

CHAPTER 1

INTRODUCTION TO TIRE MARKINGS

A problem confronting the accident investigator in examining tires is that there is such a wealth of makes, types and sizes that he must be conversant not only with the characteristics of the tire he is being asked to examine but also with any possible interaction of that tire with other tires.

The tire industry, in doing its best over the years to identify the various types of tire, has inadvertently laid traps for the unwary, and so before we consider tire problems we must consider what is engraved on the tire sidewall — and what is left off (which is just as important) — and what it all means.

Size — In the early days of the tire industry, there were two tire dimensions quoted: the overall diameter and width. These were written as, for example, 32 x 6. This meant that the tire was 32 inches in diameter and 6 inches wide. In those days, tires were as high as they were wide and so our 32 x 6 tire was also 6 inches high and was fitted to a wheel which was $32 - (6 \times 2) = 20$ inches in diameter. (Tire height, or the distance from tread to bead, must be subtracted twice from the tire diameter to give the wheel diameter.)

This led to some confusion because people tended to think (and still do think) that if a 32 x 6 tire was not available, a 32 x 6½ tire would do. It wouldn't, for the simple reason that the wheel size for a 32 x 6½ tire would have been $32 - (6\frac{1}{2} \times 2) = 19$ inches. To overcome this problem in understanding, the tire industry began to quote tire sizes as a width and a wheel diameter, thus, 4.50-17. Note that "X" has been replaced by "-", read as "for", i.e., 4.50 for 17. A 4.5 inch wide tire for a 17 inch diameter wheel. It needs little imagination to see that 4.50 x 17, as it is still sometimes mistakenly written, is quite a different size. Try working out the wheel size just to drive the point home. Having done that, consider a 6.50 x 12 tire and, if you can, picture the wheel size!

The point here is to get the terminology correct even if it is commonly misused.

Size marking would present no problem if tires had remained as wide as they were high, i.e., with an aspect ratio of 100, but making tires squatter was found to have distinct advantages and so, in an attempt to separate the various aspect ratios, increasingly complex ways of using the sizing were employed until a 6.20 and a 6.2 and a 6.25 were all very different tires.

Suffice it to say that this confusing muddle was resolved by marking the aspect ratio in with the size. This meant that a 225/60R13 tire is (nominally) 225mm wide, has a 60% aspect ratio, i.e., it is 60% as high as it is wide, is radial (R) and fits a 13 inch diameter wheel.

Type — All was well in the early days, as all tires needed inner tubes. Then in the early 50's tubeless tires arrived. No problem to the tire industry, just mark tubeless tires as such: TUBELESS.

The others? No problem again. Leave them as they always had been with nothing on the sidewall. This practice still largely persists today. If the tire does not specifically say TUBELESS, it should be taken as a type needing an inner tube.

This is an obvious case for Murphy's Law (If it can go wrong, sooner or later it will) to apply. Many manufacturers make both tubeless and tubed tires, and to save the cost of a special mold for each, they use a simple insert to identify the tire.

If a tubeless tire has an inner tube fitted, it normally will present no problem, (see Chapter 12) but if a tubed tire is fitted without its inner tube, air will quickly force its way into the cord structure and force it apart because, unlike tubeless tires, tubed tires have no thick rubber inner liner to prevent air permeation.

So if the factory forgets to fix the tubeless tire label to the mold, its tires will say nothing and the trade will conclude that they are tubed type and fit an inner tube — no problem. But if the tubeless designation is left in the mold by mistake, and Murphy's Law says sooner or later it will be, the tires will be vulcanized with the incorrect designation TUBELESS

and will fail in service with all the attendant chances of an accident.

To avoid this possibility, many manufacturers (but not all) also designate their tubed tires with the engraving TUBED TYPE, or less commonly, REQUIRES INNER TUBE. Clearly at some stage the investigator confronted with an unidentified tire failure should verify that the tire is of the correct designation by confirming that the cord structure inside a tubeless tire is covered by a continuous inner liner of adequate gauge.

Many tire companies realizing the serious consequences of using tubed tires as tubeless make a common tire of tubeless construction. This is necessarily more expensive but it is safer. You cannot rely on every tire being of this construction, unfortunately.

Construction — In the early days of the tire industry, all tires were bias (or cross) ply. When radial constructions began to appear, some means of distinguishing such tires was desirable and they were simply engraved RADIAL. Cross or bias ply tires, being predominant, said nothing about their construction.

The very early radial tires were made in inch sizes but quite quickly passenger tires in radial construction changed to metric sizing for the width, leaving the wheel diameter still in inches, so that 155-13 meant a 155mm wide tire to fit (or for) a 13 inch diameter wheel. Purists offended by this mixture of metric and imperial units will have to get used to it. The tire industry abounds in such anachronisms. Radial truck tires, however, remained, for a long time, and many still remain at the time of writing, in inch sizes with an R built into the size as a reminder, thus, 10.00R20 designates a 10 inch wide radial tire for a 20 inch diameter wheel.

The word RADIAL should also appear on both sides of any radial tire. Belted bias construction tires should carry a designation on both sides to that effect and the letter B in the size.

Tires are now required to say what materials are used and in what manner. A tire which says SIDEWALL 4 PLYES RAYON • TREAD 4 PLYES RAYON is almost certain to be of bias ply construction, but when there is a large difference in the ply material between tread and sidewall, it is probable that belts are used and so the tire is of either radial or