TEST REPORT

TW-TT11-MT224

Benchmarking tests of 205/55R16 winter tyres

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1. Objective

The objective of the project was to test the performance of Goodyear Ultra Grip Ice against competitor tyres. The project consisted of tests on ice, snow, dry and wet surfaces.

2. Tyres

The tyre selection in the project was the following

Brand	Specification	Size	LI/SI	DOT	Date
Bridgestone	Noranza 2 Evo	205/55R16	94T	YLCP	0611
Continental	ContiIceContact	205/55R16	94T	CP0F NVVD	3811
Dunlop	Ice Touch	205/55R16	94T	A50F JA9R	5111
Goodyear	Ultra Grip Ice	205/55R16	94T	A50F JBTR	5111
Michelin	X-Ice North XI2	205/55R16	94T	22WC 7W6X	1511
Nokian	Hakkapeliitta 7	205/55R16	94T	60CP	3511
Pirelli	Carving Edge	205/55R16	94T	XA BK K802	3911

- All tyres were delivered by the customer
- Tyres were run in by Test World
- Separate tyre sets were used for ice/snow and wet/dry tests to avoid wear problems

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3. Tests

The following tests were carried out.

3.1. Ice tests

Test	Method
Braking	Measurement of braking distance
Acceleration	Measurement of acceleration
Handling, objective	Measurement of lap times on a circuit track
Handling, subjective	Subjective analysis of tyre behaviour

3.2. Snow tests

Test	Method
Braking	Measurement of braking distance
Acceleration	Measurement of acceleration time
Handling, objective	Measurement of lap times on a circuit track
Handling, subjective	Subjective analysis of tyre behaviour

3.3. Wet tests

Test	Method
Braking	Measurement of braking distance
Aquaplaning resistance	Measurement of tyre slip vs. speed
Handling, objective	Measurement of lap times on a circuit track
Handling, subjective	Subjective analysis of tyre behaviour

3.4. Dry tests

Test	Method
Braking	Measurement of braking distance
Handling, subjective	Subjective analysis of tyre behaviour

3.5. Environment and comfort tests

Test	Method
Noise	Subjective inside car noise
Rolling resistance	Coast-down outdoor rolling resistance

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4. Test cars

The test car for all tests was Audi A3 front wheel drive. Different engine models were used.

5. Test tracks

The tests were performed at two locations and at different temperatures.

Tests	Track	Test time	Test temperatures
Ice and snow	Test World Ltd, Ivalo, Finland	January 2012	-4 ... -11 °C
Wet and dry	Colmar-Berg, Luxembourg	January 2012	+6 ... +7 °C

6. Test team

All tests were carried out by Test World personnel.

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7. Results

Test results are displayed as

Index – larger index = better performance (reference tyre 100)
Grade – subjective grade between 4 = unacceptable and 10 = excellent
Speed – aquaplaning speed

7.1. Ice tests

7.1.1. Ice braking

Code	Index
Continental	116.8
Goodyear	113.3
Dunlop	113.2
Pirelli	102.5
Michelin	101.2
Nokian	100.0
Bridgestone	96.7

7.1.2. Ice acceleration

Code	Index
Dunlop	106.7
Goodyear	106.1
Continental	106.0
Nokian	100.0
Michelin	91.4
Bridgestone	90.9
Pirelli	89.7

7.1.3. Ice handling, objective

Code	Index
Continental	105.3
Goodyear	104.2
Dunlop	102.2
Bridgestone	101.2
Nokian	100.0
Pirelli	99.3
Michelin	97.9

7.1.4. Ice handling, subjective

Code	Grade
Continental	9.0
Goodyear	9.0
Nokian	7.5
Pirelli	7.5
Bridgestone	7.0
Dunlop	7.0
Michelin	6.0

7.2. Snow tests

7.2.1. Snow braking

Code	Index
Goodyear	103.7
Continental	102.6
Michelin	102.2
Pirelli	102.1
Dunlop	101.7
Bridgestone	100.0
Nokian	100.0

7.2.2. Snow acceleration

Code	Index
Goodyear	105.8
Michelin	104.4
Dunlop	103.9
Continental	103.7
Pirelli	103.6
Bridgestone	100.8
Nokian	100.0

7.2.3. Snow handling, objective

Code	Index
Goodyear	105.7
Continental	103.6
Michelin	102.7
Pirelli	102.2
Dunlop	102.1
Bridgestone	101.4
Nokian	100.0

7.2.4. Snow handling, subjective

Code	Grade
Continental	9.0
Goodyear	8.7
Dunlop	8.3
Nokian	8.0
Michelin	7.7
Bridgestone	7.0
Pirelli	7.0

7.3. Wet tests

7.3.1. Wet braking

Code	Index
Bridgestone	101.0
Pirelli	100.2
Nokian	100.0
Continental	99.5
Goodyear	98.7
Dunlop	97.7
Michelin	94.9

7.3.2. Aquaplaning resistance

Code	Speed (km/h)
Bridgestone	81.3
Pirelli	76.1
Goodyear	72.5
Continental	70.3
Nokian	70.3
Michelin	68.5
Dunlop	62.1

7.3.3. Wet handling, objective

Code	Index
Continental	101.5
Bridgestone	101.4
Pirelli	101.3
Goodyear	101.0
Dunlop	100.7
Nokian	100.0
Michelin	99.4

7.3.4. Wet handling, subjective

Code	Grade
Continental	8.5
Bridgestone	8.0
Dunlop	7.5
Goodyear	7.0
Pirelli	6.5
Nokian	6.0
Michelin	5.5

7.4. Dry tests

7.4.1. Dry braking

Code	Index
Continental	101.1
Pirelli	100.8
Dunlop	100.7
Goodyear	100.2
Nokian	100.0
Bridgestone	99.5
Michelin	98.4

7.4.2. Dry handling, subjective

Code	Grade
Continental	8.0
Bridgestone	7.5
Pirelli	7.5
Dunlop	7.0
Goodyear	7.0
Nokian	6.5
Michelin	6.0

7.5. Environment and comfort tests

7.5.1. Noise

Code	Grade
Bridgestone	7.0
Continental	7.0
Nokian	7.0
Goodyear	6.5
Michelin	6.5
Dunlop	6.0
Pirelli	6.0

7.5.2. Rolling resistance

Code	Index
Bridgestone	100.3
Nokian	100.0
Dunlop	98.7
Michelin	98.3
Goodyear	97.4
Pirelli	97.3
Continental	94.9

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8. Test protocols

8.1. Braking

8.1.1. Results

- Braking distance for a selected speed interval
- Ice 20-5 km/h and 22-5 km/h
- Snow 35-5 km/h
- Wet asphalt 80-5 km/h
- Dry asphalt 100-5 km/h
- Snow and ice tests done 2-3 times, final result average of test runs

8.1.2. Car systems

- ABS on

8.1.3. Measurements

Ice and snow
- Reference tyre used after two test tires (REF-A-B-REF-C-D-REF)
- 12-16 brakings per tyre
- Brakings always on a new spot

Wet and dry
- Reference tyre used in the beginning and at the end (REF-A-B-C-D-REF)
- 8 brakings per tyre
- Brakings always on the same spot

8.1.4. Driving protocol

- Accelerate the vehicle over the chosen speed
- Put the clutch down and let the vehicle roll freely for a short time
- Brake hard, from 2-3 km/h over the target speed
- Steer straight
- Wait for the vehicle to stop
- Check the data after each braking
- Mark and repeat any faulty measurements

8.1.5. Measuring unit

- Racelogic VBox

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8.2. Acceleration

8.2.1. Results

- Acceleration time for a selected speed interval
- Ice 5-20 km/h and 5-22 km/h
- Snow 5-35
- Snow and ice tests done 2-3 times, final result average of test runs

8.2.2. Car systems

- Traction control on

8.2.3. Measurements

- Reference tyre used after two test tires (REF-A-B-REF-C-D-REF)
- 12-16 accelerations per tyre
- Accelerations always on a new spot

8.2.4. Driving protocol

- Stay still
- First gear, clutch down
- Lift clutch, throttle bottom
- Steer straight
- Wait for the vehicle to accelerate 2-3 km/h over the chosen speed
- Check the data after each acceleration
- Mark and repeat any faulty measurements

8.2.5. Measuring unit

- Racelogic VBox

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8.3. Handling

8.3.1. Results

- Sector times
- 2-4 sectors on a track
- Subjective comments
- Snow and ice tests done 2-3 times, final result average of test runs

8.3.2. Car systems

- ABS on
- Traction control on
- ESC off

8.3.3. Measurements

Ice and snow

- Reference tyre used after two test tires (REF-A-B-REF-C-D-REF)
- 3-4 laps (12-16 sector times) per tyre

Wet

- Reference tyre used in the beginning and at the end (REF-A-B-C-D-REF)
- 2-3 laps (12-16 sector times) per tyre

Dry

- No timing for dry

8.3.4. Driving protocol

- Drive normally finding the limit of grip
- No left foot braking / hand brake etc allowed
- Subjective comments of
  - steering
  - controllability on and over limit
  - behaviour during acceleration/braking in straight/curves

8.3.5. Measuring unit

- Racelogic VBox

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8.4. Aquaplaning

8.4.1. Results

- Aquaplaning speed for straight acceleration when tyre slip exceeds 10%

8.4.2. Car systems

- ABS on
- Traction control on
- ESC off

8.4.3. Measurements

- Reference tyre used in the beginning and at the end (REF-A-B-C-D-REF)
- 6-8 measurements per tyre

8.4.4. Driving protocol

- Follow the marked line when entering water
- Increase the speed at 2-3 km/h for every pass

8.4.5. Measuring unit

- Racelogic VBox III (100 Hz)

8.5. Noise

8.5.1. Results

- Subjective analysis of inside car tyre noise

8.5.2. Car systems

- All systems on

8.5.3. Measurements

- Reference tyre used after two test tires (REF-A-B-REF-C-D-REF)

8.5.4. Driving protocol

- Accelerate until 100 km/h
- Change to neutral gear
- Steer straight
- Let the car coast down freely until 40 km/h

8.5.5. Measuring unit

- Racelogic VBox for speed control

8.6. Rolling resistance

8.6.1. Results

- Rolling distance between 75-40 km/h

8.6.2. Car systems

- All systems on

8.6.3. Measurements

- Reference tyre used after two test tires (REF-A-B-REF-C-D-REF)

8.6.4. Driving protocol

- Accelerate until 80 km/h
- Change to neutral gear
- Steer straight
- Let the car coast down freely until 40 km/h
- Measure the rolling distance

8.6.5. Measuring unit

- Racelogic VBox

8.7. Result calculation methods

8.7.1. Indexes

- In all tests the reference tyre was given an index of 100%
- Values above 100% = better
- Values below 100% = worse

8.7.2. Grades

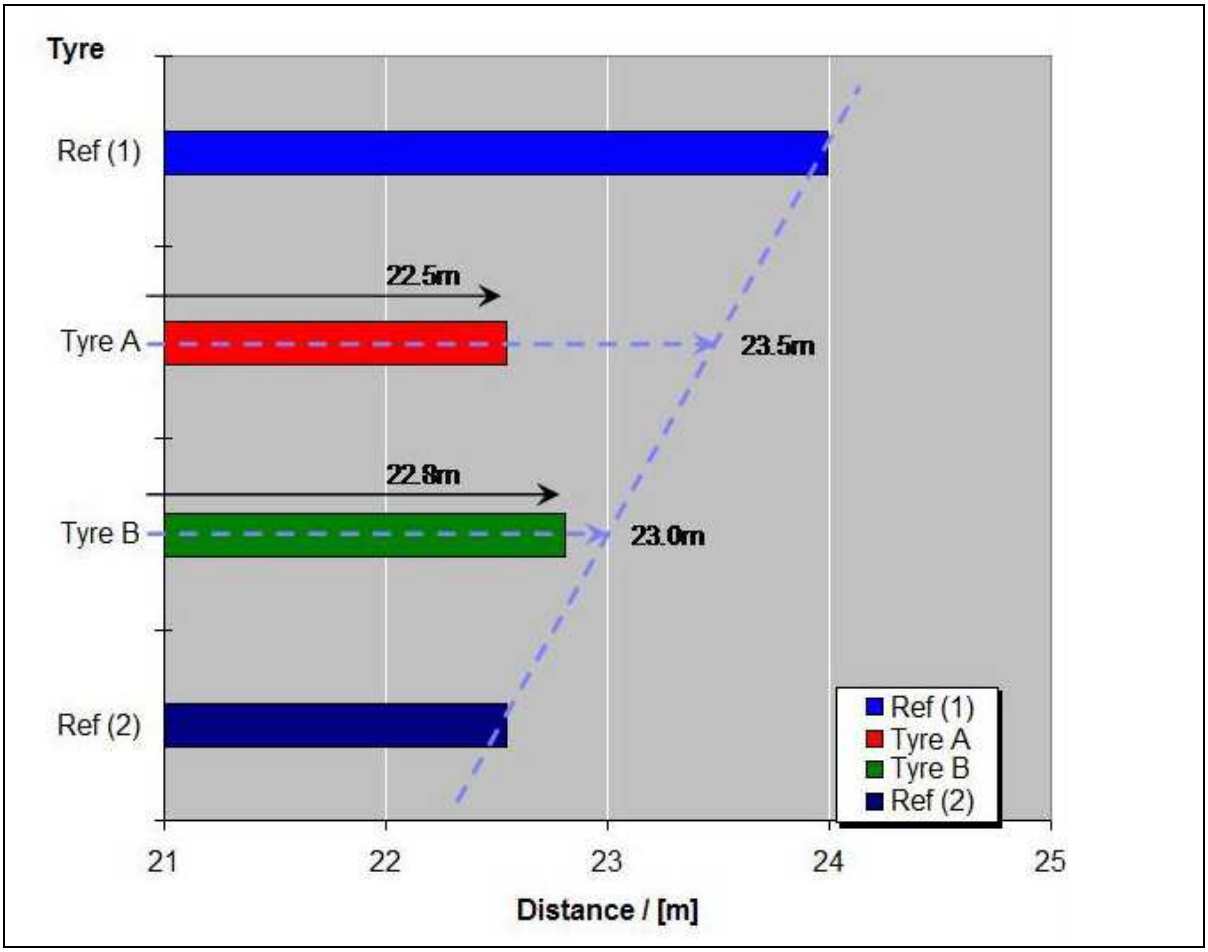
- In subjective tests a grading scale was used.
- The scale is from 4 = unacceptable to 10 = excellent.
- A one point grade difference can normally be recognized by a normal driver

8.7.3. Position correction

- In all tests position correction was applied
- In the method, any systematic effects caused by the track are eliminated

8.7.4. Reference calculation

- In all tests the reference method was used in calculations
- In the method, a reference tyre is driven at certain intervals to control any change in conditions



9. Conclusion

All tests have been executed applying Test World quality systems and requirements for test conditions, deviation, methods and security. Tests were executed using the same test methods as normally for magazines.

Test World Ltd hereby claims that the test results are representative for the tyre selection when tested under outlined conditions, cars, tracks and methods. Test World Ltd does not take responsibility for any liabilities from the conclusions drawn from the test results.

Ivalo, 10.5.2012

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