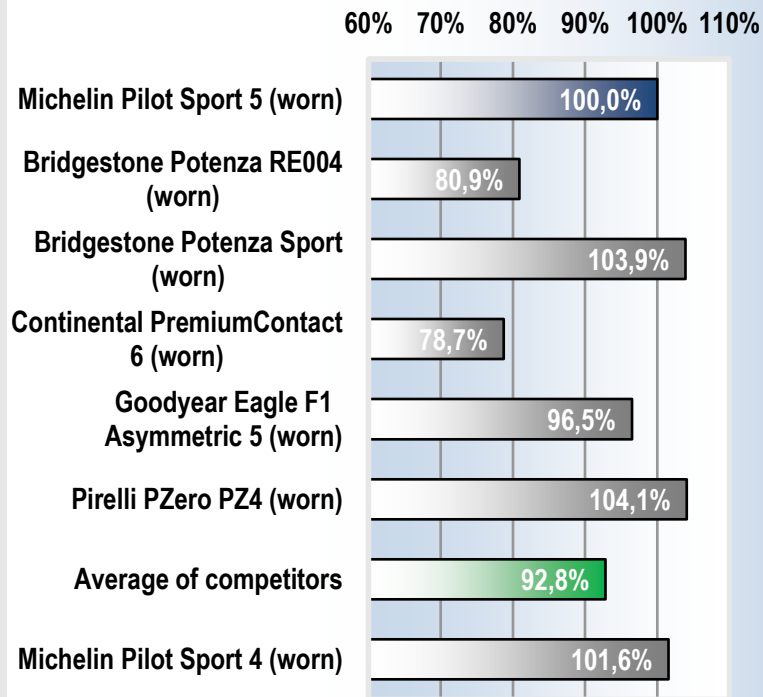
\*) Average of the performance on high and low  $\mu$  wet surface.

## TEST RESULTS

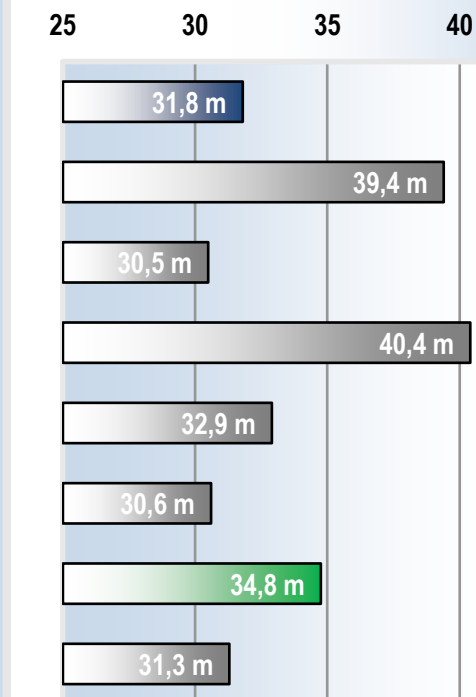
### WET BRAKING IN WORN CONDITION

- ABS-emergency stop on wet high and low  $\mu$  surfaces (within the permitted range of ECE R117):
- $T_{\text{surface}} = 17.9$  to  $27.5^{\circ}\text{C}$      $T_{\text{air}} = 15.2$  to  $19.1^{\circ}\text{C}$
- Relevant test speed range: 80 to 20 km/h

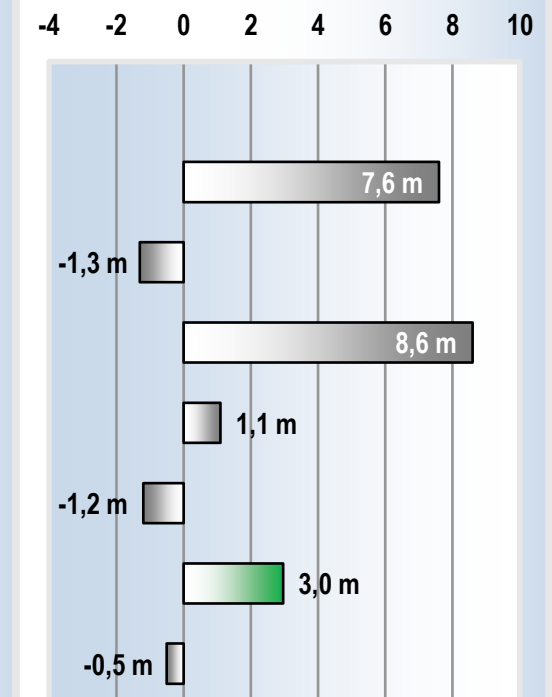
#### WET BRAKING PERFORMANCE\* [%]



#### STOP. DISTANCE\* [m], 80-20 km/h



#### $\Delta$ [m] REF. TO MICHELIN PS5\*



\*) Average of the performance on high and low  $\mu$  wet surface.



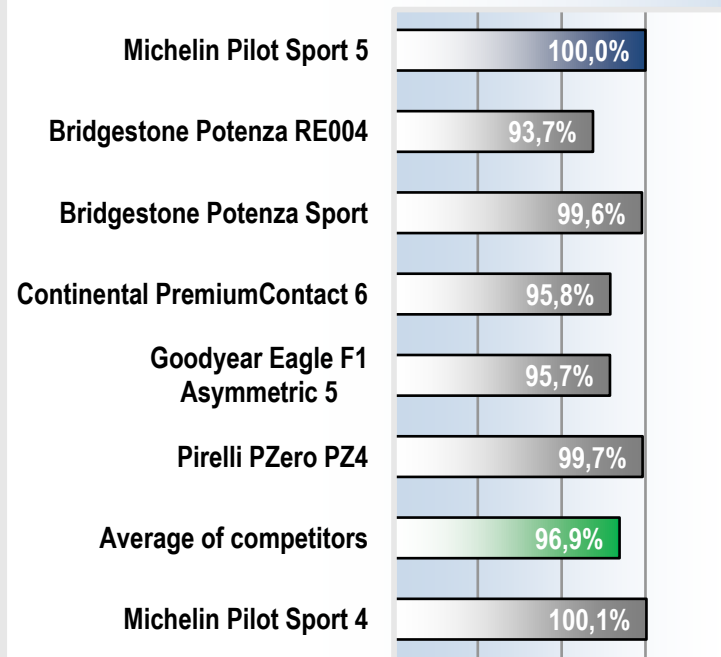
## TEST RESULTS

### ■ DRY BRAKING IN NEW CONDITION

- ABS-emergency stop on dry asphalt surface
- $T_{\text{surface}} = 35.5$  to  $38.7^{\circ}\text{C}$  and  $T_{\text{air}} = 21.6$  to  $22.2^{\circ}\text{C}$
- Relevant test speed range: 100 to 0 km/h

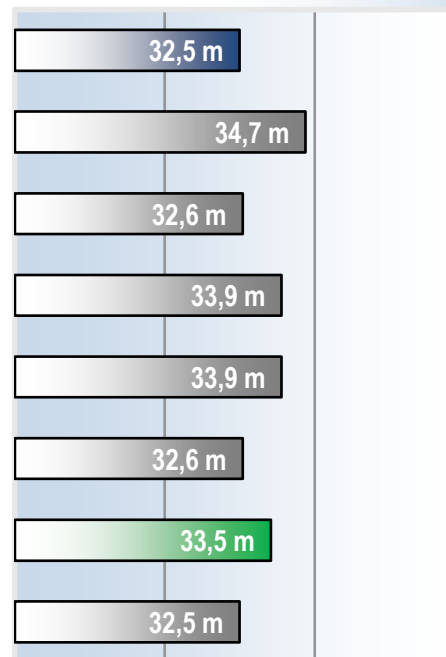
#### DRY BRAKING PERFORMANCE [%]

70% 80% 90% 100% 110%



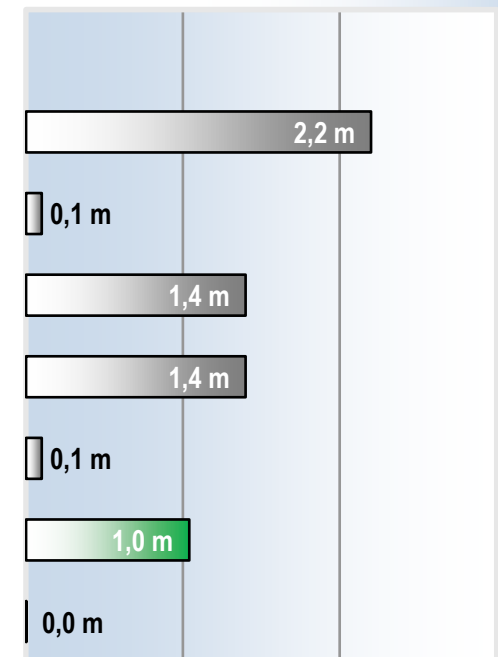
#### STOP. DISTANCE [m], 100-0 km/h

25 30 35 40



#### Δ [m] REF. TO MICHELIN PS5

0 1 2 3



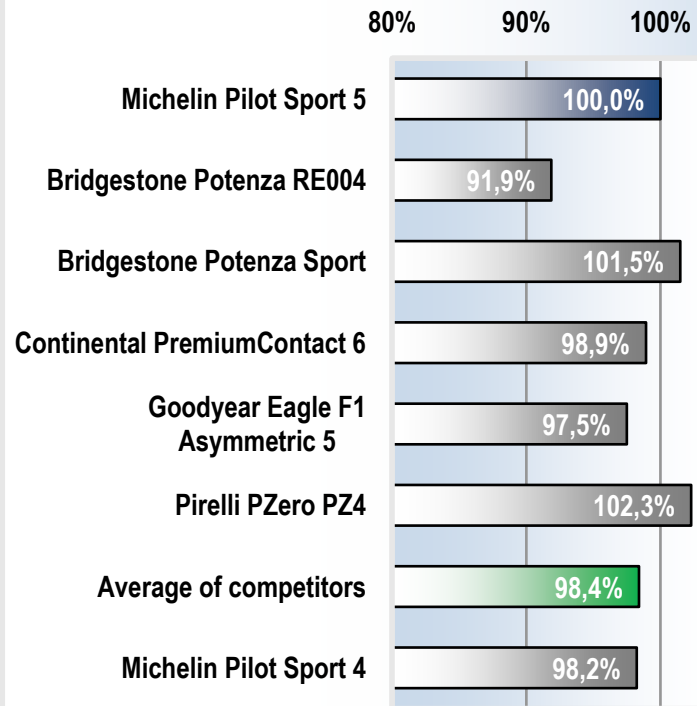


## TEST RESULTS

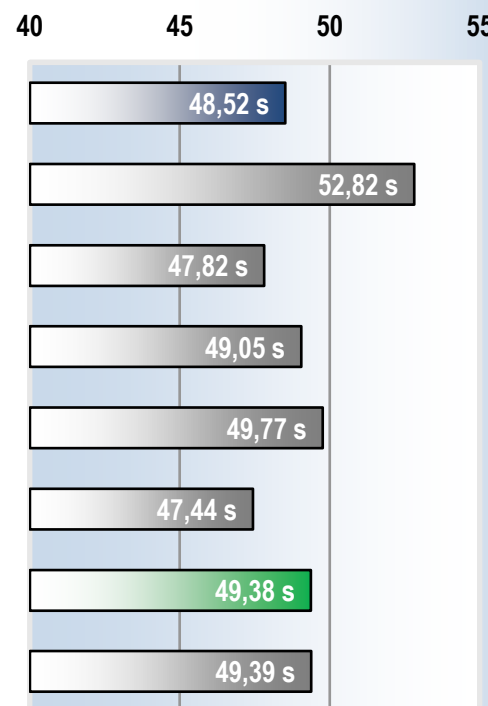
### WET HANDLING IN NEW CONDITION

- Handling test on wet asphalt surface; double execution; track length: 1.050m
- $T_{\text{surface}} = 19.6$  to  $26.3^{\circ}\text{C}$  and  $T_{\text{air}} = 18.2$  to  $23.3^{\circ}\text{C}$
- Relevant test data: lap time [s]

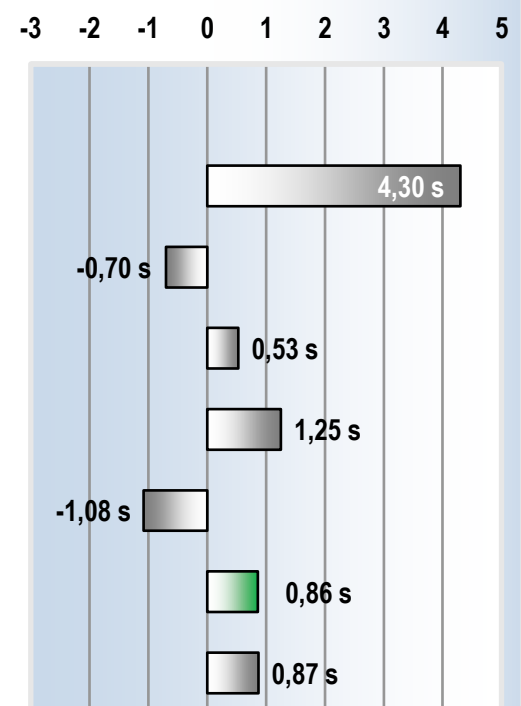
#### WET HANDLING PERFORMANCE\* [%]



#### LAP TIME\* [s]



#### Δ [s] REF. TO MICHELIN PS5\*



\*) Average of the tire performance, test execution of run 1 and run 2 on two different days.

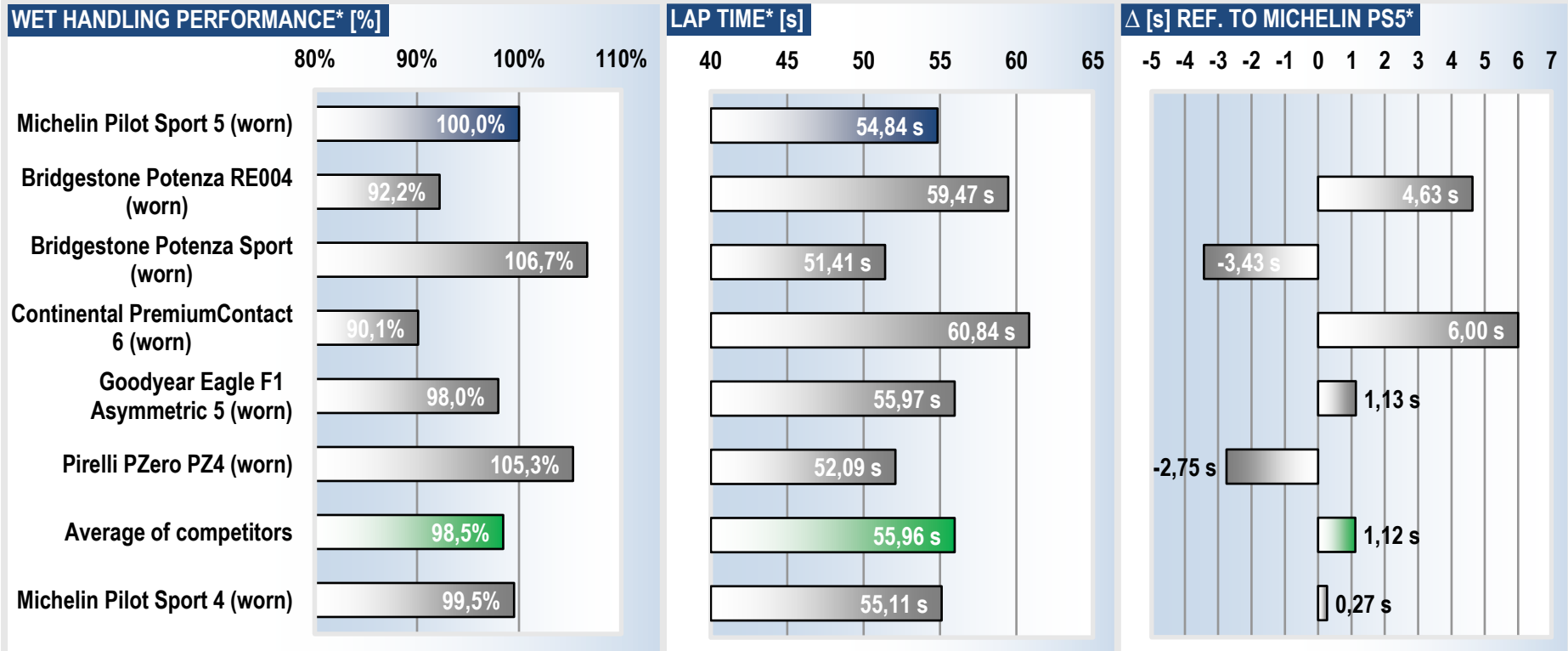




## TEST RESULTS

### WET HANDLING IN WORN CONDITION

- Handling test on wet asphalt surface; double execution on two different days; track length: 1.050m
- $T_{\text{surface}} = 22.2$  to  $29.4^{\circ}\text{C}$  and  $T_{\text{air}} = 20.7$  to  $26.3^{\circ}\text{C}$
- Relevant test data: lap time [s]



\*) Average of the tire performance, test execution of run 1 and run 2 on two different days.

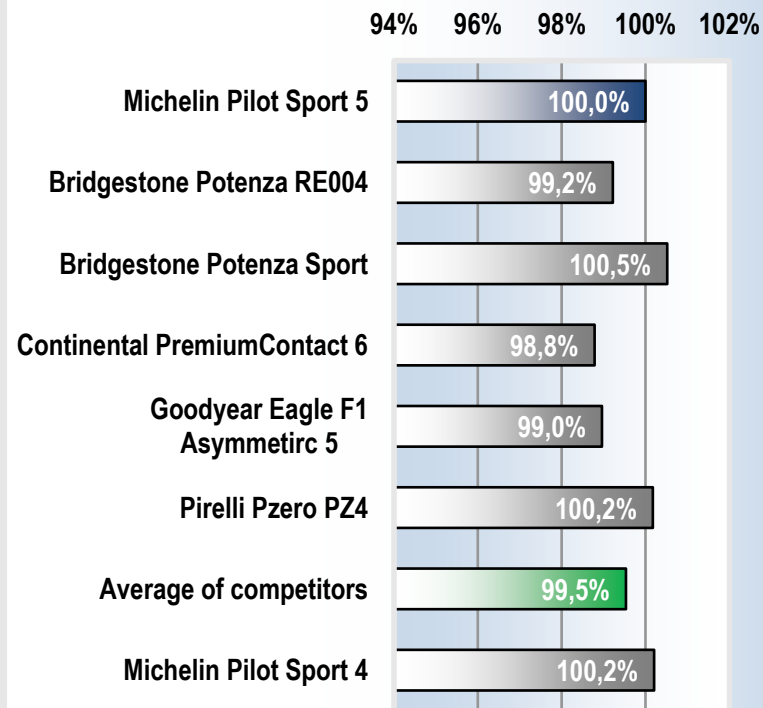


## TEST RESULTS

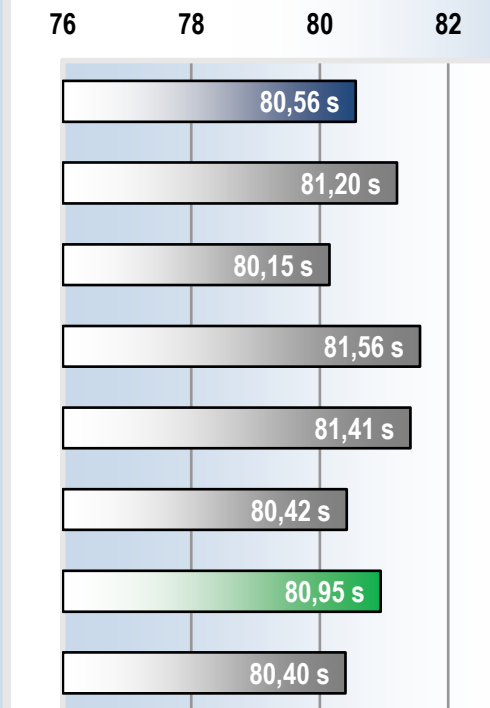
### ■ DRY HANDLING IN NEW CONDITION

- Handling test on dry asphalt surface; track length: 2.600m
- $T_{\text{surface}} = 25.7$  to  $29.8^{\circ}\text{C}$  and  $T_{\text{air}} = 14.8$  to  $17.7^{\circ}\text{C}$
- Relevant test data: lap time [s]

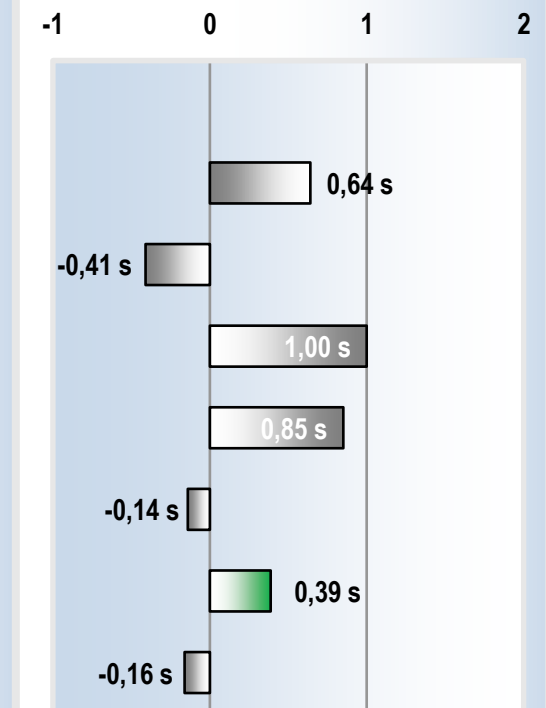
#### DRY HANDLING PERFORMANCE [%]



#### LAP TIME [s]



#### Δ [s] REF. TO MICHELIN PS5



## TEST RESULTS

### ■ TREAD DEPTH MEASUREMENT

- The tires were buffed to an aim value of 2mm and measured by Michelin.
- TÜV SÜD PS validated the results on the basis of random samples. Tread wear was checked at one tire of each set.

### MICHELIN PILOT SPORT 5

Measurement Michelin							Measurement TÜV SÜD PS							Congruence average value Michelin/TÜV (≥ 95%)	
Unit [mm]	Section				Average		Unit [mm]	Section				Average			
	1	2	3	4				1	2	3	4				
Measurement point	1	2,14	2,12	2,17	1,98	<b>2,10</b>	Measurement point	1	2,01	2,07	2,01	1,90	<b>2,00</b>		
	2	1,97	2,00	2,06	1,75	<b>1,95</b>		2	1,78	1,80	1,90	1,62	<b>1,78</b>		
	3	1,92	2,17	1,99	1,66	<b>1,94</b>		3	1,74	1,99	1,82	1,47	<b>1,76</b>		
	4	1,91	2,11	2,06	1,74	<b>1,96</b>		4	1,72	1,98	1,89	1,54	<b>1,78</b>		
	5	1,93	2,16	1,97	1,80	<b>1,97</b>		5	1,74	1,95	1,70	1,66	<b>1,76</b>		
	6	2,08	2,59	2,25	2,05	<b>2,24</b>		6	1,99	2,48	2,19	1,90	<b>2,14</b>		
	7	-	-	-	-	-		-	7	-	-	-	-		-
	8	-	-	-	-	-		-	8	-	-	-	-		-
Average		1,99	2,19	2,08	1,83		Average		1,83	2,05	1,92	1,68			
General average tire tread depth [mm]					2,02	✓	General average tire tread depth [mm]					1,87	✓		
Max. deviation of measurement points' average [mm]					0,31	✓	Max. deviation of measurement points' average [mm]					0,39	✓		
Standard deviation of all measurements [mm]					0,19	✓	Standard deviation of all measurements [mm]					0,22	✓		
<b>Target criteria:</b>															
General average tire tread depth 2mm ± 0,2mm															
Max. deviation of measurement points' average ≤ 0,6mm															
Standard deviation of all measurements ≤ 0,35mm															



## TEST RESULTS

### ■ TREAD DEPTH MEASUREMENT

- The tires were buffed to an aim value of 2mm and measured by Michelin.
- TÜV SÜD PS validated the results on the basis of random samples. Tread wear was checked at one tire of each set.

### MICHELIN PILOT SPORT 4

Measurement Michelin							Measurement TÜV SÜD PS							Congruence average value Michelin/TÜV (≥ 95%)	
Unit [mm]		Section				Average	Unit [mm]		Section				Average	Max error of single value (≤ 10%)	
		1	2	3	4				1	2	3	4			
Measurement point	1	2,02	2,12	2,04	2,09	<b>2,07</b>	Measurement point	1	1,79	1,94	1,94	1,91	<b>1,90</b>	<b>91,7%</b>	
	2	2,19	2,22	2,21	2,37	<b>2,25</b>		2	1,95	2,06	2,07	2,25	<b>2,08</b>		
	3	2,24	2,28	2,13	2,31	<b>2,24</b>		3	2,03	2,09	1,94	2,13	<b>2,05</b>		
	4	1,76	1,73	1,69	1,83	<b>1,75</b>		4	1,55	1,59	1,50	1,61	<b>1,56</b>		
	5	1,86	1,90	1,72	1,91	<b>1,85</b>		5	1,71	1,70	1,56	1,76	<b>1,68</b>		
	6	2,30	2,18	2,14	2,17	<b>2,20</b>		6	2,13	2,02	2,01	2,09	<b>2,06</b>		
	7	-	-	-	-	-		7	-	-	-	-	-		
	8	-	-	-	-	-		8	-	-	-	-	-		
Average		2,06	2,07	1,99	2,11		Average		1,86	1,90	1,84	1,96			
General average tire tread depth [mm]					2,06	✓	General average tire tread depth [mm]					1,89	✓		
Max. deviation of measurement points' average [mm]					0,50	✓	Max. deviation of measurement points' average [mm]					0,52	✓		
Standard deviation of all measurements [mm]					0,21	✓	Standard deviation of all measurements [mm]					0,22	✓		



#### Target criteria:

General average tire tread depth 2mm ± 0,2mm

Max. deviation of measurement points' average ≤ 0,6mm


Standard deviation of all measurements ≤ 0,35mm

## TEST RESULTS

### ■ TREAD DEPTH MEASUREMENT

- The tires were buffed to an aim value of 2mm and measured by Michelin.
- TÜV SÜD PS validated the results on the basis of random samples. Tread wear was checked at one tire of each set.

### BRIDGESTONE POTENZA ADRENALIN RE004

Measurement Michelin							Measurement TÜV SÜD PS							Congruence average value Michelin/TÜV (≥ 95%)	
Unit [mm]		Section				Average	Unit [mm]		Section				Average	Max error of single value (≤ 10%)	
		1	2	3	4				1	2	3	4			
Measurement point	1	1,92	2,28	2,13	1,92	<b>2,06</b>	Measurement point	1	1,81	1,93	2,00	1,95	<b>1,92</b>	<div style="background-color: #003366; color: white; padding: 5px; text-align: center;">92,1%</div> <div style="background-color: #003366; color: white; padding: 5px; text-align: center;">15,4%</div>	
	2	1,83	1,94	1,90	2,06	<b>1,93</b>		2	1,70	1,85	1,66	1,80	<b>1,75</b>		
	3	2,38	2,24	2,11	2,30	<b>2,26</b>		3	2,22	2,26	1,94	2,11	<b>2,13</b>		
	4	1,92	1,63	1,73	1,94	<b>1,81</b>		4	1,75	1,63	1,52	1,66	<b>1,64</b>		
	5	2,04	2,18	2,12	2,07	<b>2,10</b>		5	1,81	1,93	1,90	1,98	<b>1,91</b>		
	6	-	-	-	-	-		6	-	-	-	-	-		
	7	-	-	-	-	-		7	-	-	-	-	-		
	8	-	-	-	-	-		8	-	-	-	-	-		
Average		2,02	2,05	2,00	2,06		Average		1,86	1,92	1,80	1,90			
General average tire tread depth [mm]					2,09	✓	General average tire tread depth [mm]					1,87	✓		
Max. deviation of measurement points' average [mm]					0,45	✓	Max. deviation of measurement points' average [mm]					0,49	✓		
Standard deviation of all measurements [mm]					0,19	✓	Standard deviation of all measurements [mm]					0,19	✓		
<b>Target criteria:</b>															
General average tire tread depth 2mm ± 0,2mm															
Max. deviation of measurement points' average ≤ 0,6mm															
Standard deviation of all measurements ≤ 0,35mm															

## TEST RESULTS

### ■ TREAD DEPTH MEASUREMENT

- The tires were buffed to an aim value of 2mm and measured by Michelin.
- TÜV SÜD PS validated the results on the basis of random samples. Tread wear was checked at one tire of each set.

### BRIDGESTONE POTENZA SPORT

Measurement Michelin							Measurement TÜV SÜD PS							Congruence average value Michelin/TÜV (≥ 95%)	
Unit [mm]	Section				Average		Unit [mm]	Section				Average			
	1	2	3	4				1	2	3	4				
Measurement point	1	1,92	2,34	1,99	2,02	2,07	Measurement point	1	1,91	2,18	1,76	1,92	1,94	91,0%	
	2	1,92	2,42	1,90	1,89	2,03		2	1,97	2,20	1,78	1,72	1,92		
	3	2,20	2,42	2,13	2,19	2,24		3	1,96	2,23	1,86	1,92	1,99	Max error of single value (≤ 10%)	
	4	2,08	2,20	2,05	2,07	2,10		4	1,84	2,00	1,85	1,88	1,89		16,7%
	5	2,23	2,36	2,22	2,14	2,24		5	1,99	2,09	1,85	1,87	1,95		
	6	2,10	2,11	1,88	1,76	1,96		6	2,00	1,93	1,66	1,60	1,80		
	7	-	-	-	-	-		7	-	-	-	-	-		
	8	-	-	-	-	-		8	-	-	-	-	-		
Average		2,08	2,31	2,03	2,01		Average		1,95	2,11	1,79	1,82			
General average tire tread depth [mm]					2,11	✓	General average tire tread depth [mm]					1,92	✓		
Max. deviation of measurement points' average [mm]					0,28	✓	Max. deviation of measurement points' average [mm]					0,20	✓		
Standard deviation of all measurements [mm]					0,18	✓	Standard deviation of all measurements [mm]					0,16	✓		
<b>Target criteria:</b>															
General average tire tread depth 2mm ± 0,2mm															
Max. deviation of measurement points' average ≤ 0,6mm															
Standard deviation of all measurements ≤ 0,35mm															



## TEST RESULTS

### ■ TREAD DEPTH MEASUREMENT

- The tires were buffed to an aim value of 2mm and measured by Michelin.
- TÜV SÜD PS validated the results on the basis of random samples. Tread wear was checked at one tire of each set.

### CONTINENTAL PREMIUMCONTACT 6

Measurement Michelin							Measurement TÜV SÜD PS							Congruence average value Michelin/TÜV (≥ 95%)	
Unit [mm]		Section				Average	Unit [mm]		Section				Average	Max error of single value (≤ 10%)	
		1	2	3	4				1	2	3	4			
Measurement point	1	2,03	2,26	2,25	2,08	2,16	Measurement point	1	1,71	2,00	2,09	1,85	1,91	90,2%	
	2	1,94	2,32	2,12	2,07	2,11		2	1,78	2,11	1,95	1,85	1,92		
	3	2,18	2,27	2,33	2,23	2,25		3	1,95	1,98	2,06	1,94	1,98	16,5%	
	4	1,82	1,78	1,97	1,82	1,85		4	1,52	1,49	1,72	1,54	1,57		
	5	1,97	1,88	1,97	2,04	1,97		5	1,93	1,90	1,86	1,84	1,88		
	6	1,99	2,19	2,21	2,00	2,10		6	1,91	2,10	1,96	1,81	1,95		
	7	-	-	-	-	-		7	-	-	-	-	-		
	8	-	-	-	-	-		8	-	-	-	-	-		
Average		1,99	2,12	2,14	2,04		Average		1,80	1,93	1,94	1,81			
General average tire tread depth [mm]					2,07	✓	General average tire tread depth [mm]					1,87	✓		
Max. deviation of measurement points' average [mm]					0,41	✓	Max. deviation of measurement points' average [mm]					0,42	✓		
Standard deviation of all measurements [mm]					0,16	✓	Standard deviation of all measurements [mm]					0,17	✓		



#### Target criteria:

General average tire tread depth 2mm ± 0,2mm

Max. deviation of measurement points' average ≤ 0,6mm

Standard deviation of all measurements ≤ 0,35mm

## TEST RESULTS

### ■ TREAD DEPTH MEASUREMENT

- The tires were buffed to an aim value of 2mm and measured by Michelin.
- TÜV SÜD PS validated the results on the basis of random samples. Tread wear was checked at one tire of each set.

### GOODYEAR EAGLE F1 ASYMMETRIC 5

Measurement Michelin							Measurement TÜV SÜD PS						
Unit [mm]	Section				Average	Unit [mm]	Section				Average		
	1	2	3	4			1	2	3	4			
Measurement point	1	2,18	2,05	2,39	2,29	<b>2,23</b>	Measurement point	1	1,93	1,82	2,11	2,11	<b>1,99</b>
	2	1,91	1,94	2,01	1,91	<b>1,94</b>		2	1,80	1,72	1,90	1,74	<b>1,79</b>
	3	1,88	2,04	2,18	2,05	<b>2,04</b>		3	1,62	1,79	1,94	1,79	<b>1,79</b>
	4	1,71	1,72	2,01	1,99	<b>1,86</b>		4	1,44	1,50	1,76	1,76	<b>1,62</b>
	5	1,71	1,64	2,02	1,80	<b>1,79</b>		5	1,56	1,43	1,76	1,62	<b>1,59</b>
	6	2,11	1,94	2,27	2,21	<b>2,13</b>		6	1,98	1,81	2,08	2,01	<b>1,97</b>
	7	-	-	-	-	-		7	-	-	-	-	-
	8	-	-	-	-	-		8	-	-	-	-	-
Average		1,92	1,89	2,15	2,04		Average		1,72	1,68	1,93	1,84	

Congruence average value Michelin/TÜV (≥ 95%)	<b>89,9%</b>
Max error of single value (≤ 10%)	<b>15,5%</b>

General average tire tread depth [mm]	2,00	✓	General average tire tread depth [mm]	1,80	✓
Max. deviation of measurement points' average [mm]	0,44	✓	Max. deviation of measurement points' average [mm]	0,40	✓
Standard deviation of all measurements [mm]	0,20	✓	Standard deviation of all measurements [mm]	0,20	✓

#### Target criteria:

General average tire tread depth 2mm ± 0,2mm

Max. deviation of measurement points' average ≤ 0,6mm

Standard deviation of all measurements ≤ 0,35mm





## TEST RESULTS

### ■ TREAD DEPTH MEASUREMENT

- The tires were buffed to an aim value of 2mm and measured by Michelin.
- TÜV SÜD PS validated the results on the basis of random samples. Tread wear was checked at one tire of each set.

### PIRELLI PZERO PZ4

Measurement Michelin							Measurement TÜV SÜD PS							Congruence average value Michelin/TÜV (≥ 95%)	
Unit [mm]	Section				Average		Unit [mm]	Section				Average			
	1	2	3	4				1	2	3	4				
Measurement point	1	2,00	1,94	2,22	2,06	2,06	Measurement point	1	1,73	1,77	2,02	1,87	1,85	91,6%	
	2	2,03	2,05	2,19	2,04	2,08		2	1,94	1,94	2,09	1,92	1,97		
	3	2,29	2,27	2,33	2,06	2,24		3	2,10	2,04	2,10	1,85	2,02	Max error of single value (≤ 10%)	
	4	2,03	1,98	2,04	1,85	1,98		4	1,93	1,81	1,87	1,65	1,82		
	5	2,00	2,03	2,13	1,92	2,02		5	1,80	1,80	1,93	1,82	1,84	15,8%	
	6	1,80	1,96	2,06	1,92	1,94		6	1,69	1,78	1,92	1,79	1,80		
	7	2,00	2,13	2,25	2,20	2,15		7	1,70	2,00	2,01	2,06	1,94		
	8	-	-	-	-	-		8	-	-	-	-	-		
Average	2,02	2,05	2,17	2,01		Average	1,84	1,88	1,99	1,85					
General average tire tread depth [mm]					2,06	✓	General average tire tread depth [mm]					1,89	✓		
Max. deviation of measurement points' average [mm]					0,30	✓	Max. deviation of measurement points' average [mm]					0,23	✓		
Standard deviation of all measurements [mm]					0,13	✓	Standard deviation of all measurements [mm]					0,13	✓		
<b>Target criteria:</b>															
General average tire tread depth 2mm ± 0,2mm															
Max. deviation of measurement points' average ≤ 0,6mm															
Standard deviation of all measurements ≤ 0,35mm															

