BRAKE SHOE GUIDE

What Shoe is Right For You?

A Guide on Brake Shoe Linings

MAY 2020

BRAKE SYSTEMS

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One Shoe Does Not Fit All

TRP® Brake Shoe linings are available in either 21,000 lb or 23,000 lb Gross Axle Weight Rating (GAWR). So why are there 2 different types of linings available and which one is best suited for your application?

This guide was developed to help you understand why there are different types of lining material and to help you identify which lining is best suited for your application.

There are several different factors that need to be taken into consideration when choosing the right brake lining for your truck or trailer. All brake linings are designed to exceed maximum load limits in Australia so axle ratings, whilst important, don't play a large role in determining the right lining.

Consideration however, must be given to load, road type, braking frequency, maintenance practices, and driver habits when determining the right lining type.

What is right for one application may not be suited to another. Brake linings certified at 23,000 lb. could be much too aggressive for some applications, causing the brake drums to wear prematurely or result in brakes that "grab". Likewise, brakes certified at 21,000 lb. may not provide sufficient braking power to stop some heavy vehicles.

21,000 GAWR Friction Material

The TRP® 21K GAWR grade friction is stable and provides excellent wear and fade characteristics. It has consistent braking characteristics, low noise and provides great stopping power. It is best suited for on-highway trailer and truck applications.

23,000 GAWR Friction Material

The TRP® 23K GAWR grade friction material performs extremely well in demanding applications. It is formulated to handle high braking duty cycles encountered in city pick-up and delivery and highway applications where steep grades are negotiated. It is recommended in refuse, mixer, off-road, bus and tanker applications. It provides excellent lining life, superb stopping power, and superior resistance to fade.

Did you know?

Fade occurs when brake linings become extremely hot and lose some of their holding power.

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Gross Axle Weight Rating

A vehicle's Gross Axle Weight Rating (GAWR) is the specific weight determined to be the maximum allowable weight that can be placed on a vehicle's axle. The GAWR includes the weight of the truck and/or trailer, passengers and cargo.

Drive, Steer and trailer axles all have individual GAWR's. You can think of GAWR as a weight limit for each of the axles for your truck and trailer.

Overloaded or unevenly distributed heavy loads can make it difficult to control the truck and put stress on the brake system, causing the brakes to be less effective.

It's important to note that all TRP® brake linings exceed the maximum GAWR limit in Australia. However, choosing a 23,000 lb rated lining doesn't mean it is right for your application. Nor does it mean that you'll get any service life improvements from the lining. What is important is the application that the lining will be utilized in.

NHVL National Heavy Vehicle Law			
Max. Mass limit by Axle Group	6 t	17 t	22.5 t
Max. Mass limit by Axle	6 t	8.5 t Per axle	7.5 t Per axle

Brake linings ratings	GAWR (lbs.)	GAWR (t)
	21,000 lbs.	9.6 t
	23,000 lbs.	10.5 t

All brake linings exceed maximum load limit in Australia

Did you know?

Brake drums also play an important role in dissipating heat that is generated through braking. Overheating of the linings can cause glazing, blisters and discolouration, leading to premature wear and reduced performance. TRP® drums are all tested to FMVSS 121 standard and have excellent heat dissipation properties.

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Brake Lining Selection Guide

The below table has been developed to help you decide which is the right shoe for you and your application.

It's important to note that linings rated 23K GAWR are not necessarily better. It's all about the application that you are using your vehicle in.

FACTORS	21,000 GAWR LININGS	23,000 GAWR LININGS
Road Type	On-highway truck and trailer	On/Off-Highway, steep grades, worksites, city roads
Load Types	General cargo, produce	Liquids, gases, mining, logging, refuse, construction
Braking Frequency	Low, mostly interstate, moderate, mix of interstate and urban	Moderate to high, any environment
Maintenance Habits	Regular maintenance and services, maintenance as needed	Poor, intermediate service, brakes serviced when problem appears
Driver Habits	Gentle to average	Average to aggressive

Did you know?

When a brake lining gets hot, it swells. When it cools, it contracts – but usually not all the way back to its original size. "Swell" indicates how much the lining expands when heated, and "growth" indicates how thick the lining remains after cooling. Growth and swell can cause the linings to wear prematurely or cause the wheel to lock-up when the linings are hot.

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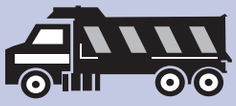
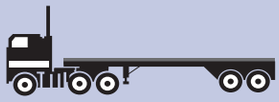
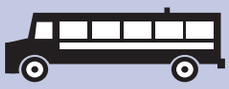
Typical Brake Shoe Applications

APPLICATION	TRUCK	21,000 LB GAWR	23,000 LB GAWR
Prime Mover		21K	23K
Agitator / Tipper			23K
Refuse			23K
Tandem Dump			23K
Beverage		21K	
Tri-Axle Trailer		21K	
Tanker		21K	23K
B Double Trailer		21K	
Moving Van - Low Profile		21K	
Tandem Axle Trailer		21K	
Flatbed		21K	
Single Axle Tractor Trailer		21K	
Bus			23K

The above table is a guide only. Best practice when choosing the right lining is to follow the manufacturer's recommendation.

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TRP® Brake Shoe Identification

FEATURES & BENEFITS

- Most truck and trailer applications are covered in the TRP® range, offering a wide selection and a one stop shop
- Designed, tested and engineered to meet the demanding conditions on Australian roads, ensuring TRP® brake shoes are reliable and built for purpose
- Automated riveting process eliminates any potential human error
- Certified to FMVSS-121 and ECE R90 (where applicable) to ensure TRP® Brake Shoes meet recognised, industry wide standards
- 300 hours salt spray paint finish ensures a high resistance to corrosion and rust
- 7 long weld points for strength and matched to OE specs increases durability and extends the service life
- OEM Quality hardware kit helps extend the life of the shoe
- 12 Month hassle free warranty for peace of mind

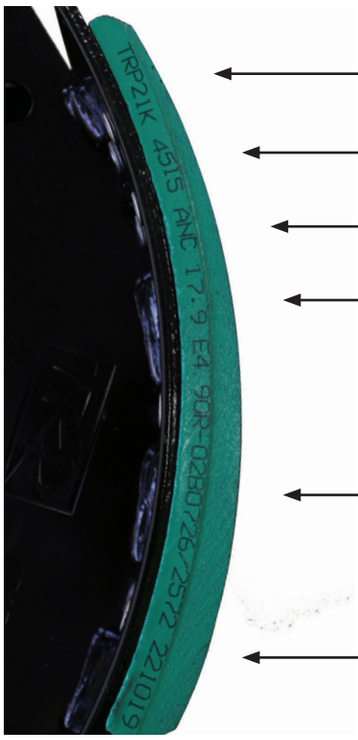
TRP® Brake Shoes and the friction material can easily be identified by the side markings and part numbers.

The 21,000 lb linings have a green edge colouring and part numbers all start with TRP21.

The 23,000 lb linings have a gold edge colouring and part numbers all start with TRP23.

Every brake shoe has an edge marking which can tell you a lot about that particular shoe and friction material. Below is an explanation on what those markings mean.

EDGE MARKINGS EXPLAINED



Material Lining Code
Identifies the linings GAWR & TRP brand

FMSI Lining Type
Standardised part number system used to identify the brake application

Cam or Anchor
Identifies orientation of the shoe

Lining Thickness
Measurement in millimetres

ECE R90 Approval (Where applicable)
Unique number that all ECE R90 certified linings are assigned.

Batch Code
Manufacturing tracking number for friction material

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TEST RESULTS

Not All Aftermarket Linings Are Created Equal...

TRP® Brake Shoes are independently tested to FMVSS 121, an industry recognised standard that tests whether a friction material has sufficient frictional characteristics to be safe on a given application.

TRP® Brake Shoes are also tested and certified to ECE R90 where applicable. This is a European standard, recognised by Australian Design Rules (ADR). A brake shoe tested to ECE R90 has to perform within 15% of the OEM product and all TRP® shoes certified to ECE R90 exceed this requirement.

WHAT IS FMVSS 121 STANDARD?

FMVSS 121 stands for Federal Motor Vehicle Safety Standard 121 and tests whether a given friction material has sufficient frictional characteristics to be safe on a given application.

FMVSS 121 is not a comparison of premium and standard linings. It is a measure of each product as it relates to the standard.

WHY TEST TO FMVSS 121 STANDARD?'

Testing TRP® shoes to the FMVSS 121 standard ensures that the linings are put through standardised testing. It verifies that the lining passes a set criteria at a given weight load.

Australian and New Zealand vehicle standards are for the fully dressed axle, so it is important that we use a recognised standard like FMVSS 121 to test the performance of the friction material.

MATERIAL TESTED AND TEST PARAMETERS

The test was performed by Link Manufacturing, an independent testing facility based in the US. The FMVSS 121 test was performed on the following Linings:

21,000 lb GAWR
TRP21K Lining Material
23,000 lb GAWR
TRP23K Lining Material

TESTING PARAMETERS

- Air Brake Chamber 30/30
- Slack adjuster 5.5″
- Factor 165 (30″x 5.5″)

*It's important to note that we tested to factor 165 for both standard and premium linings. The factor is calculated by multiplying the slack adjuster arm length by the air chamber diaphragm size. (30 x 5.5 = 165). We test to this factor as most class 8 trucks use a 5.5" slack adjuster and a 30/30 air chamber.

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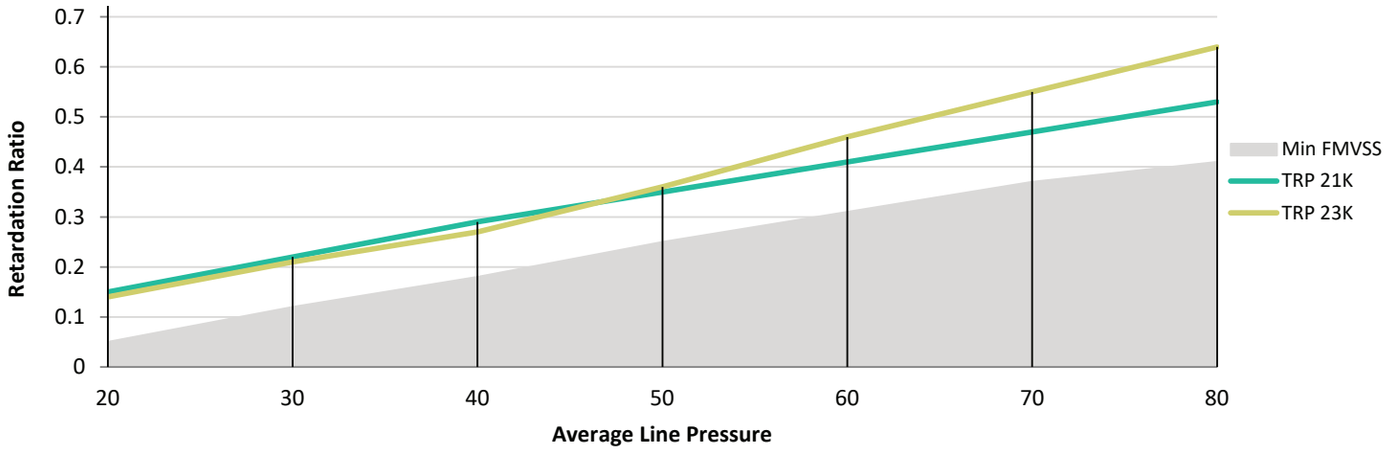
21K and 23K Comparison

The following graphs were created using the FMVSS 121 independent test results. The results show the difference in the stopping abilities of each lining material.

Retardation Force

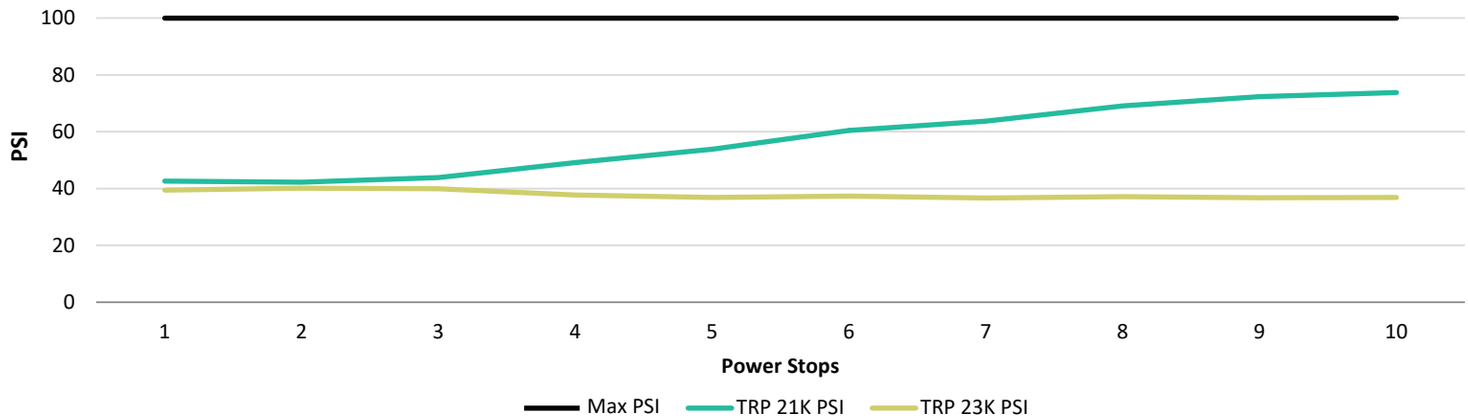
More force is better: Retardation ratio represents the force (PSI) applied by the brake divided by the Gross Axle Weight Rating (GAWR). A greater ratio implies a greater brake force.



- The above retardation force comparison shows that the 23K lining produces more overall friction than the 21K lining.
- More friction applied to the drum will generate better deceleration.

Fade Performance

Less is best: Simulates 10 continuous, abrupt decelerations. Lower air pressures indicate less brake force is required to perform the abrupt stop.



- As linings get hotter, more force (PSI) from the air chamber is needed to create enough friction in order to stop.
- The above comparison shows higher PSI is required over the 10 stops on the 21K lining, whilst the 23K remains consistent.

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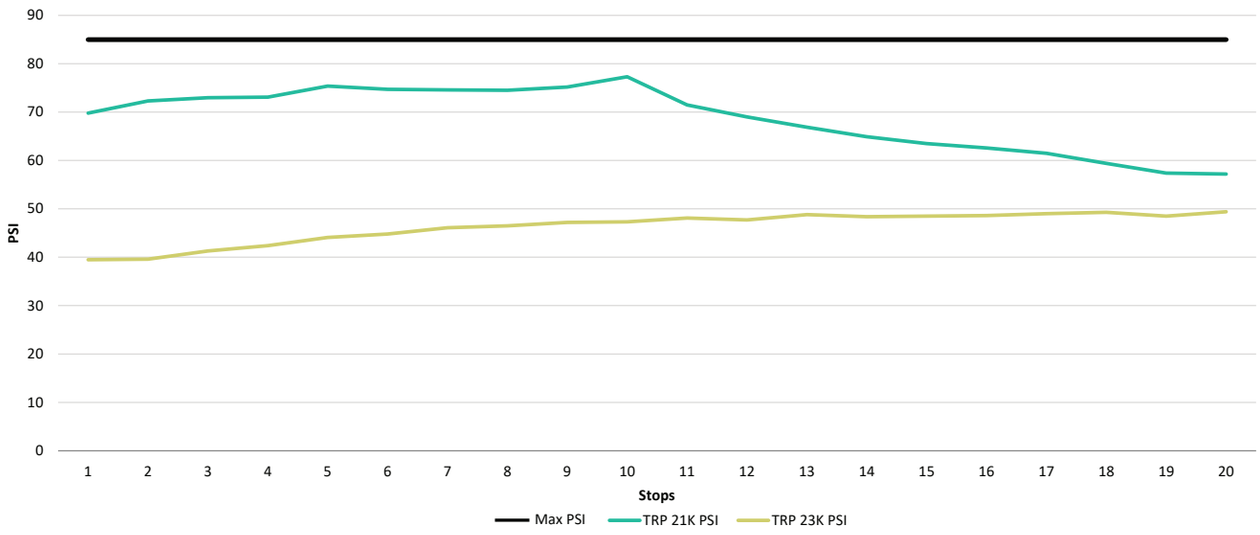
21K and 23K Comparison

Recovery Performance

Less is Best: Simulates how fast the lining material recovers after the Fade test and measures how well the brake copes with conditions that could result in brake fade.



- This test shows the ability of the linings to continue to create sufficient friction after it has been exposed to the high temperatures in the Fade test.
- The 21K lining shows a steady decrease in PSI over the 20 stops, whilst the 23K shows a consistent and steady PSI throughout the test.

Lining Weight Loss in Grams*

The above graph shows total weight loss of the linings and drum after the FMVSS 121 test has been completed. The smaller the bar the better the result. The leading OEM brake shoe manufacturer results have also been included. The comparison shows that TRP® linings outlast the OEM equivalent by up to 30% and deliver a better return on investment.

*21,000 lb GAWR lining comparison

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21K Brake Shoe Kits

PART NUMBER	SUITS	FMSI + SHOE TYPE	SIZE	ECE R90	CROSS REFERENCES
TRP19032/21/95	BPW BRAKE 95 BC/36/1	BC/36/1, B95	420MM X 180MM	Y	MKSMG2ABC36/95, BBC/36PT95K, 0509146320BH95, RDSKMG1ABC3695, TLSKMG1ABC36/95
TRP19032/21/NG	BPW NEW GEN BC36/1	BC/36/1, NG	420MM X 180MM	Y	MKSMG2ABC36/NG, , RDSK-MG1ABC36NG, Q ABP MG1ABC36/NG
TRP19094/21/95	BPW BRAKE 95 BC/37/1	BC/37/1, B95	420MM X 200MM	Y	MKSMG2ABC37
TRP211308Q	MERITOR STEER ‘‘Q’’	1308, Q	15” X 4” Q		KSMA2121308Q, Q ABP MG1A1308Q
TRP214311E	EATON DRIVE	4311, E	16.5” X 7”		KSMA2124311E, RDSKMG1A4725R
TRP214514Q	MERITOR STEER ‘‘Q’’	4514, Q	16.5” X 6” Q		KSMA2124514Q, RDSKMG1A4514Q, Q ABP MG1A4514Q
TRP214515FQ	FRUEHAUF/ SAF/ TMC	4515, F(Q)	16.5” X 7” Q	Y	KSMA2124515F3, RDSKMG1A4515F3, TLSKMG1A4515F3, Q ABP MG1A4515F3
TRP214515P	MERITOR DRIVE ‘‘P’’	4515, P	16.5” X 7” P	Y	PKSMA2124515P, RDSKMG1A4515PHD, Q ABP MG1A4515PHD
TRP214515PSS-01	MERITOR DRIVE ‘‘P’’ SEVERE SERVICE	4515, PSS	16.5” X 7” P	Y	PKSMA2124515PSS, RDSK-MG1A4515PSS, TLSKMG1A4515PSSK, Q ABP MG1A4515PSS
TRP214515Q	MERITOR DRIVE ‘‘Q’’	4515, Q	16.5” X 7” Q	Y	KSMA2124515Q, RDSKMG1A4515Q, TLSKMG1A4515Q, Q ABP MG1A4515Q
TRP214524Q	MERITOR STEER ‘‘Q’’	4524, Q	16.5” X 5” Q		KSMA2124524Q, RDSKMG1A4524Q, Q ABP MG1A4524Q
TRP214702QP	MERITOR STEER ‘‘Q PLUS’’	4702, QP	15” X 4” Q PLUS		KSMA2124702QP, Q ABP MG1A4702QP
TRP214707QP	MERITOR DRIVE ‘‘Q PLUS’’	4707, QP	16.5” X 7” Q PLUS	Y	KSMA2124707QP, RDSKMG1A4707QP, TLSKMG1A4707QP, Q ABP MG1A4707QP
TRP214709E2	EATON ESII DRIVE	4709, ESII	16.5” X 7”		KSMA2124709E2, RDSKMG1A4311E, Q ABP MG1A4311E, Q ABP MG1A4709E2
TRP214710QP	MERITOR STEER / TRAILER ‘‘Q PLUS’’	4710, QP	15” X 8 5/8” Q PLUS		KSMA2124710QP, RDSKMG1A4711QP, Q ABP MG1A4710QP
TRP214711QP	HENDRICKSON INTRAAX	4711, QP	16.5” X 8 5/8” Q PLUS		KSMA2124711QP, B4711PTQK, Q ABP MG1A4711QP
TRP214715QP	MERITOR STEER ‘‘Q PLUS’’	4715, QP	16.5” X 6” Q PLUS		KSMA2124715QP, Q ABP MG1A4715QP
TRP214720QP	MERITOR STEER ‘‘Q PLUS’’	4720, QP	16.5” X 5” Q PLUS		KSMA2124720QP, Q ABP MG1A4720QP
TRP214725E	SPICER STEER BRAKE	4725, E	16.5” X 6”		KSMA2124725R, Q ABP MG1A4725R,

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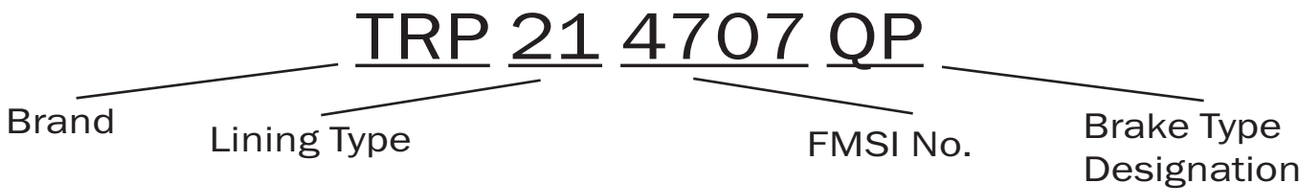
23K Brake Shoe Kits

PART NUMBER	SUITS	FMSI + SHOE TYPE	SIZE	ECE R90	CROSS REFERENCES
TRP231308Q	MERITOR STEER "Q"	1308, Q	15" X 4" Q		KSMA3121308Q
TRP234515FQ	FRUEHAUF/ SAF/ TMC	4515, F(Q)	16.5" X 7" Q	Y	KSMA3124515F3, B4515PTFREUHAUFQCK
TRP234515P	MERITOR DRIVE "P"	4515, P	16.5" X 7" P	Y	PKSMA3124515P
TRP234515PSS-01	MERITOR DRIVE "P" SEVERE SERVICE	4515, PSS	16.5" X 7" P	Y	PKSMA3124515PSS, B4515PTGPWWK
TRP234515Q	MERITOR DRIVE "Q"	4515, Q	16.5" X 7" Q	Y	KSMA3124515Q, B4515PTQCK, WKS4515QVHP
TRP234524Q	MERITOR STEER "Q"	4524, Q	16.5" X 5" Q		KSMA3124524Q, WK4524QVHP
TRP234707QP	MERITOR DRIVE "Q PLUS"	4707, QP	16.5" X 7" Q PLUS	Y	KSMA3124707QP, B4707PTQPK, WKS4707QVHP
TRP234709E2	EATON ESII DRIVE	4709, ESII	16.5" X 7"		KSMA3124709E2
TRP234715QP	MERITOR STEER "Q PLUS"	4715, QP	16.5" X 6" Q PLUS		KSMA3124715QP
TRP234720QP	MERITOR STEER "Q PLUS"	4720, QP	16.5" X 5" Q PLUS		KSMA3124720QP, B4720PTQK, WK4720QVHP
TRP234725E	SPICER STEER BRAKE	4725, E	16.5" X 6"		

TRP® Part Number System



Did you know?

21K and 23K linings are all designed to pull the same torque. The differences in the linings are in the strength, wear, noise and consistency level.

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FREECALL* 1800 (TRPART) 877 278 NOW TO SPEAK TO YOUR LOCAL DEALER

For further information and full warranty details visit our website

www.trpparts.com.au

* Calls from Australian landlines are generally free of charge whilst calls from mobile phones are typically charged based on the rate determined by the caller's mobile service provider. Please check with your mobile service provider for call rates.

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