Rail Vehicle Applications

EBC® BRAKES


EBC
BRAKES

About EBC Brakes – Rail Vehicle Applications

EBC Brakes are a British manufacturer of disc braking products with multiple sites around the UK. With a large rail market for disc brake pads and continued development of materials for railway and transit vehicles, we are always ready to offer the best possible solution.

The equipment and techniques operating within our factory include modern mixing, moulding and machining facilities, under comprehensive manufacturing and quality management controls. EBC Brakes are a top rated supplier to many prestigious companies worldwide and are registered to ISO 9001:2015, is RISQS Verified and working towards the UNIFE IRIS 2017 Certification.

With extensive research and development facilities available, new friction material products and applications are continually investigated. In particular, several test dynamometers provide vital performance information to match customer's specific requirements. For railway testing, the R & D department is equipped with a full-scale test dynamometer which can simulate most of the known braking conditions met by the world's railways.

In the demanding and competitive world of friction materials, where quality, performance and safety are paramount to the customer, EBC Brakes are able to offer total support for their products from development and performance testing, to packaging and delivery scheduling and with service monitoring and advice.

Research and Development

At EBC Brakes we understand that one material does not suit all applications of the same reference and that the individual operating requirements, rolling stock variations, local regulations etc. all have an effect on the choice of material we would recommend.

We will, if necessary, run dynamometer tests before recommending any material and if required, we are able to develop new materials for each application. The EBC Brakes full scale rail dynamometer is able to test disc brake pads to international and national specifications, as well as to individual route simulations.

The dynamometer capabilities are:

Inertia Range:	556Kg m^2 - 2907 Kg m^2
Maximum Torque:	25 kNm
Maximum Drag Braking Torque:	2000 Nm
Maximum Speed:	350 kph
Maximum Axle Load:	20 tonnes
Maximum Pad Load:	65 KN

Friction Material Selection

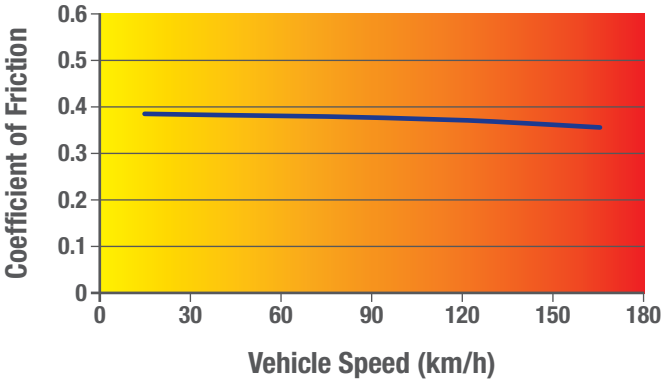
RAILWAY FRICTION MATERIALS

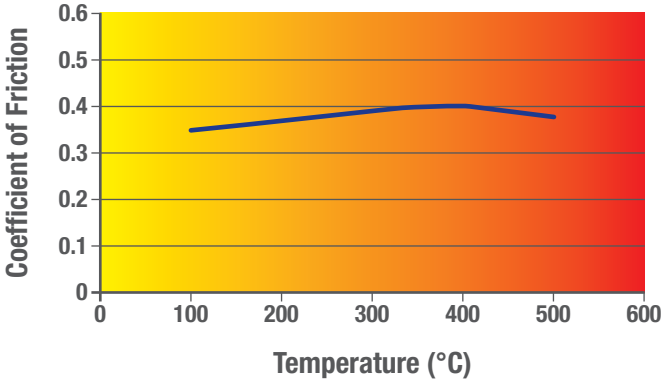
MATERIAL	CODE	COEFFICIENT	DESCRIPTION
KX	**E308**	**0.38**	Medium/high friction, semi-conformable pad material for light rail and suburban train disc brakes. Exceptionally good wear and conditioning properties. In wide use in the UK.
MH	**E349**	**0.33**	Medium/low friction, semi-conformable pad, primarily for rapid transit and Metro vehicles, subject to frequent braking and high disc temperatures.
MP	**E352A**	**0.35**	Medium friction pad material for use on light rail and trams. Very good pressure stability over a wide operating range. Designed for the higher pressure motor applications.
MV	**E359**	**0.35**	Medium friction pad material for use on light rail and trams. Meets OE requirements for friction stability and low wear rates at operating temperatures up to 400°C.
NG	**E368**	**0.42**	High friction, semi-conformable pad material for light rail and suburban train disc brakes.

All values quoted for friction materials have been obtained from our laboratory tests and implies no guarantee of performance.

Friction Material Information and Selection

EBC BRAKES – E308 DATA SHEET





E308 is an organic moulded friction material designed for use in disc braking of railway vehicles operating at speeds of up to 160km/h.

The material contains no asbestos, heavy metals or other compounds with known environmental hazards and has found successful application primarily on rapid transit, underground and Metro systems demanding frequent braking with high rates of retardation and high disc temperatures.

In these applications **E308** exhibits a stable coefficient of friction, with a mean value of 0.38, over a range of operating conditions and temperatures.

The material contains no hard abrasives resulting in an extremely low wear rate.

Repeated braking on cast iron, SG iron or cast steel discs produces a polish on the disc surface, with negligible disc wear.

PHYSICAL PROPERTIES

Typical Values		
Mean Density	2.23	g/cm³
Rockwell Hardness	34.0	RHM
Compression Modulus	80.0	kN/cm²
Ult. Flexural Strength	28.0	kN/cm²
Min. Shear Strength	450	N/cm²

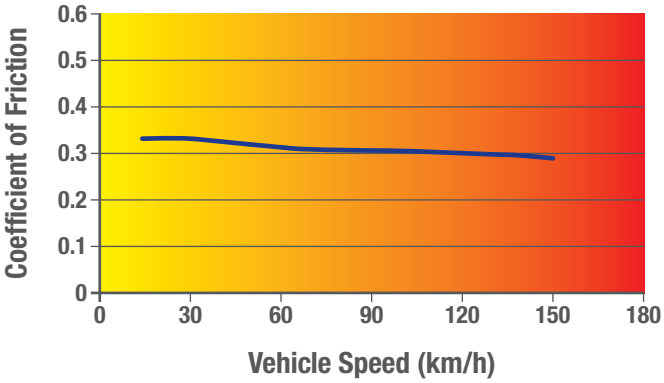
OPERATING CONDITIONS

Mean Coefficient of Friction	0.38	μ
Max. Specific Pressure	100	N/cm²
Max. Continuous Temperature	420	°C
Max. Intermittent Temperature	640	°C

All values quoted for friction materials have been obtained from our laboratory tests and implies no guarantee of performance.

Friction Material Information and Selection

EBC BRAKES – E349 DATA SHEET



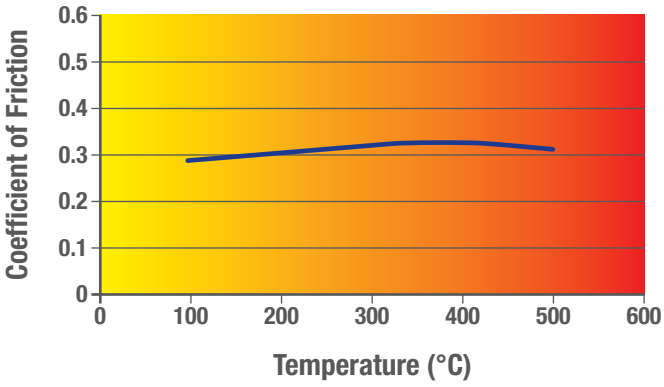
E349 is an organic moulded friction material, designed for use in disc braking of railway vehicles operating at speeds up to 160km/h.

The material contains no asbestos, heavy metals or other compounds with known environmental hazards and has found successful application primarily on rapid transit, underground and Metro systems demanding frequent braking with high rates of retardation and high disc temperatures.

In these applications **E349** exhibits a stable coefficient of friction with a mean value of 0.31, over a range of operating conditions and temperatures.

The material contains no hard abrasives resulting in an extremely low wear rate.

Repeated braking on cast iron, SG iron or cast steel discs produces a polish on the disc surface, with negligible disc wear.



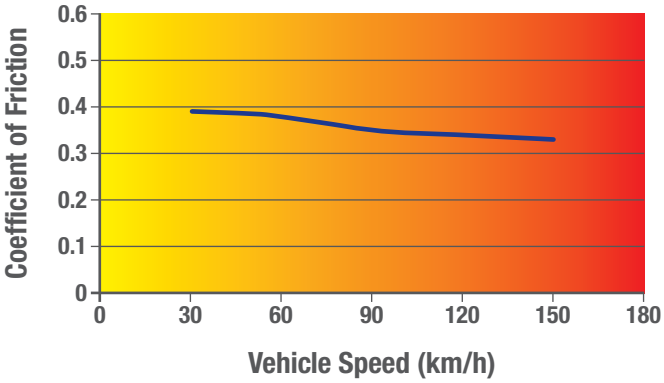
PHYSICAL PROPERTIES		
Typical Values		
Mean Density	2.25	g/cm³
Rockwell Hardness	34.0	RHM
Compression Modulus	80.0	kN/cm²
Ult. Flexural Strength	28.0	kN/cm²
Min. Shear Strength	450	N/cm²

OPERATING CONDITIONS		
Mean Coefficient of Friction	0.31	μ
Max. Specific Pressure	100	N/cm²
Max. Continuous Temperature	420	°C
Max. Intermittent Temperature	640	°C

All values quoted for friction materials have been obtained from our laboratory tests and implies no guarantee of performance.

Friction Material Information and Selection

EBC BRAKES – E352A DATA SHEET

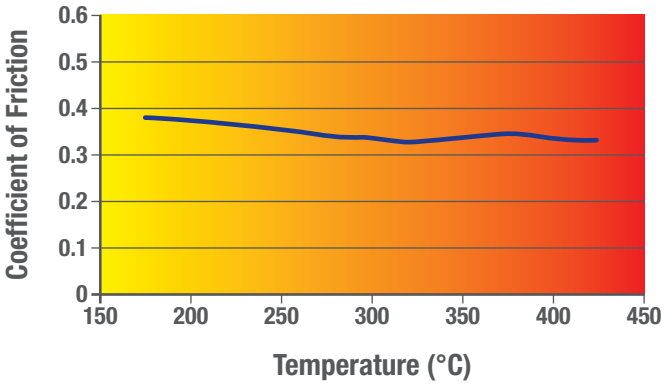


E352A is an 'Asbestos Free' material developed as a disc brake pad material for use in CV, PSV and tram applications.

The coefficient of friction (m) is very stable over a wide temperature range. This material overcomes the major problems associated with high operating temperatures created by demanding CV and PSV operation.

Application

Wide range of Disc Brake Pads for CV, PSV, tram and specialist Heavy Duty applications.



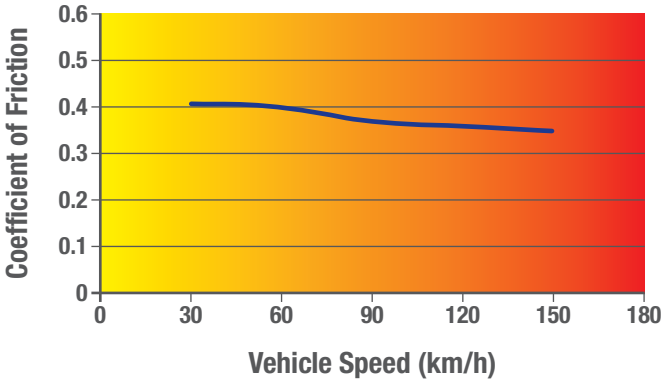
PHYSICAL PROPERTIES		
Typical Values		
Mean Density	2.70	g/cm³
Rockwell Hardness	60	RHM
Compression Modulus	80	kN/cm²
Ult. Flexural Strength	28	kN/cm²
Min. Shear Strength	450	N/cm²

OPERATING CONDITIONS		
Mean Coefficient of Friction	0.35	μ
Max. Specific Pressure	150	N/cm²
Max. Continuous Temperature	400	°C
Max. Intermittent Temperature	600	°C

All values quoted for friction materials have been obtained from our laboratory tests and implies no guarantee of performance.

Friction Material Information and Selection

EBC BRAKES – E359 DATA SHEET

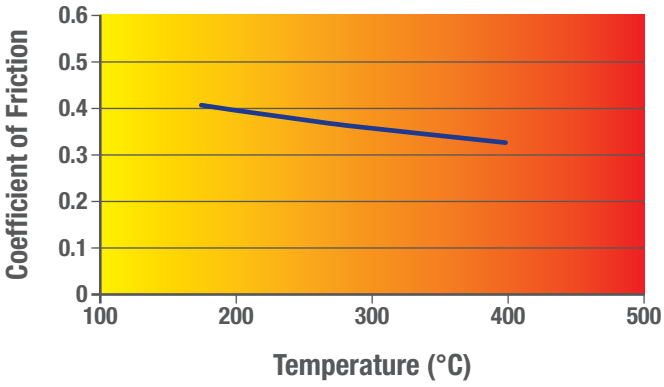


E359 is an asbestos free material developed as a disc brake pad material for use in tram applications. It has a nominal friction level of 0.36.

The coefficient of friction (m) is very stable over a wide temperature range. This material overcomes the major problems associated with the high operating temperatures created by demanding tram operation.

Application

Designed for use in tram applications.



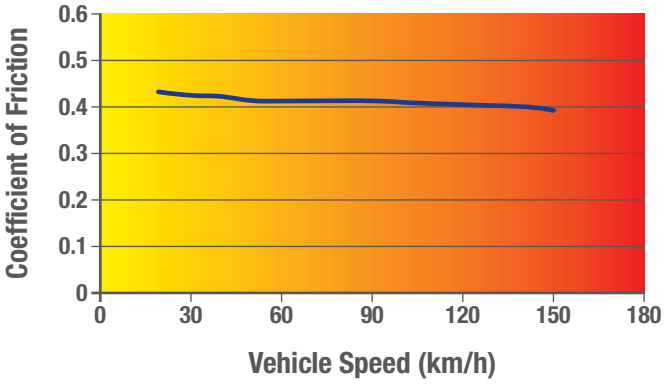
PHYSICAL PROPERTIES		
Typical Values		
Mean Density	2.70	g/cm³
Rockwell Hardness	60	RHM
Compression Modulus	80	kN/cm²
Ult. Flexural Strength	28	kN/cm²
Min. Shear Strength	450	N/cm²

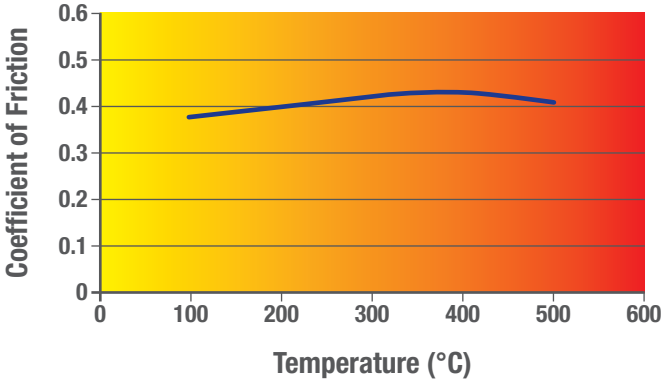
OPERATING CONDITIONS		
Mean Coefficient of Friction	0.36	μ
Max. Specific Pressure	150	N/cm²
Max. Continuous Temperature	400	°C
Max. Intermittent Temperature	600	°C

All values quoted for friction materials have been obtained from our laboratory tests and implies no guarantee of performance.

Friction Material Information and Selection

EBC BRAKES – E368 DATA SHEET





E368 is an organic moulded friction material, designed for use in disc braking of railway vehicles operating at speeds up to 160km/h.

The material contains no asbestos, heavy metals or other compounds with known environmental hazards, and has found successful application primarily on rapid transit, underground and Metro systems demanding frequent braking with high rates of retardation and high disc temperatures.

In these applications **E368** exhibits a stable coefficient of friction with a mean value of 0.41, over a range of operating conditions and temperatures.

The material contains no hard abrasives resulting in an extremely low wear rate.

Repeated braking on cast iron, SG iron or cast steel discs produces a polish on the disc surface, with negligible disc wear.

PHYSICAL PROPERTIES

Typical Values		
Mean Density	2.19	g/cm³
Rockwell Hardness	34.0	RHM
Compression Modulus	80.0	kN/cm²
Ult. Flexural Strength	28.0	kN/cm²
Min. Shear Strength	450	N/cm²

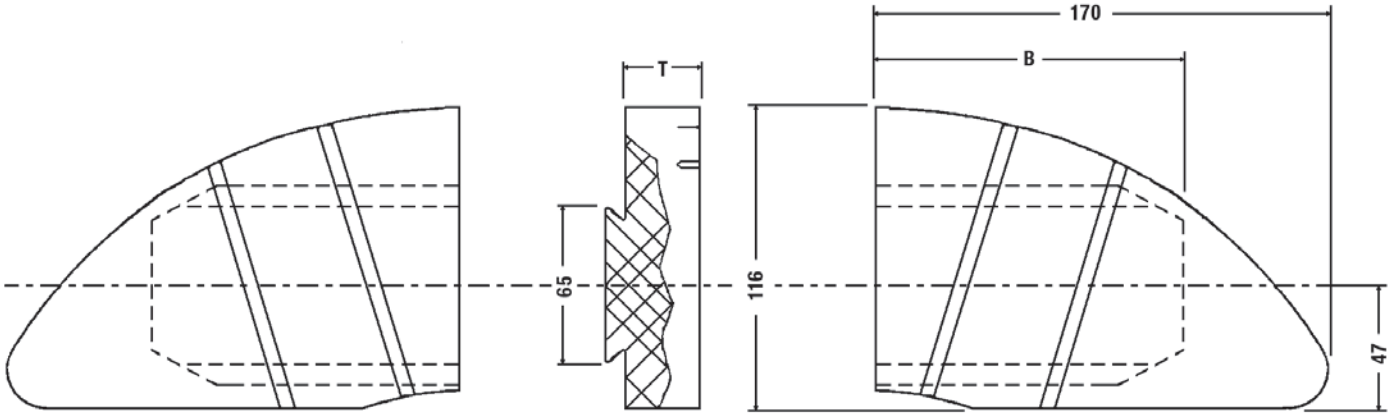
OPERATING CONDITIONS

Mean Coefficient of Friction	0.41	μ
Max. Specific Pressure	100	N/cm²
Max. Continuous Temperature	420	°C
Max. Intermittent Temperature	640	°C

All values quoted for friction materials have been obtained from our laboratory tests and implies no guarantee of performance.

Product Information and Selection

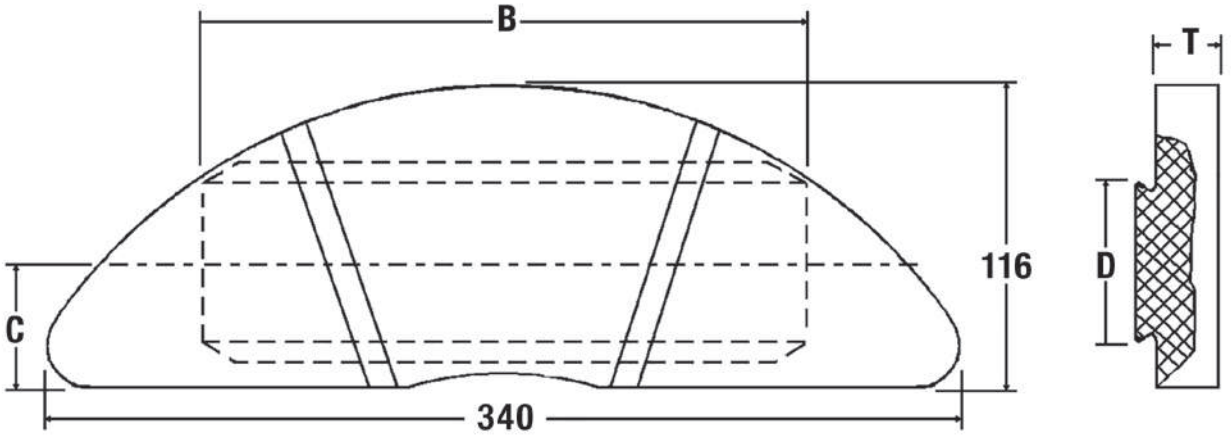
UIC 300 cm² DISC BRAKE PAD
Half pads



EFI REFERENCE	T	B	GROOVES	COMMENTS
EFI 618	16	114	YES	
EFI 625	16	130	YES	
EFI 634	24	114	YES	
EFI 635	24	114	NO	
EFI 636	24	130	YES	

Product Information and Selection

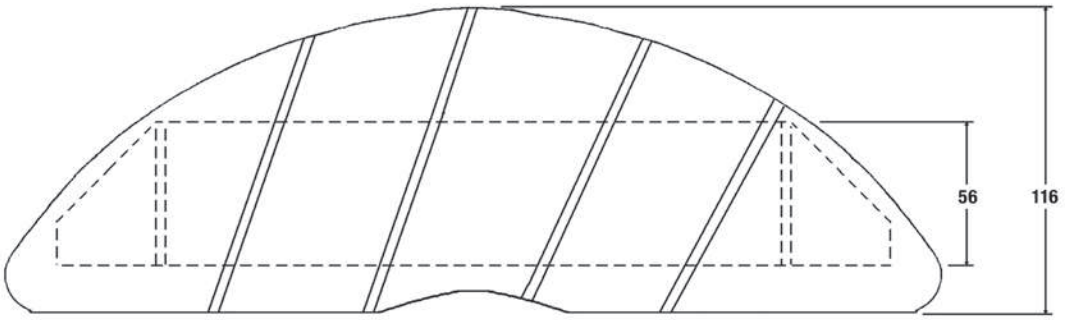
UIC 300 cm² DISC BRAKE PAD
Full pads



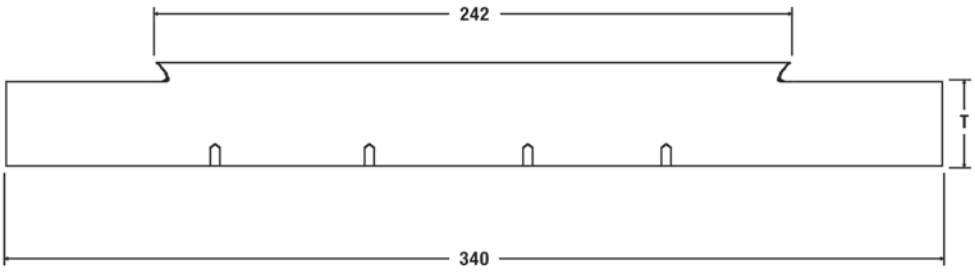
EFI REFERENCE	T	B	C	D	GROOVES	COMMENTS
EFI 629	24	262	47	65	YES	
EFI 633	16	262	47	65	YES	
EFI 646	24	228	47	65	YES	
EFI 650	35	177	60	37	YES	FOR ALTERNATIVE GROOVES – SEE NEXT PAGE
EFI 651	25	262	47	65	YES	
EFI 652	20	262	47	65	YES	
EFI 664	25	177	60	37	YES	

Product Information and Selection

UIC 300 cm² DISC BRAKE PAD
Alternative back plate

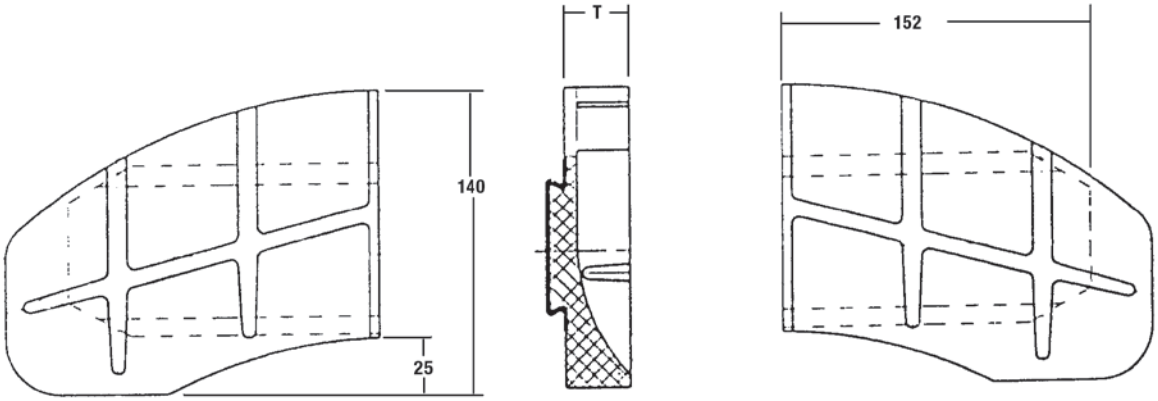


EFI REFERENCE	T	GROOVES	COMMENTS
EFI 617	16	YES	
EFI 623	16	NO	
EFI 624	24	NO	
EFI 631	35	NO	
EFI 632	24	YES	



Product Information and Selection

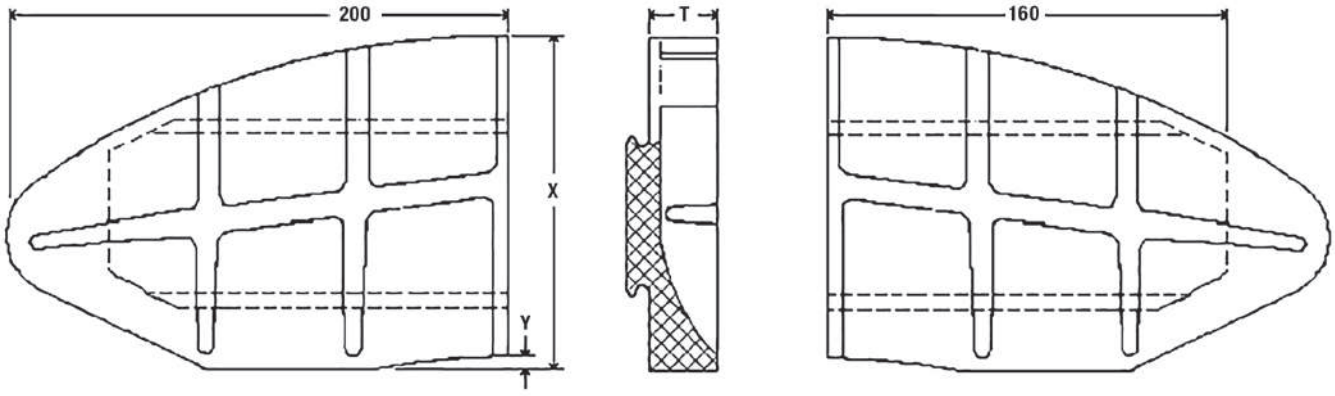
UIC 350 cm² DISC BRAKE PAD



EFI REFERENCE	T	GROOVES	COMMENTS
EFI 603	30	NO	
EFI 606	24	NO	
EFI 608	16	NO	
EFI 609	35	NO	
EFI 627	24	YES	CAIRO ONLY
EFI 637	27	YES	
EFI 638	24	YES	
EFI 639	30	YES	
EFI 661	25	NO	BOTTOM CHAMFER

Product Information and Selection

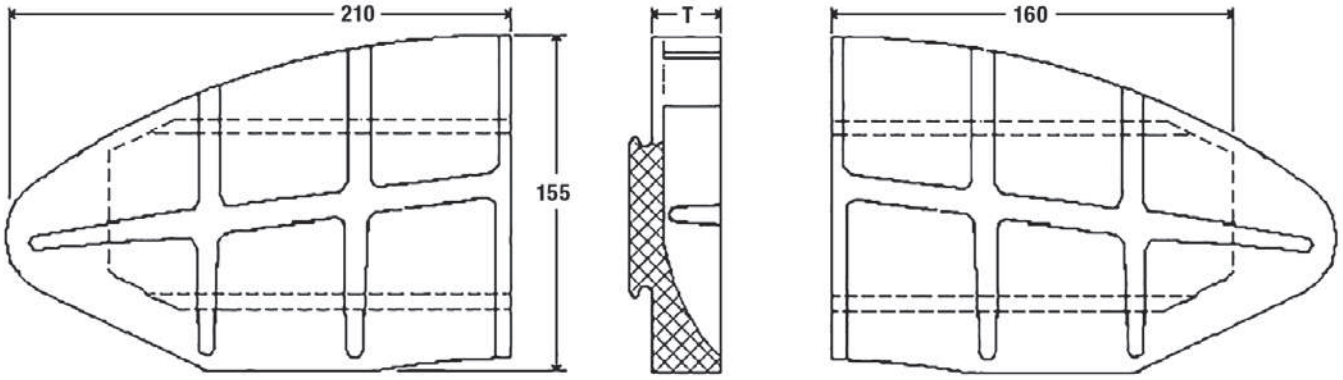
UIC 400 cm² DISC BRAKE PAD



EFI REFERENCE	T	X	Y	GROOVES	COMMENTS
EFI 602	24	140	15	YES	
EFI 610	35	140	15	NO	
EFI 628	30	130	5	NO	
EFI 640	24	140	15	NO	
EFI 641	35	140	15	YES	
EFI 649	27	130	5	YES	
EFI 660	30	140	15	YES	

Product Information and Selection

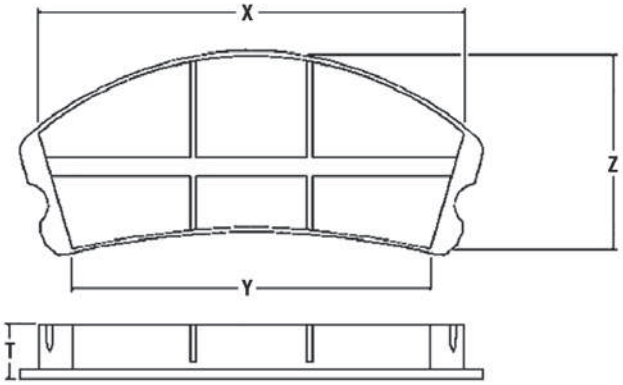
UIC 500 cm² DISC BRAKE PAD



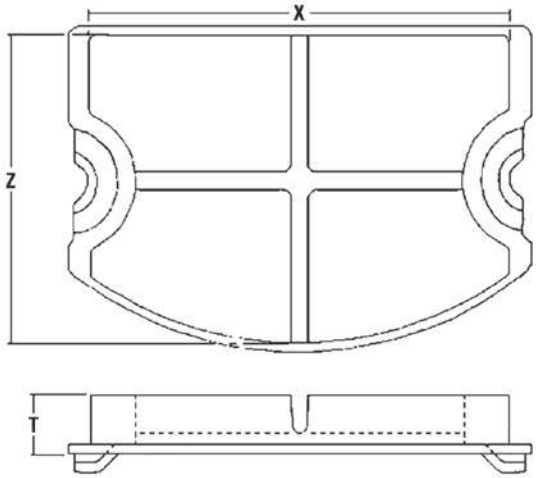
EFI REFERENCE	T	GROOVES	COMMENTS
EFI 642	24	NO	
EFI 643	35	NO	
EFI 644	24	YES	
EFI 645	35	YES	
EFI 647	27.5	YES	

Product Information and Selection

LUCAS GIRLING TYPE DISC BRAKE PAD

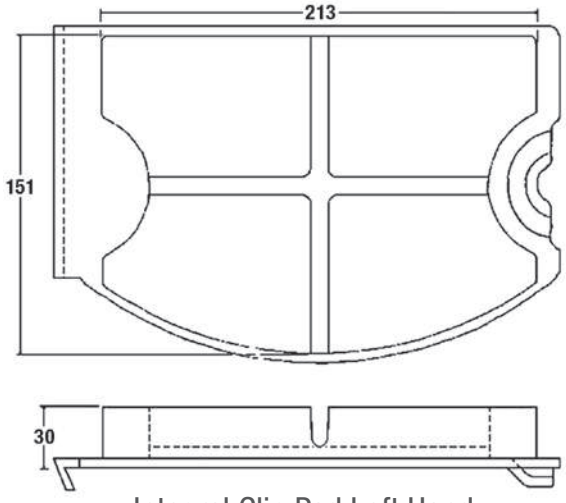


Freight

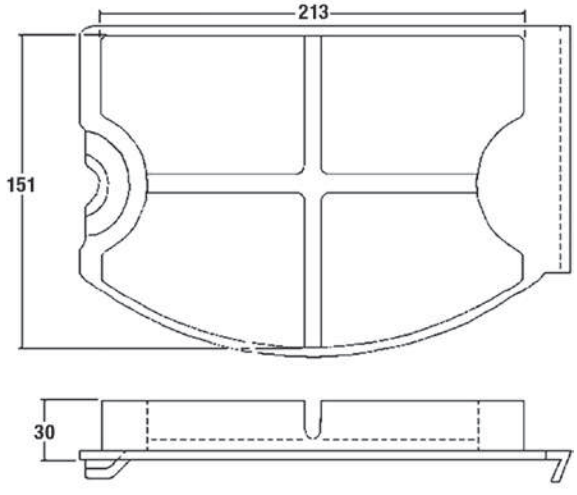


Passenger

EFI REFERENCE	T	X	Y	Z	COMMENTS
EFI 607	30	213	N/A	151	SMALL PASSENGER
EFI 614	16	262	47	65	LARGE 'BANANA' FREIGHT
EFI 616	TBA	TBA	TBA	TBA	LARGE PASSENGER
EFI 655	25	275	218	96	SMALL 'BANANA' FREIGHT
EFI 664	TBA	TBA	TBA	TBA	JUMBO FREIGHT
EFI 667	30	213	N/A	145	'MOD' PASSENGER
EFI 672	30	213	N/A	151	SMALL PASSENGER WITH INTEGRAL CLIP



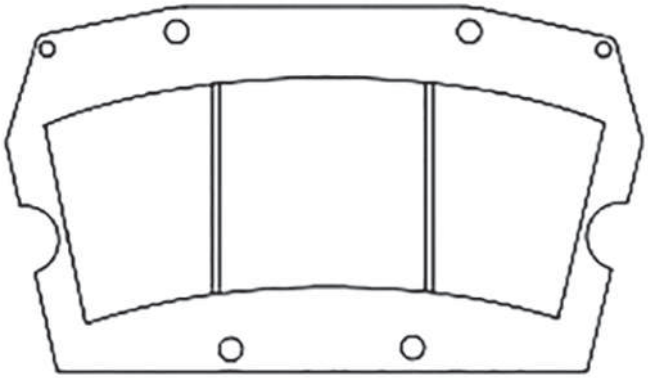
Integral Clip Pad Left Hand



Integral Clip Pad Right Hand

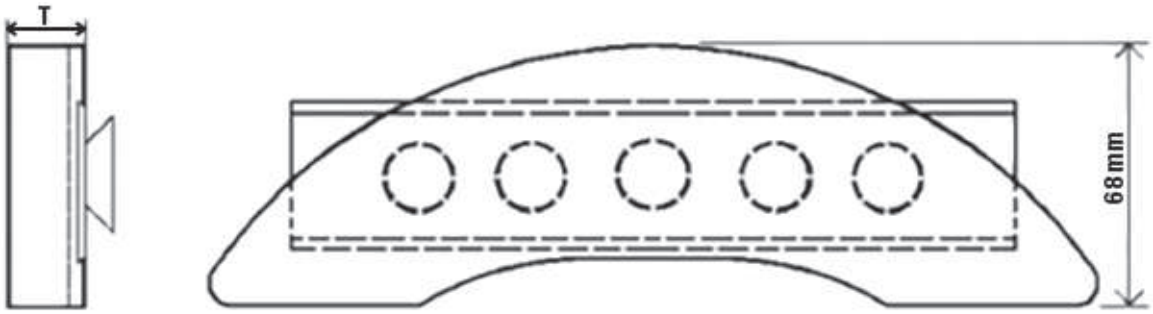
Product Information and Selection

EFI601
HUNSLETT LOCO GEAR BOX BRAKE



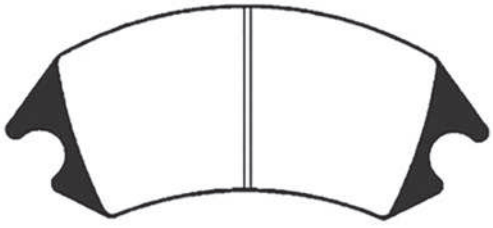
EFI605
TWIFLEX GMR BRAKE PAD

EFI654
TRAM BRAKE



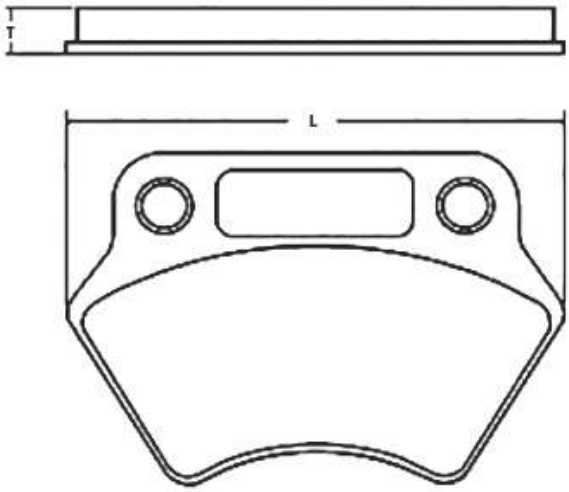
EFI REFERENCE	T	GROOVES
EFI 654	18	NO

EFI659
MIDLAND METRO MOTOR BOGIE



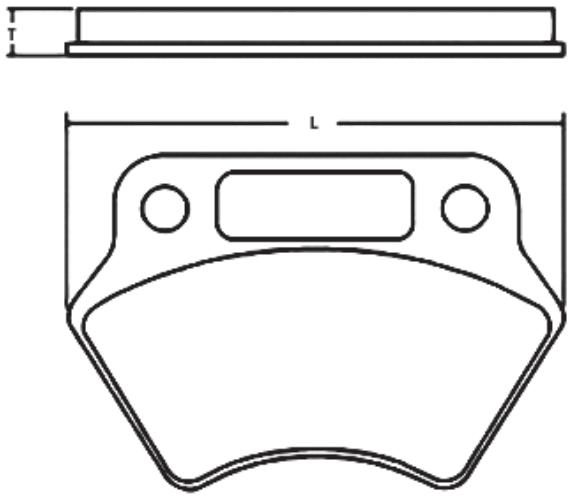
Product Information and Selection

EFI657
SIEMENS MOTOR BOGIE



EFI REFERENCE	T	L	HOLE CENTRES	HOLE DIA.	PAD AREA
EFI 657	25.4 mm	267.47 mm	162.56 mm	24.38 mm	231 cm^2

EFI671
SIEMENS SD160 TRAM



EFI REFERENCE	T	L	HOLE CENTRES	HOLE DIA.	PAD AREA
EFI 657	20.5 mm	288.84 mm	162.56 mm	24.38 mm	259 cm^2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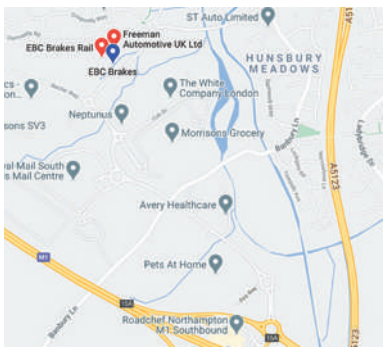

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