

New Formula Vee tyre for 2020.

As everyone would be aware by now Formula Vee has a new control tyre for 2020.

The tyre is the Dunlop CR82.

While the Advan was an excellent product in its own right, Formula Vee lacks the weight and Horse Power to make the compound work in its desired heat range.

The Dunlop CR82 is specifically made for Formula Vee, the tyres width; weight and rolling radius are a perfect combination.

The new tyres are of Bias Cross ply construction which will give excellent feedback, enable controlled slides and are forgiving when maximum grip levels are reached.

DIFFERENCE BETWEEN BIASED CROSS PLY AND A RADIAL

It is important to know how the Bias Cross Ply works as opposed to the Radial Tyre, this knowledge is needed to assist in the new set up of the car and what to expect when racing on it.

The main difference is in the construction;

Biased Cross Ply have relatively stiff side walls and a flexible tread face, therefore hot pressures are reasonable critical. Excessive air pressure will cause the tread face to bulge (crown), reducing the contact patch. When pushed hard in a corner the tyres will start to slide rather than snap break away because of the stiff side walls.

Radial has a very stiff tread face (usually with steel bands built into it), and flexing side walls. Under normal conditions the flexing of the side allows the tyres tread face to keep contact with the road surface however the tyres will tuck under when pushed in a corner.

The following points will need to be remembered:-

- 1) Bias Tyres work best stood up (about 1 to 1 1/2 degree negative camber) were as Radials generally needed more static negative camber (about 2 to 3 degrees).
- 2) For Bias Tyres it is important to set the tyre pressures before the race so that they come up to correct pressure in the race (more on this below). The ideal pressure is when the tyre has a slight crown on top; this means that the tyre will be flat across its face at the bottom with the cars weight on it.
- 3) With Radials, air pressure was used to reduce sidewall rollover (help stop the tyre wallowing in corners due to the tyre bagging).
- 4) Radials generally provide more breakaway grip than a bias tyre, however Radials give less warning before 'breaking away'. This made radials harder to drive at the limit.
- 5) Bias ply tyres give more warning (than radials) about traction limits and have excellent feedback of what the contact patch is doing.
- 6) Bias ply tyres are far more responsive to changes so make them in small increments.
- 7) The Radials had an aggressive tread pattern which helped them disperse water, a pressure adjustments is required with the Bias ply tyre to make them work, also the deeper the tread pattern the better.
- 8) Bias tyres are much lighter than Radials; this gives better tyre frequency and is kinder on car components.
- 9) Radials tend to give better brake feel than Bias Cross Plys, this is due to the steel band in the tread surface preventing the tread surface distorting under brake loads. However this will be somewhat offset by the new Bias Tyre compound having much more grip.

Measured differences between new and old FV tyres.

Below is a table of the physical differences that I have measured.

Characteristic	Advan	Dunlop	Difference
Front Tyre	185/55/15	120/590/15	-
Rear Tyre	195/55/15	135/620/15	-
Front Tyre Weight	7.63Kg	4.68Kg	2.95Kg
Rear Tyre Weight	8.67Kg	6.45Kg	2.22Kg
Front Tyre width	185mm	120mm	65mm
Rear Tyre width	195mm	135mm	60mm
Front Rolling Radius	297mm @ 22psi	295mm	2mm
Rear Rolling Radius	288mm @ 22psi	305mm	17mm
Rear Rolling Radius	285mm @ 15psi	305mm	20mm
Rear Rolling Circumference	1,810mm @ 22psi	1,897mm	4.8%
Rear Rolling Circumference	1,791mm @ 15psi	1,897mm	5.9%

BEDDING IN NEW TYRES

The tyre bedding process heats the tyre up to operating temperature and chemically sets the compound to ensure good tyre life in both wear and grip level over the tyre's life.

The process is very simple; Set tyre pressures to 19 psi front, 20 psi rear.

1st Lap scrub tyres to remove mould release, tyres will be slippery.

Laps 2 and 3 build up speed slowly and get tyres up to operating temperatures.

Lap 4 do one hot lap at race speed, (on a very cold day it may take 2 laps), you will know you are on the hot lap by the cars grip level coming in. Do not keep driving hard after the hot lap.

Once the tyres have done a hot lap then do a cool down lap (avoid aggressive driving in corners).

Park the car and either remove wheels or put the car on stands so that the tyres are not sitting on concrete with the weight on the car on them.

Let the tyres sit for at least 3 hours, (preferably night). I have always bedded tyre in the last session on Friday.

DO NOT try to bed tyres on a wet track; the tyres will be super slippery. When they are finally scrubbed they will feel soft but will never have the grip of a hot bedded tyre.

TYRE PRESSURES

Pressure will determine the tyres contact patch, ideally you want a small amount of crown so that the weight of the car gives the tyre a flat contact with the road surface.

Tyre temperature and pressures are directly related. Tyres tend to cool down on the straights and heat up in the corners.

On a test day set front and rear pressures to about 3 psi below the desired hot pressure, straight after your test session check and bleed off tyres back to the required hot pressure.

Do this after every session and in an exercise book note; Track, time of day, weather, air temperature (use a wall that has not been in the sun), track (pavement) temperature, starting pressure, final hot pressure and the difference they came up. You will very quickly have enough data to work out what starting pressures you will need before a race considering the conditions.

Note that at different tracks the pressure stager will vary.

Example Winton being a clockwise track the left hand side of the car will be doing more work so the starting pressures on the left-hand side of the car will need to be lower to start with.

After the final bleed off for the day let the car sit for 3 hrs (or next morning) check the pressures and find out what they come in at cold.

In a race if you find the tyres have gone over pressure the car will slide about more, this in turn will create more heat. Remember that the tyres cool down on straights and heat up in corners. Try going a bit easier through corners; pick a slight later apex if the front understeer is increasing, open the steering wheel out a bit earlier if the rear is starting to get away from you. After a short while you will find that the tyres will start to come back to you. This is all race craft that will stay with you wherever you go.

Tyre management is very easy and rewarding to get right, remember you are out there racing, not just driving in 'ever decreasing circles'.

CAR SET UP

A good starting point for set up to go testing would be-

FRONT

Camber – 1 $\frac{1}{2}$ degrees

Castor – 4 $\frac{1}{2}$ degrees

Toe – 1mm out

Ride height - 45mm (see note below)

Hot pressure – 22 psi maximum

REAR

Camber – 1 $\frac{1}{4}$ degrees

Toe – 1mm in

Ride height – about 65mm (see note below)

Hot pressure – 23 psi maximum

Rake ideally about 15mm to 20mm.

Note – With the rear swing axle suspension, ride height and camber are interconnected; 1 degree of camber lowers the rear end about 14mm.

The camber of the rear end is most important part of set up. Set it first then adjust front ride height to get rake.

SHOCK ABSORBER SETTINGS

The front wheel frequency will be reduced by about 5% due to the lighter front tyre. If your car is fitted with reasonable quality shock absorbers and they are not currently at the bottom end of their adjustment range then a couple of clicks should dial out any dampening problem. If you do experience front shudder then check the usual suspects; loose wheel bearings, steering rack, ball joints, rod ends and uneven castor from side to side.

To set bump; set shocks on full soft, keep increasing bump until you experience chatter then go one click softer.

Use rebound for slowing weight transfer through a particular part of the track; if the rear is coming up under brakes add rebound (Too much rebound may create wheel spin in a corner by stopping the wheel contacting the road). If you are experiencing exit understeer add rebound to the front to slow down the weight transfer.

Use rebound or sway bars for lateral weight transfer, never bump.

WET TYRE SET-UP

Two schools of thought; either soften suspension set up and allow car to weight transfer in corners or leave as is with a dry set up provided the car is balanced.

The soft set up makes the car easier to handle, the dry set up is great if the track looks like drying out.

Whichever you choose make sure you pump the tyres up to 26 to 30 psi; this will make the tyre crown and punch through the standing water. The tread will also open up and allow the tyre to pump more water from the contact patch.

You will be surprised how well the tyres will handle the wet. It is important to remember to adjust your brake bias to the rear to prevent front lock up as the forward weight transfer under brakes in the wet is much less.

WHAT TO DO IN TESTING

Break up a corner into a series of parts. -

Braking; weight transfers to front, front goes down, rear comes up. Car should be stable. If car darts about check front for bump steer or add castor.

Turn in; initially equal weight on front tyre, car should point in nicely. Front toe out helps with turn in.

Corner entry; car should be balanced and weight transfer should transfer to the outer wheels as you get to the apex. This is where the car's camber comes into play.

Apex; by now you should be back on the throttle and feeding the power in. Cars roll should start to even out.

Corner exit; Power down and weight transfers to rear, front rises, rear squats. Car should not understeer. Front droop comes into play by keeping some weight on front.

- Try different hot tyre pressures, Tyre gauges will vary so that the actual reading may be different from gauge to gauge. Hot tyre pressures may be varied between 18 psi and 23 psi.
- Try different camber, remember that adjusting front camber will change toe and in some cases with the ball joint front end, castor. Increase in castor tends to make steering heavier. Too little castor may make the front end dart and wander down the straight.
- Try different Toe Out on front and rear. Front will give a more responsive turn in and rear should assist with the mid corner understeer. Toe In on rear makes it more stable on exit (reduces oversteer). Remember toe will have some effect on straight line speed and add tyre temp.
- Try to keep front ride height as low as possible, new ride height is 40mm minimum.
- Try to keep rear ride height as high as possible. Keeping in mind that the rear camber and rear ride height are interrelated due to the nature of the swing axle.
- Use front ride height to control rake and static car weight distribution.

A GUIDE TO GENERAL PROBLEM SOLVING

To Decrease Understeer	To Decrease Oversteer	Adjustment
Higher	Lower	Front Tire Pressure
Lower	Higher	Rear Tire Pressure
More Negative	More Positive	Front Wheel Camber
Toe-out	Toe-in	Front Toe
Toe-out	Toe-in	Rear Toe
More Positive	More Negative	Front Caster
Soft	Stiffen	Front Springs
Stiffen	Soft	Rear Springs
Smaller	Larger	Front Anti-sway bar

Note - the new tyres are sensitive to change, make changes in small increments.

TYRE STORAGE

Between Race Meetings tyres should be kept in a dry, cool, dark environment for them to maintain good grip. Best wrapped in black plastic garbage bags, avoid hot and sunny (UV) environments.

DUNLOP TYRE SUPPLIERS

Tyres should be available from December 2019.

The price negotiated by the FVAA includes fitting and balancing and disposal of old tyre
Make sure your rims are reasonable straight and that you get the fitted wheels balanced.
With the lighter unsprung mass balancing is more noticeable.

New South Wales	Gary's Motorsport 3/13 Penny Pl Arundle Park
Victoria	Stuckeys Tyre Service 828 Sydney Road Brunswick Melbourne
South Australia	North Terrace Tyres 55 North Tce Hackney, Adelaide
Western Australia	Kosteras Tyre Service 7 Mead Street Kalamunda, Perth
Tasmania	Fultons Enterprises 41 McKenzie St Mowbray, Launceston
Queensland	Queensland Raceway Champions Way Willowbank, Ipswich

CONCLUSION

Keep an eye on wear; it will give you a good indication to the car's setup.

Too much wear on centre – pressures to high.

Too much wear on both shoulders – pressures to low.

Too much wear on inner shoulder – too much camber or toe out.

Too much wear on outer shoulder – not enough camber or too much toe in

The operating temperature of the tyres should be between 65 and 90 °C.

Some use a pyrometer to check car set up, I have always found reading the wear on the tyre gives a much more accurate indication of set up. If using a pyrometer, temperatures across the tyre should be within a 5°C range, slightly higher on the inside.

The learning curve is going to be relatively easier than previous tyres; the new tyres tend to be forgiving and should allow you to explore limits. No tyre is that good that if you go in far too hard then you are not going to spin.

The above information is intended as a guide and will vary from car to car.

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