

**Policy Document****LOADER/DOZER/GRADER TYRE MATCHING POLICY**

February 2011

*(This replaces Otraco's December 2010 policy document)*

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# Loader/Dozer/Grader Tyre Matching Policy

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## 1 INTRODUCTION

This tyre matching policy applies to:

- Loaders, dozers and graders.

Tyre matching criteria and tolerances under this policy are the same irrespective of whether radial ply or bias ply tyres are fitted to the machine.

The reason that we need to follow tyre matching rules for loaders, dozers and graders is to ensure that tyre and machine component life are not compromised. Poor tyre matching by circumference / diameter can result in significantly reduced tyre life through excessive tyre tread wear, and in significantly reduced life of machine drive train components.

## 2 DEFINITIONS

The following definitions are used in relation to this tyre matching policy.

- **Inflated circumference** of a tyre: is the circumference measured along the tread centre line of a fully inflated<sup>1</sup> tyre. – typically measured with a tape measure.
- **Average tread depth** of a tyre: is the average of the two tread depths taken at the quarter-points of both shoulders of a tyre<sup>2</sup> – typically measured with a tread depth gauge; this measurement may be taken on an inflated or deflated tyre<sup>3</sup>.

## 3 POLICY

Loader, dozer and grader tyres should be matched in terms of inflated circumference or average tread depth within the dimensional tolerances set out below. While matching tyres by inflated circumference is the most accurate method it is often impracticable (because one tyre is often in a deflated state, and also because of increased potential risks with the task); hence matching by tread depth is, in practice, usually the preferred method and is quite reliable provided that the tyres being measured and compared are of the same brand, size and tread pattern<sup>4</sup>.

Retreaded tyres should always be matched by inflated circumference rather than tread depth because of variations in retread thickness. The same rule applies to repaired bias ply tyres that have been autoclave cured because of the probability of tyre shrinkage during curing.

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<sup>1</sup> The measured circumference of tyre will vary significantly depending on whether the tyre is inflated or deflated.

<sup>2</sup> Example: a tyre whose quarter-point tread depths are 43mm on one shoulder and 47mm on the other shoulder has an average tread depth of 45mm  $[(43 + 47) / 2]$

<sup>3</sup> A tyre's tread depth measurement does not vary whether the tyre is measured while inflated or deflated.

<sup>4</sup> "Same tread pattern" also implies the same Original Tread Depth (OTD).

### **3.1 Loaders & Dozers**

This policy applies to matching tyres across the same axle, and matching tyres between the front and rear axles.

- The maximum difference in tyre circumference (or overall diameter/radius) from side to side on the same axle should not exceed 3%.
- The maximum difference in tyre circumference (or overall diameter/radius) between the largest tyre on the machine and the smallest tyre on the opposite axle should not exceed 4% for mechanical-drive machines and 6% for electric-drive machines.

Refer to Tables 1 and 2 for allowable variations in remaining tread depth (RTD) for matching tyres on loaders and dozers.

### **3.2 Graders**

This policy applies to matching tandem tyres only. There is no requirement to match non-driven front tyres.

- The maximum difference in tyre circumference (or overall diameter/radius) between the largest drive tyre on the machine and the smallest tyre on the opposite tandem should not exceed 3%.
- The maximum difference in tyre circumference (or overall diameter/radius) between the front and rear tyres on the same tandem should not exceed 2%.

Refer to Tables 1 and 3 for allowable variations in remaining tread depth (RTD) for matching tyres on graders.

**MATCHING TYRES ON LOADERS, DOZERS & GRADERS**

Because Otraco often needs to check and compare inflated tyres already fitted to the machine with unmounted deflated tyres, we must generally use tyre tread measurements rather than tyre circumference measurements to compare the tyres for matching (note that to do this, both tyres must be of the same specification - brand, tread pattern & original tread depth - OTD). However, if we are comparing retreaded tyres or autoclave repaired bias ply tyres, then we must use tyre circumference (rather than tread depth) as the comparative measure.

Otraco's tyre matching system is based on Caterpillar's system for mechanical-drive loaders, dozers and graders, and on Le Tourneau's system for electric-drive machines.

If tyre Protector Chains are fitted, then the chain gauge/thickness must be accounted for in the maximum allowable tread depth variations shown below.

**Table 1: Tyre matching tolerance by size**

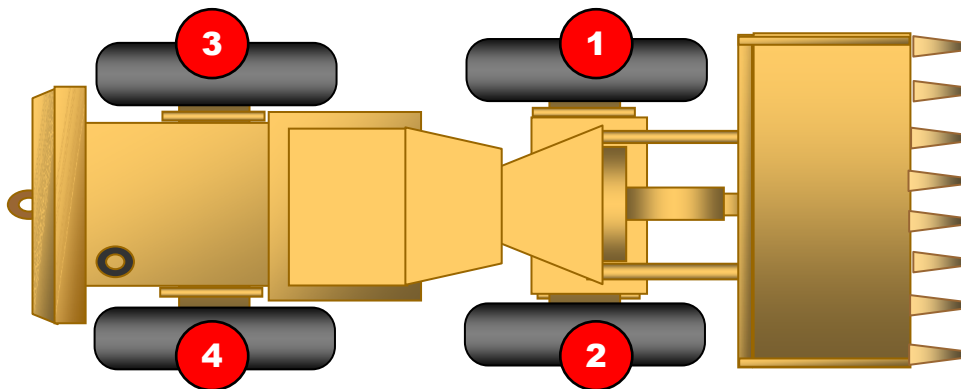
Tyre size	Brand	Specification	Maximum Allowable Variation in Tyre REMAINING TREAD DEPTH (mm) <i>refer Notes 1 &amp; 2</i>				Mechanical Grader	
			Mechanical Loader/Dozer Side to Side <i>based on 3% circum.</i>	Mechanical Loader/Dozer Front & Rear <i>based on 4% circum.</i>	Electrical Loader/Dozer Side to Side <i>based on 3% circum.</i>	Electrical Loader/Dozer Front & Rear <i>based on 6% circum.</i>	Within a tandem <i>based on 2% circum.</i>	Among the 4 drives <i>based on 3% circum.</i>
70/70-57 58/85-57 53.5/85-57 49.5/85-57 60/80R57	Firestone Firestone Firestone Firestone Michelin	SRG DT LD L4 SRG DT LD L4 SDT LD L5 SDT LD L5 XMINED2	56 mm	75 mm	56 mm	112 mm		
65/65-57 55.5/80R57 55/80R57	Bridgestone Bridgestone Michelin	DL VSDL XMINED2	52 mm	70 mm	52 mm	105 mm		
55.5/80-57 52/80-57 50/80-57	Bridgestone Goodyear Goodyear	DL All Specs All Specs	50 mm	68 mm	50 mm	100 mm		
50/65x51	All Brands	All Specs - radial & bias	42 mm	56 mm	42 mm	84 mm		
45/65x45	All Brands	All Specs - radial & bias	37 mm	50 mm	37 mm	75 mm		
40.5/75x39	All Brands	All Specs - radial & bias	37 mm	50 mm	37 mm	75 mm		
37.5x39	All Brands	All Specs - radial & bias	36 mm	48 mm	36 mm	73 mm		
37.25x35	All Brands	All Specs - radial & bias	34 mm	46 mm	34 mm	68 mm		
37.5x33	All Brands	All Specs - radial & bias	34 mm	46 mm	34 mm	68 mm		
40/65x39	All Brands	All Specs - radial & bias	33 mm	44 mm	33 mm	66 mm		
33.25x35	All Brands	All Specs - radial & bias	32 mm	43 mm	32 mm	64 mm		
33.5x33	All Brands	All Specs - radial & bias	32 mm	43 mm	32 mm	64 mm		
29.5x35	All Brands	All Specs - radial & bias	31 mm	41 mm	31 mm	61 mm		
33.25x29	All Brands	All Specs - radial & bias	30 mm	40 mm	30 mm	59 mm		
35/65x33	All Brands	All Specs - radial & bias	28 mm	37 mm	28 mm	56 mm		
29.5x29	All Brands	All Specs - radial & bias	27 mm	35 mm			18 mm	27 mm
26.5x29	All Brands	All Specs - radial & bias	27 mm	35 mm			18 mm	27 mm
29.5x25	All Brands	All Specs - radial & bias	26 mm	34 mm			17 mm	26 mm
30/65x29	All Brands	All Specs - radial & bias	24 mm	32 mm			16 mm	24 mm
26.5x25	All Brands	All Specs - radial & bias	24 mm	32 mm			16 mm	24 mm
23.5x25	All Brands	All Specs - radial & bias	22 mm	30 mm			15 mm	22 mm
18.00x25	All Brands	All Specs - radial & bias	22 mm	30 mm			15 mm	22 mm
20.5x25	All Brands	All Specs - radial & bias	21 mm	28 mm			14 mm	21 mm
16.00x25	All Brands	All Specs - radial & bias	21 mm	28 mm			14 mm	21 mm
16.00x24	All Brands	All Specs - radial & bias	21 mm	28 mm			14 mm	21 mm
14.00x25	All Brands	All Specs - radial & bias	20 mm	27 mm			13 mm	20 mm
17.5x25	All Brands	All Specs - radial & bias	19 mm	25 mm			13 mm	19 mm
14.00x24	All Brands	All Specs - radial & bias	19 mm	25 mm			13 mm	19 mm
13.00x24	All Brands	All Specs - radial & bias	19 mm	25 mm			12 mm	19 mm
15.5x25	All Brands	All Specs - radial & bias	18 mm	24 mm			12 mm	18 mm
12.00x24	All Brands	All Specs - radial & bias	17 mm	23 mm			12 mm	17 mm

**Note 1** The mm figures shown are those calculated according to the allowable percentage variation. In some cases this variation, in mm, may be greater than the original tread depth (OTD) of a particular tyre. If this is the case, it means that a brand new tyre can be matched with a completely worn out tyre, and still be within the allowed tolerance.

**Note 2** If chains are fitted to a machine, then the chain link thickness/gauge must be taken into account when comparing the variation in remaining tread depth (RTD) between tyres to check whether the tyres can be matched across the axle or between axles. This means that the chain link thickness (mm) must be added to the RTD (mm) of the tyre to which the chain will be fitted, and then this total amount must be compared against the other tyres being matched with it.

**Table 2: Allowable tolerances for matching tyres on Wheel Loaders and Dozers**

What to Measure	What to Compare (based on the maximum allowable variation in RTD shown in Table 1)	
	Matching tyres Side to Side	Matching tyres Front & Rear
<p>Determine the average remaining tread depth (RTD) of each tyre to be matched</p> <p><i>(If a tyre is fitted with a chain, add the chain link thickness to the average RTD of the tyre to determine the effective RTD of the tyre and chain)</i></p>	<p>Between positions 1 &amp; 2</p> <p>and</p> <p>Between positions 3 &amp; 4</p>	<p>Between the Largest tyre on the machine &amp; the Smallest tyre on the other axle</p>



**Table 3: Allowable tolerances for matching tyres on Graders**

What to Measure	What to Compare (based on the maximum allowable variation in RTD shown in Table 1)	
	Matching tyres Within a Tandem	Matching tyres Among the 4 Drive tyres
<p>Determine the average remaining tread depth (RTD) of each tyre to be matched</p>	<p>Between positions 3 &amp; 5</p> <p>and</p> <p>Between positions 4 &amp; 6</p>	<p>Between the Largest &amp; the Smallest of the drive tyres (positions 3 to 6)</p>

