

## **Brembo brakes put to test at the Formula 1 Bahrain GP 2017**

It all comes down to the performance of the braking systems of the single seaters in Bahrain, one of the toughest circuits for brakes.

From April 14th to the 16th, the Bahrain International Circuit will host the 3rd round of the 2017 World Formula 1 Racing Championship. Located in the Sakhir desert, the circuit was designed by Hermann Tilke, and its construction cost 150 million dollars, most of which was necessary to create the asphalt bed.

Thanks to the installation of an artificial lighting system, since 2014 the Bahrain GP has been disputed at night. Despite this, ground temperature during the last two editions has always ranged between 26 and 31 degrees. These values translate into a significant mechanical grip that this year is bound to increase due to the larger tires used.

The presence of many high-energy impact brakings, what's more concentrated in the central area of the circuit, means high friction material wear. To adapt to the 2017 single seaters, which yield higher performances than the previous years, Brembo technicians have increased the thickness of the carbon discs and have created new calipers.

For each team, Brembo constructed ad hoc braking system that ensure optimal integration with the aerodynamic and mechanical characteristics of the cars. Brembo has increased the number (from 1,200 to 1,400) and the dimension of the cooling holes to help dissipate heat generated during braking.

The Middle-Eastern circuit is an extremely tough test bench for all the components of the braking system, as shown by the difficulty index assigned by Brembo technicians. On a scale of 1 to 10, the Bahrain International Circuit earns a 9, making it one of the most challenging on brakes. Only Montreal, Mexico City, Abu Dhabi and Singapore rank higher.

### **The demand on the brakes during the GP**

In Bahrain the pilots use the brakes just under 16 seconds a lap, meaning 18% of the race.

Compared to last year's edition, average deceleration has increased from 4.1 to 4.4 g due to an increase of braking torque generated by the new regulations. Therefore, even the energy dissipated when braking has increased: this year, during the entire race, on average a single seater will dissipate 174 kWh, equal to an hourly consumption of 152 inhabitants of Bahrain.

From start to checkered flag, each pilot will use the brakes 450 times, exerting a total force on the pedal of approximately 53 tonnes. In other words, each pilot exerts a load of over 570 kg per minute.

### **The most demanding braking sections**

Of the Bahrain International Circuit's 8 braking points, 4 are classified as crucial for brakes and the other 4 are of average difficulty. Deceleration in six of these braking points is at least 4.5 g.

The most difficult braking point is that of curve 1, dedicated to Michael Schumacher: the cars hit the area at 327km/h and brake for 2.5 seconds in 69 meters to strongly decelerate to 78km/h. The pilots exert a load of 128 kg on the pedal and are forced to withstand 4.8 g of deceleration, which equates to the value usually experienced by astronauts during their return to Earth.

The same deceleration is also in bend 14, but the peak speed before braking (304 km/h) and that at the entrance (122 km/h) are lower: this means less braking time and space, 2.18 seconds and 52 meters.

Braking in bend 4 is an impressive feat: in only 53 meters, less than half the height of the highest mountain in Bahrain, the single seaters loose 186 km/h with a deceleration of 4.7 g.

### **Brembo performance**

In Bahrain, the single seaters equipped with Brembo calipers have won 10 of the 12 editions disputed up to now, including the last 9. The most victorious Racing Team with Brembo brakes in Sakir is Ferrari with 4 wins. All 7 pilots that won the Bahrain GP have triumphed at least once with Brembo brakes. Sebastian Vettel and Lewis Hamilton are tied at 2 victories.