MICHELIN®
Race Tire Catalog
and User's Manual

MICHELIN

A better way forward

WELCOME TO THE MICHELIN RACING FAMILY

1913 MICHELIN wins the Indianapolis 500 with Jules Goux in a Peugeot.

1923 André Lagache and René Leonard triumphed at the first 24 Hours of Le Mans with MICHELIN® tires.

1965 MICHELIN introduces its radial tire to the racing world with the XAS tire.

1973 MICHELIN wins the first World Rally Championship with an Alpine/Renault.

1978 Six months after MICHELIN's F1 debut, Carlos Reutemann scores the company's first win in the Brazilian Grand Prix.

1979 Ferrari driver Jody Scheckter becomes the F1 world champion and his team wins the constructor's championship while riding on MICHELIN® tires.

1983 F1 driver, Nelson Piquet, becomes the world champion on MICHELIN® rubber.

1984 After proving their capabilities by winning 14 of the 16 races in F1, MICHELIN decides to withdraw from the top racing series.

1993 MICHELIN-shod Peugeots take the top three spots at Le Mans.

1994 MICHELIN wins a seventh straight title in the World Rally Championship.

1995 A BMW V12-powered McLaren F1 GTR takes the top spot in a rain-soaked 24 Hours of Le Mans.

1996 MICHELIN-shod Porsches were victorious in the GT1 and GT2 categories at 24 Hours of Le Mans.

At MICHELIN, we work continuously to develop the most advanced tire technologies. In the laboratory or on the racetrack, we strive to be the best and provide quality performance tires and valuable technical support for every team running on MICHELIN® rubber. This manual was designed to reinforce our place as a top player in the world of motorsports and give you a helpful tool to get the results you desire on the track. Inside, you will find key sizing and technical information necessary for attaining maximum performance from your racing tires.

OUR RACING HERITAGE

Dedication to competition has long been an important part of the MICHELIN corporate philosophy. Our racing heritage dates back to 1891, when our tires helped Charles Terront and Jiel Laval capture a victory in the Paris-Brest-Paris bicycle race. Since that first triumph, we have been committed to designing tires that perform at the highest level and meet the demands of our customers. Since we passionately engineer each tire, we design and produce some of the best tires for the top racing series around the world. And like the best drivers in the world, our validation comes from MICHELIN® tires crossing the line first.

1998 MICHELIN took overall victory at Le Mans with a Porsche GT1 and topped the GT2 category with an Oreca Viper.

1999 The Oreca Viper dominated the GTS category of Le Mans with MICHELIN® rubber.

2000
- With the announcement of a return to F1 in 2001, MICHELIN tests more than 3,000 tires and covers more than 6,200 miles.
- Oreca Vipers took the top two spots in the GTS category while running on MICHELINs at Le Mans.

2001 In the first season back in F1, MICHELIN and BMW/Williams found the top of the podium four times.

2002
- The Peugeot 206 took an astonishing 8 wins before securing the top spot in the WRC on MICHELIN® tires.
- MICHELIN found victory lane twice in a hard-fought F1 season.
- Oreca Vipers, on MICHELIN® rubber, took top honors at the Rolex 24 Hours of Daytona.

2003

- In the third season back in F1, MICHELIN-shod cars were victorious 6 times.
- MICHELIN® tires took the top 10 spots at the historic 24 Hours of Le Mans.

2004 MICHELIN® tires took the 12 Hours of Sebring and the 24 Hours of Le Mans ...again.

2005 MICHELIN sweeps the F1 driver and constructor championships; WRC; MotoGP and is victorious at the 24 Hours of Le Mans for the eighth consecutive year.

2006 MICHELIN teams again capture the F1 driver and constructor championships; the MotoGP championships and win every manufacturer, team, driver and tire championship in the American Le Mans Series while sweeping the top 13 places at the 24 Hours of Le Mans.

2007 A first for a tire manufacturer, MICHELIN completed its first perfect season in the American Le Mans Series (ALMS) competition. MICHELIN also secured an unprecedented tenth consecutive win at the 24 Hours of Le Mans.

TIRE MEASUREMENTS

One of the advantages of the MICHELIN® racing slick's radial construction is dimensional consistency. Most teams will find over time that there is no need to measure rollout as tires are changed. Once you have established the optimum setup for your car at a given track, this benefit will minimize changes due to tire irregularities.

MICHELIN® racing slicks are currently offered in the following sizes:

Tire Size	Diameter		Approximate Tread Width		Section Width (mm) on Rim (in)	Section Width (in) on Rim (in)	Rev. per mile	Rim Width (in)
	mm	in	mm	in				
16/53 - 13 X TL	532	20.9	175	6.9	216 on 8.0 x 13	8.5 on 8.0 x 13	983	5.5 to 8.0
20/54 - 13 X TL	544	21.4	195	7.7	226 on 8.0 x 13	8.9 on 8.0 x 13	957	8.0 to 9.0
22/54 - 13 X TL	545	21.5	220	8.7	265 on 10.0 x 13	10.4 on 10.0 x 13	956	8.5 to 10.0
24/64 - 18 X TL	643	25.3	225	8.9	254 on 9.5 x 18	10.0 on 9.5 x 18	807	8.5 to 10.0
27/68 - 18 X TL	682	26.9	270	10.6	317 on 12.0 x 18	12.5 on 12.0 x 18	761	10.5 to 12.0
27/65 - 18 X TL	648	25.5	270	10.6	296 on 11.0 x 18	11.7 on 11.0 x 18	801	9.5 to 11.5
28/71 - 18 X TL	705	27.8	265	10.4	299 on 11.0 x 18	11.8 on 11.0 x 18	735	10.0 to 11.5
29/65 - 18 X TL	655	25.8	280	11.0	318 on 12.0 x 18	12.5 on 12.0 x 18	797	11.5 to 12.5
30/65 - 18 X TL	653	25.7	300	11.8	320 on 12.0 x 18	12.6 on 12.0 x 18	795	11.5 to 12.5
31/71 - 18 X TL	708	27.9	315	12.4	347 on 13.0 x 18	13.7 on 13.0 x 18	732	12.0 to 13.5
33/65 - 18 X TL	651	25.6	327	12.9	355 on 13.5 x 18	14.0 on 13.5 x 18	797	13.0 to 13.5
37/71 - 18 X TL	710	28.0	376	14.8	400 on 14.5 x 18	15.7 on 14.5 x 18	726	14.0 to 14.5

To understand what these numbers mean, see the sizing information below.
(To convert from centimeters to inches, divide by 2.54)

First Number indicates approximate tread width in centimeters

Second Number indicates overall diameter in centimeters

Third Number indicates rim diameter in inches

27 / 68 – 18

//EXAMPLE

Tire has 27 cm wide tread, is 68 cm in diameter, and uses an 18 inch wheel
Diameter in inches = 68 / 2.54 = 26.8 inches
Approximate tread width in inches = 27 / 2.54 = 10.6 inches*

So, it is similar in size to a 27 x 10.5 – 18 tire in common North American designation

*Measuring tread width is subjective and varies by tire brand. There is no industry standard. MICHELIN strives to characterize tread width as the width of the tread actually in contact with the road surface on a typical road, at a typical load and at a typical operating inflation pressure.

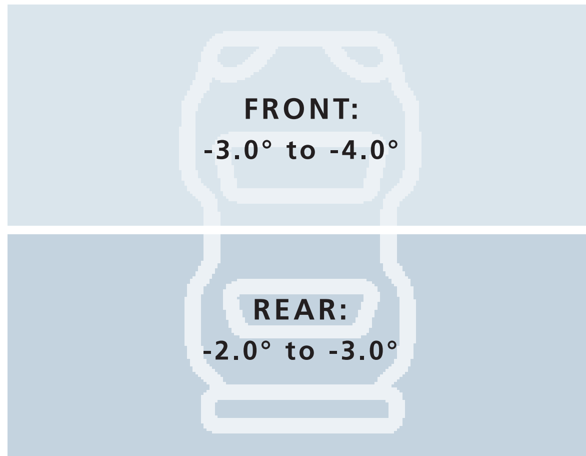
CAMBER AND PRESSURE RECOMMENDATIONS

When considering a race vehicle's optimal camber settings, a number of factors come into play such as track layout, suspension geometry, aerodynamic downforce and maximum speed on the track.

When it comes to setting the camber, you cannot precisely say in advance what the ideal setup will be — the only way to determine this is to run the car, then measure tire temperatures and pressures.

Our experience has shown that most cars on most road courses should run camber settings as stated in the chart below:

Track layout // Suspension geometry // Aerodynamic downforce // Maximum speed on the track



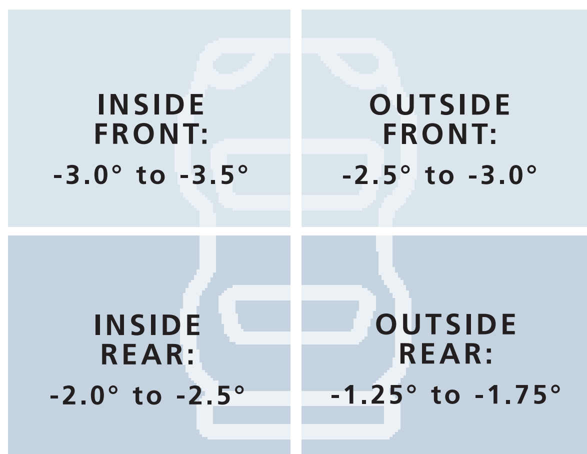
Typical road course camber setup

Cars using the wider 30/65-18 and 31/71-18 tires (such as Vipers and Porsche GT1/GT2s) will perform better with camber settings closer to -3.0° in the front and -2.0° in the rear.

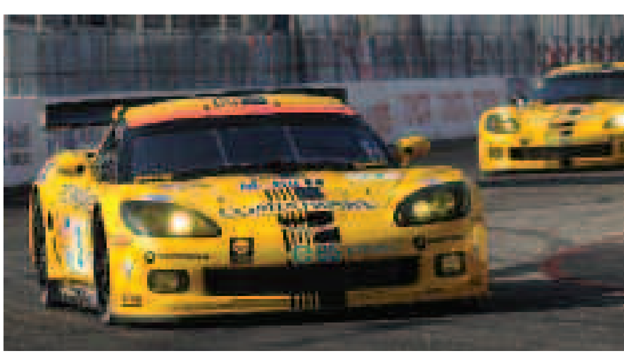
When competing on tracks with a pronounced bias for turns in only one direction (examples: Lime Rock, Road Atlanta) it may be advantageous to run less negative camber on the inside wheels.

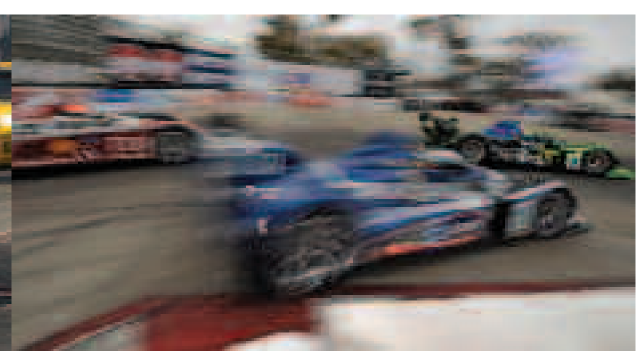
Also, when driving on a track that requires more hard braking, your car may benefit from less negative camber. This should improve straight-line braking but will typically be at the expense of a slight loss of ultimate grip in the middle of the corners.

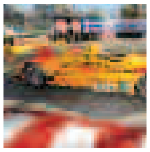
For tracks with sections of high-banking, or "rovals", the camber settings must be significantly reduced because the track's banking dramatically increases the load on the tires. In this case, cambers should be set as follows:

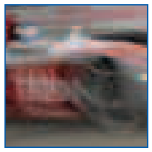


Roval camber setup









READING THE MICHELIN® RACING SLICK

Reading the pressures and temperatures of your new MICHELIN® racing slicks is one of the only sources for objective data on how your car is handling. By combining this data with the input you obtain from driving, you can decide the best route to getting the most from your MICHELIN® tires.

Collecting Data

On most road courses a minimum of six hot laps should be run before considering any changes based on temperature and pressure readings. This is because it takes a certain amount of "energy input" for tire pressures and tread temperatures to stabilize. Taking readings before the tires have reached stable operating conditions is not recommended and may lead you to miss the ideal setup.

After a hot lap session, temperatures should be taken at three points across the tire; start at the inside shoulder of the tire, move to the center, then finish at the outer shoulder. Readings on the outboard sections of the tire should be taken about 1 1/2" from the shoulder. Taking temperatures too close to the "corner" of the shoulder will give an inaccurate reading. Due to heat dissipation, time plays a critical role in collecting the most accurate data. It is recommended that you begin with the outside rear tire and be sure to focus on the tread temperatures first.

Below is an example of the minimum data that you should collect from each run with some sample comments added:

LEFT FRONT					RIGHT FRONT				
Cold pressure	Hot pressure	Outside	Center	Inside	Inside	Center	Outside	Hot pressure	Cold pressure
22.0	32.5	195°	201°	195°	185°	182°	173°	30.5	22.0
		Average = 197°			Average = 180°				
Cold pressure	Hot pressure	Outside	Center	Inside	Inside	Center	Outside	Hot Pressure	Cold Pressure
22.0	30.0	186°	183°	192°	189°	189°	180°	31.0	22.0
		Average = 187°			Average = 186°				
LEFT REAR					RIGHT REAR				

MICHELIN® slicks are designed to operate at pressures ranging from 30 psi to 32 psi hot.

A cold pressure of around 22 psi should be a good starting point, which can then be fine-tuned to your car's setup and your driving style. You should never go below 19 psi cold, to avoid any risk of bead unseating.

Temperature readings should only be taken with a probe-type device.

Non-contact infrared devices are not recommended as they only take surface temperatures which cool at a much quicker rate and are not reliable. Both pyrometers and pressure gauges should be periodically calibrated or verified against calibrated equipment.

Working with the Data

There is a wealth of information that can be gained from one set of hot laps. In most cases, when a car is set with the proper camber and pressure settings, the outside shoulder temperatures should be about 10 degrees Fahrenheit lower than the inside shoulder temperatures. And the center temperatures should be similar to slightly cooler than the inside temperatures.

//EXAMPLE

The Problem

The chart shows example readings of a set of tires that completed a hot lap session before being measured. Let's assume the driver was complaining about understeer. Looking at the left rear temperatures and pressures of the set of tires, you might be tempted to add 1.5 psi or 2.0 psi to the left rear tire — after all, the tire pressure is on the low side, and the tire temperature is lowest in the center, indicating the pressure is too low. Furthermore, it should help the understeer in right-hand corners. However, a little additional analysis shows that there is another problem with the car. By looking carefully at the left front temperatures, we see that there may not be enough negative camber in that position because the outside temperature is equal to the inside temperature.

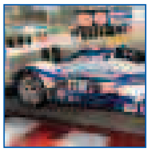
The Solution

The most logical solution for this situation is to slightly increase the negative camber of the left front, and rerun the car without changing the tire pressures. This should increase the grip at the left front, reducing the understeer. This in turn will reduce the work going into the left front, lowering its temperatures and pressures. Increasing the grip on the left front will put more stress on the left rear, increasing its temperatures and pressures, and thus, bringing the entire car into a better balance.

This example demonstrates that incorrect tire pressures can be the result of vehicle setup as well as a cause of handling problems. Careful analysis is required to determine whether the **pressures** *are the cause of or the* **result** *of a classic setup problem. In general, tire pressures should be one of the final adjustments made to a car's setup, used for very fine-tuning. Remember, any adjustments that affect car handling are interrelated and tire data should be collected after each change is made to the car.*

Never skip this step.





TEMPERATURE VS. PRESSURE

A tire's pressure is dependent on its temperature. If the tire temperature increases, the air pressure in the tire increases as well. For every 10 degrees Fahrenheit increase in temperature, the tire will gain approximately 0.7 psi.

This ratio is extremely important to keep in mind when setting tire pressures. A good rule of thumb is to choose a cold starting pressure, set at the beginning of the day, with tires that have NOT been exposed to direct sunlight. At the same time, set the pressures in all of the tires that you plan to use that day. This becomes the baseline.

To better understand how temperatures can affect tire pressures and car performance, refer to the following chart:

	The wrong way – Adjusting absolute pressures	The right way – Adjusting pressure differences from a baseline
8:00 am Ambient temperature 60° F	Set all tires in Set One and Set Two to 22 psi.	Set all tires in Set One and Set Two to 22 psi.
11:40 am Ambient temperature 80° F	Set One running on car. Set Two left front and right rear sitting in the sun, at 100° F and now at 25 psi. Set Two right front and left rear, sitting under the awning, at 80° F and now at 23.5 psi.	Set One running on car. Set Two left front and right rear sitting in the sun, at 100° F and now at 25 psi. Set Two right front and left rear, sitting under the awning, at 80° F and now at 23.5 psi.
11:45 am	Driver comes in after 10 laps on Set One. Car balance is good, grip seems a little low. Tires are at 34 psi all around, target pressure is 31 psi. Hot tires are 3 psi too high.	Driver comes in after 10 laps on Set One. Car balance is good, grip seems a little low. Tires are at 34 psi all around, target pressure is 31 psi. Hot tires are 3 psi too high.
11:50 am	Tire man figures that his 3 psi hot is about equal to 2 psi cold, so he should have used 20 psi instead of 22 psi. Resets all 4 tires in Set Two to 20 psi and gives set to crewchief to put on car.	Tire man figures that his 3 psi hot is about equal to 2 psi cold, so his cold pressures are 2 psi too high. Bleeds 2 psi out of each tire in Set Two, bringing left front and right rear down to 23 psi, and right front and left rear down to 21.5 psi. Gives set to crewchief to put on car.
12:10 pm	Driver comes in after 10 laps on Set Two. Car is oversteering in right turns and understeering in left turns, and car is bouncing a lot. Car has a problem with the shocks, or maybe we got a bad set of tires. Pressures are: LF : 27 psi RF : 29 psi LR : 29 psi RR : 27 psi	Driver comes in after 10 laps on Set Two. Car balance is good, grip is better with the new tires and lower pressures. Pressures are: LF : 31 psi RF : 31 psi LR : 31 psi RR : 31 psi

TIRE TROUBLESHOOTING TIPS

Below is a partial list of things to consider for troubleshooting handling issues. Keep in mind that it is up to you to determine what changes to make to a car and when.

Chasing car setup If you seem to be chasing your setup, consider increasing the number of hot laps between setup changes. Tires should be up to operating temperatures and recommended hot pressures before making changes to the setup.

Pressure as a "Quick Fix" Tire pressure should never be used as a "quick fix" for a car's handling problem. It should only be considered for fine-tuning vehicle performance. Therefore, changing away from the recommended hot pressure should be the last adjustment, not the first.

Excessive shoulder wear Adjust static and/or dynamic camber (the camber "gain" of the suspension geometry) to reduce loading on the affected shoulder.

Straight-line instability Check for incorrect toe (especially rear) or rear axle out of square. Consider increasing front tire pressure or adjusting brake bias if instability occurs under braking.

Safety Considerations

- Never race on an underinflated tire.
- We strongly discourage soaking of tires. It can be hazardous to the person soaking the tires, the environment and the tire itself. The additional complexity and components in radial tires puts the product at risk when solvents are used in an attempt to "soften" the tread area of the tire.
- We strongly discourage pressure bleeders. A bleeder is another item that can fail. With a proper pressure management program you can obtain repeatable and correct hot pressures without the risk of additional components.
- Always inspect each tire thoroughly, prior to and immediately following each use.
- Get familiar with your new tires.

Tire storage tips

In order to preserve the characteristics and properties of tires, there are some important rules to be observed during storage. The following should be avoided:

- Direct and prolonged exposure to sunlight, sources of high heat and humidity, long term storage in stacks.
- Exposure to low temperatures (50 ˚F / 10 ˚C).
- The presence of solvents, lubricants, fuel and other chemical products.
- Equipment causing ozone emission (transformers, welding units, electric motors, etc.).
- The storage space must be dry, well-ventilated, without direct light and reserved for tires. Racks suitable for storing tires vertically should be used to avoid exercising pressure on the carcasses.

Tire aging

- Tires age even when not used or if they are only used occasionally; excessive aging of tires may lead to loss of grip.
- Remove from usage tires presenting clear signs of aging or fatigue (cracking of the rubber of the outer tread, of the shoulder, of the bead, deformation, etc.). When in doubt, contact a tire professional.

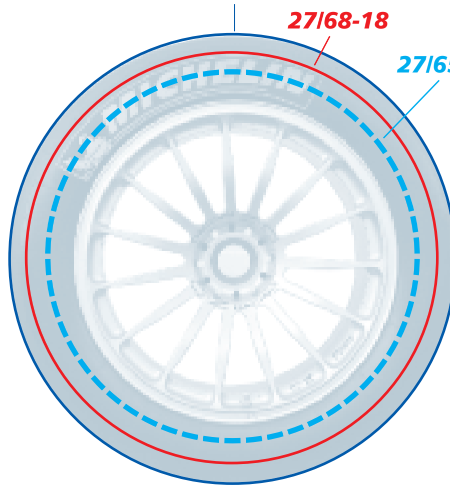


A SPECIAL NOTE ON PORSCHE

WHY RUN ON 27/68-18 OR 28/71-18

To get the most from your modern 911 racecar, MICHELIN recommends using the 27/68-18 or 28/71-18 on the rear axle. These sizes were specifically designed for the latest-generation 911 racecars (including those based on the 993, 996 and 997) and were developed and tested in world-wide competition. Compared to the 27/65-18, the taller size offers several advantages:

1. The increased diameter of the tread band permits easier conformation of the tire to the flat road surface; the tire's tread "maps" to the road surface more readily. This results in improved temperature distribution and increased performance over a longer duration.
2. The greater diameter also increases the total amount of tread rubber available to transfer power to the ground, again improving temperature distribution and prolonging performance consistency.
3. The taller sidewall helps cushion the shock of power application, providing more progressive corner exit with less wheelspin during aggressive acceleration.



BIGGER DIAMETER = GREATER CIRCUMFERENCE = MORE TREAD VOLUME

//EXAMPLE APPLICATIONS

Tire Size		Example Application	Product Number
16/53 - 13	S6B	Formula SAE	03585
16/53 - 13	P220	Formula SAE (Rain)	86922
20/54 - 13	S308	Formula BMW USA (Front)	80320
20/54 - 13	P304	Formula BMW USA (Front Rain)	97282
22/54 - 13	S400	Formula BMW USA (Rear)	92526
22/54 - 13	P400	Formula BMW USA (Rear Rain)	99599
24/64 - 18 CUP	282 G	Porsche GT3 Cup (Front Blue Sticker)	06757
24/64 - 18	S8D	Race-prepared 911 of the 993/996/997 series (including GT3 Cup) (Front)	07503
24/64 - 18	P2A	Race-prepared 911 of the 993/996/997 series (including GT3 Cup) (Front Rain)	92284
27/65 - 18	S7A	Race-prepared 993-type Porsche GT2, race-prepared BMW M3 (Front)	82634
27/65 - 18	S8B	Near-stock 911 of the 993/996/997 series (not for "serious" race-prepared cars like Carrera Cup or SuperCup cars) (Front or Rear)	08105
27/65 - 18	P2C	Race-prepared 993-type Porsche GT2 racecar (Front Rain)	41559
27/68 - 18 CUP	284 G	Porsche GT3 Cup (Rear Blue Sticker)	38455
27/68 - 18	S8B	Race-prepared 911 of the 993/ 996/997 series (including GT3 Cup), race-prepared BMW M3 (Rear)	06059
27/68 - 18	P2A	Race-prepared 911 of the 993/996/997 series (including GT3 Cup) (Rear Rain)	76703
27/68 - 18	S9C	Special banked-track version of the GT3 Cup (Rear)	07447
28/71 - 18	S9A	Race-prepared 911 of the 993/996/997 series (Rear) Recommended for 996-series GT3 R, GT3 RS and GT3 RSR	00504
30/65 - 18	S8C*	GT1 and GT2 cars, Corvettes, Vipers, etc. (Front Soft)	05221
30/65 - 18	S8D*	GT1 and GT2 cars, Corvettes, Vipers, etc. (Front Medium)	36576
29/65 - 18	P2C*	GT1 and GT2 cars, Corvettes, Vipers, etc. (Front Rain)	33093
31/71 - 18	S9C	GT1 and GT2 cars, Corvettes, Vipers, etc. (Rear Soft)	32796
31/71 - 18	S9D	GT1 and GT2 cars, Corvettes, Vipers and Porsche 993-type GT2, etc. (Rear Medium)	04963
31/71 - 18	P2C	GT1 and GT2 cars, Corvettes, Vipers and Porsche 993-type GT2, etc. (Rear Rain)	67555
33/65 - 18 TL (limited availability)		Prototype and SR1 cars, Ferrari 333SP, Riley-Scott Mark III, Audi R8 (Front)	34892
37/71 - 18 TL (limited availability)		Prototype and SR1 cars, Ferrari 333SP, Riley-Scott Mark III, Audi R8 (Rear)	12841

*Not for rear of Porsche 911 based cars.

Made for champions

DISCLAIMER

This brochure has been developed to assist you in getting the most out of your tires during a given race or track session. This information is general in nature and numerous variables such as track conditions, car setup and driver preference will play an important role in determining the optimum race configuration for your car. Setup information contained in this brochure is for your consideration only and is provided as a convenience to assist you with your new tire purchase. It is up to you to determine the best setup for your application.

Race tires hotline: 1.800.722.3234