

ROLLING CIRCUMFERENCE

Rolling circumference is the distance a tire travels in one revolution. With the growing number of mechanical front wheel drive (MFWD) tractors, the rolling circumference of the tires play an important role in determining the correct setup for your tractor. In MFWD tractors, both the front and rear tires do the work. Since the front tires are smaller than the rear tires, the front tires have to rotate faster to cover the same distance as the rear. The mechanical gearbox in the tractor accomplishes this task. Typical Front/Rear gear ratios range from 1.2 to 1.5. When selecting tires for your MFWD tractors, be sure to maintain the proper ratio of rolling circumference for your tractor. Typical tractor setups maintain a positive front tire slippage or overrun from +1 to +5%*.

*Consult vehicle manufacturer for recommended range for your particular unit.

This positive slippage maintains good steering ability for the user and reduces tire wear. (Positive slippage-front tires pulling, or leading, the rear tires. Negative slippage-front tires resisting, or lagging, the rear tires.) Too much positive slippage would cause the front tires to try to do too much work, and they become less efficient. Too much negative slippage would have a braking effect on the front and reduce steering ability.

Revs/Mile can be determined from Rolling Circumference:

$$\frac{\text{Revs}}{\text{Mile}} = \frac{63360}{\text{Rolling Circumference (In.)}}$$

Rolling circumference of tires play an important role in maintaining the correct setup of your tractor. When choosing a different size or type of tire, make sure the rolling circumference of the tire is close to the rolling circumference of the old tire being replaced. An example of this procedure is the following:

GIVEN: FRONT: 420/80R28 UltraTorque
 REAR: 520/80R38 UltraTorque
 Front/Rear Gear Ratio: 1.333 (available thru tractor dealer)

FIND WHICH OTHER FRONT TIRES WOULD FIT ON THIS TRACTOR AND STILL MAINTAIN A POSITIVE SLIPPAGE OR LEAD IN THE RANGE OF +1 TO +5%.

1. Determine the rolling circumference of both front and rear tires using the "Rolling Circumference" section of this handbook. (Sizes are sorted by rolling circumference.)

420/80R28 UltraTorque Rolling Circumference = 168.3 In.
 520/80R38 UltraTorque Rolling Circumference = 218.6 In.
 Front/Rear Gear Ratio: 1.333 (available thru tractor dealer)

CURRENTLY:

Slippage =

$$\frac{\text{Front Tire Rolling Circumference} \times \text{FRONT/REAR Gear Ratio}}{\text{Rear Tire Rolling Circumference}}$$

$$= \frac{168.3 \times 1.333}{218.6}$$

$$= 1.024 \text{ IF THIS NO. } > 1 \text{ MEANS POSITIVE SLIPPAGE}$$

$$\text{IF THIS NO. } < 1 \text{ MEANS NEGATIVE SLIPPAGE}$$

TO FIND PERCENTAGE SLIPPAGE:

$$(1.024 - 1) = .024$$

$$\times 100 = 2.4\% \text{ SLIPPAGE (GOOD; WITHIN +1 to +5\% RANGE)}$$

NEW TIRE:

Now find a tire on the engineering data pages with approximately the same rolling circumference (668.3 In.) as the 420/80R28 front tire. Select 420/70R28 as a possible replacement. It has a rolling circumference of 158.7 In.

Now check to see if this tire matches with the rear to maintain a positive slippage of +1 to +5%.

420/70R28 DT812 Rolling Circumference = 158.7 In.
 520/80R38 UltraTorque Rolling Circumference = 218.6 In.
 Front/Rear Gear Ratio: 1.333 (available thru tractor dealer)

Slippage =

$$\frac{\text{Front Tire Rolling Circumference} \times \text{FRONT/REAR Gear Ratio}}{\text{Rear Tire Rolling Circumference}}$$

$$= \frac{158.7 \times 1.333}{218.6}$$

= .966 IF THIS NO. > 1 MEANS POSITIVE SLIPPAGE
 IF THIS NO. < 1 MEANS NEGATIVE SLIPPAGE

TO FIND PERCENTAGE SLIPPAGE:

$$(.966 - 1) = -.034$$

$$\times 100 = -3.4\% \text{ SLIPPAGE (NOT ACCEPTABLE; NOT WITHIN +1 TO +5\% RANGE)}$$

TRY ANOTHER TIRE WITH A ROLLING CIRCUMFERENCE CLOSER TO THE 14.9R30 DYNA TORQUE RADIAL OF 167.4 in.