



Over 1,000 degrees for the F1 discs, more than 4,000 stops for the systems at Le Mans

## Formula 1 vs Le Mans: a comparison of Brembo braking systems

**The differences and similarities in brakes on an LMP1 car and a Formula 1 car. Brembo compares the braking systems supplied to the teams of the two competitions.**

For years, Formula 1 and the 24 Hours of Le Mans have been the two most important competitions in the world for 4-wheel prototypes. The massive investments made by Manufacturers in recent years have led to these single-seaters being equipped with engines that register up to one thousand horsepower.

To keep these beasts at bay, the braking systems have to be powerful and extremely reliable. In Formula 1, there are very intense decelerations that often surpass 5 g (at Monza they get up to 5.8 g), while at the 24 Hours of Le Mans the intensity of the braking does not go over 3.5 g. This difference is due to the different mass of the two prototypes. A Formula 1 single-seater has a minimum weight of 702 kg with the driver on board, while an LMP1 car racing at Le Mans has a minimum weight of 875 kg (855 for non-hybrid LMP1 cars).

On the contrary, a Formula 1 race cannot last more than 2 hours, but the 24 Hours of Le Mans lasts an entire day. Taking this into consideration, a comparison between two similar tracks for length, curves, geographic collocation and climate would be effective: during the Belgium GP in Spa, the Formula 1 single-seaters are called to face nearly 350 braking sections, while at the 24 Hours of Le Mans, an LMP1 car brakes up to 4,000 times in all. This is a true challenge for Brembo, but the Group has acquired more than 20 years of experience in endurance racing, providing tailor-made solutions.

The only common factor among the cars that race in the two competitions is the carbon that the discs are made of. All of the other characteristics of the discs differ significantly, as you can see in the table below:

Formula 1		24 Hours of Le Mans
28 mm	Disc thickness	30/32 mm
278 mm	Diameter of front discs	320-370 mm
278 mm	Diameter of rear discs	320-350 mm
More than 1,000	Number of ventilation holes	From 36 to 430
350-1000 degrees	Range of use	350-800 degrees
Less than 1 mm	Consumption	3-4 mm

The fact that the prototypes racing at Le Mans use much thicker discs is explained by the necessity to complete a 24 hour race with the same set. Brembo succeeded in doing this back in 2001 with the Team Joest Audi R8 that won the race.

The difference in disc diameter is linked to the size of the rims for the respective championships: in Formula 1, 13 inch rims are currently permitted but at the 24 Hours of Le Mans, 18 inch rims are used.

Ventilation of the LMP1 cars is not as intense because at the 24 Hours of Le Mans the teams face the exact opposite problem to the Formula 1: rather than cool the systems, they have to prevent the temperature from dropping too low, especially at night or during neutralisation phases.

Just like in Formula 1, the LMP1 cars at the 24 Hours of Le Mans use Brembo carbon brake pads: of course they are thicker to guarantee that they remain fully operational throughout the 24 hours. Consumption of the pads and discs in Formula 1 is less than one millimetre, while the prototypes racing at Le Mans consume 3-4 mm per disc and 8-10 mm per pad.