



BRAKE SHOES - PADS

FRICMART[®]
INDIAN FRICTION MATERIAL ENGG. CO.

FRICMART introduces *leading edge of 4TH Generation + FRLS (Fire Retardant Low Smoke) Technology on*

Asbestos Free Friction Materials

.... featuring

- EFFECTIVE SOLUTIONS AT ECONOMICAL COST
- NOT JUST PERFORMANCE ADVANCEMENT *BUT*
- NVH FACTORS ARE FOCUSED RESPECTING USERS' FEED BACK
- CUSTOMISED FEATURES & PROPERTIES FOR VEHICLE SPECIFIC / TERRAIN SPECIFIC OPERATIONS.
- MICRO STRUCTURE ADVANTAGE *the Pad Topography*
- MICRO MECHANIC ADVANTAGE *the Transfer Film*
- OPTIMIZED SURFACE RESILIENCE *the Matrix Refinement*



PRODUCTS OFFERED

- Brake Linings
- Brake Pads
- Sintered Pads / Buttons
- Brake Mixtures (for Export only)
- Performance Additives

Manufactured state-of-art and extensively tested for Physical, Chemical, Mechanical, Thermo-mechanical, Fire and Smoke Retarding, Toxicological and Performance properties in our well equipped Testing Laboratory.

Signal Friction Materials are designed to produce the highest possible performance levels over a wide range of operating conditions. They are produced in a total of three different Asbestos-Free formulations in Low Metallic, NAO Hybrid, and True Ceramic compositions, each one, the product of hundreds of hours of testing and research work.

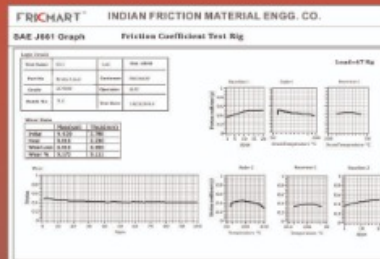
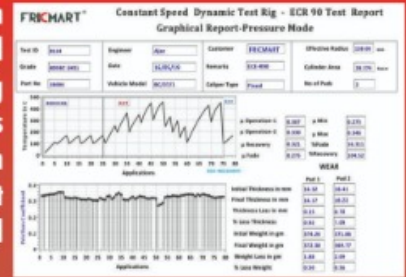
With fully equipped in-house R&D Lab as well as interaction / feedback from overseas R&D and end users, Fricmart is one among few R&Ds / OEMs in India capable of developing Friction Materials for vehicle specific, terrain specific operations.

The salient features of **Signal** Products include

- Reverse Engineered application technology assures optimum fit and performance equivalent to Original Equipment.
- Advanced Friction Formulations reduce green fade, dusting and extend pad / rotor life.
- Custom- designed grades offered to suit GVW, topography and terrain.
- Under layer design helps reduce Noise, Vibration and Harshness
- Chamfers, slots, Shims, wear sensors and other premium features are built-in / included

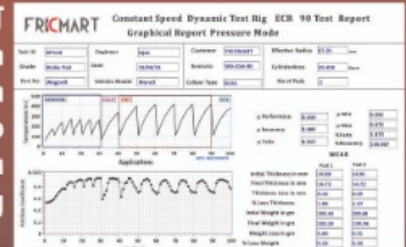
PRODUCTS OFFERED

Lx 9600 Super-Duty material is our latest development utilizing advanced 4th Generation FRLS Technology. This material is a cocktail blend of Organic and Ceramic fibres and their derivatives, modifiers and speciality additives in a low steel fibre matrix offering unmatched performance under severe high energy brake applications. This material is ideal for High end Passenger Cars, SUVs and Taxis. The salient features include formation of micro protective film or transfer layer over the rotor / drum for optimized contact between friction surface and bare rotor / drum thus extended life, comfort and consistent performance till the last residue of friction member.



Lx 9600 Plus was developed for extreme braking conditions. A medium coefficient of friction is achieved while maintaining the same flat friction curve without sacrificing the pad life which is almost 30% higher than conventional brake pads for similar application available in the market. "Plus" grade has a good 'initial bite' i.e. no green fade and fast bedding-in yet is consistent in providing super performance till the last residual layer. This material is used in CV Brake Pads, Mini Bus and Pickups operating in normal to most severe and longest terrain.

Lx 9600`Cera' is developed for all duty passenger cars and SUVs. The suffix C,H,T denotes the category / segment of passenger cars it fits. A True Ceramic recipe with cocktail of fibres belong to organic and ceramic family with highly loaded friction modifiers and performance additives. The salient features include formation of micro protective film or transfer layer over the rotor / drum for optimized contact between friction surface and bare rotor thus extend life, comfort, silent and dust free braking performance till the last residue of friction member.



BRAKE MIXTURE & PERFORMANCE ADDITIVES

Fricmart offers Asbestos Free Mixtures in 2 grades **Passenger Car & CV Brake Pads Application**. These Brake Mixture are ECE- R90 compliance for performance and REACH, ROHS compliance in meeting International & ECE norms for Health, Safety & Environment guidelines and requirements. Fricmart's unique blend of **Performance Additive PG902** is developed exclusively as Friction Control additive plays major role in formation of **'Transfer Film'** between Friction Partners.



SINTERED PADS : Fricmart offers **"FMC 4005 GH"** grade Sintered friction material with for Truck / Tractor Application high durability and anti oxidation properties exhibiting higher Hot friction than Normal dry friction preferred in Sintered Friction Technology.



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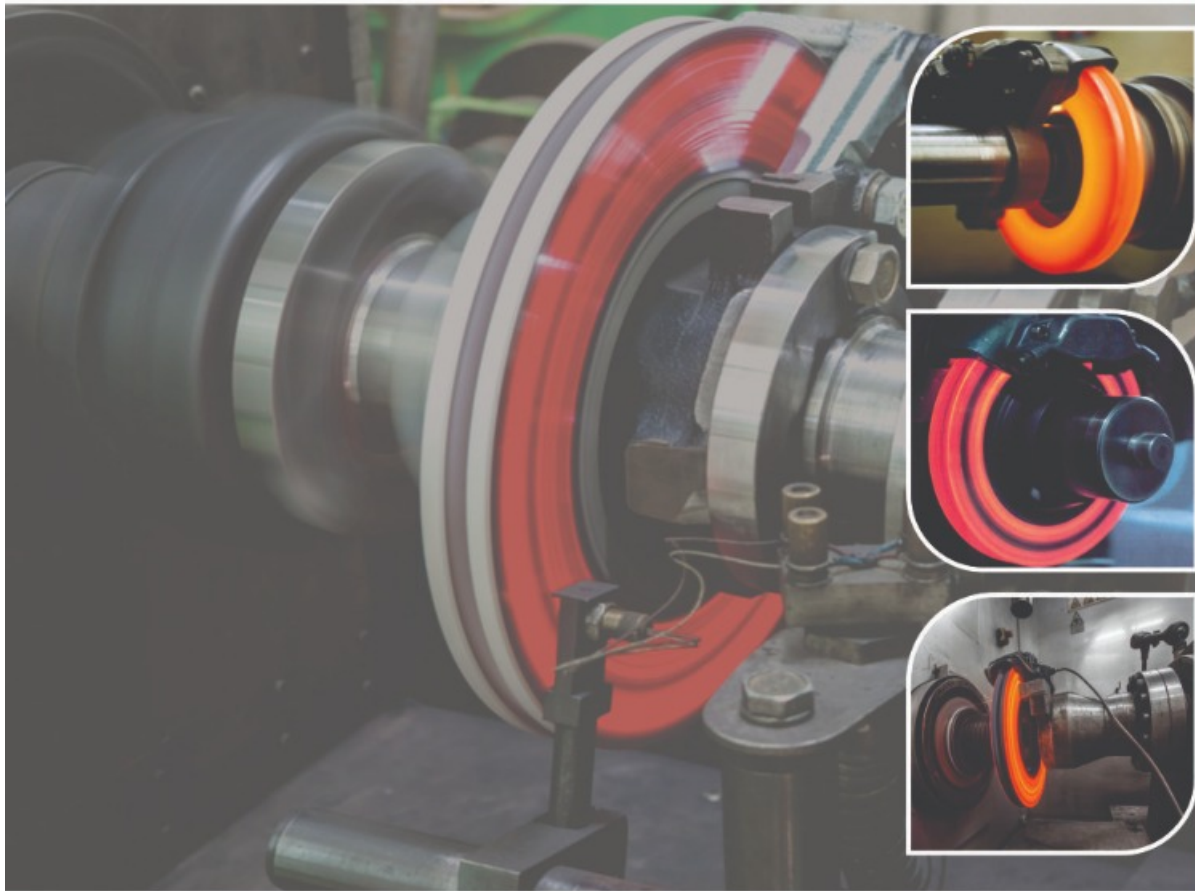
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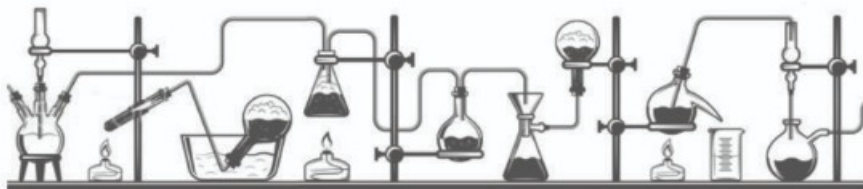
Automotive

Brake Testing

Laboratory & Tribology Solutions



**For Brake Pads, Brake Shoes
Clutch Facings & Sintered Friction Materials**



ABOUT US

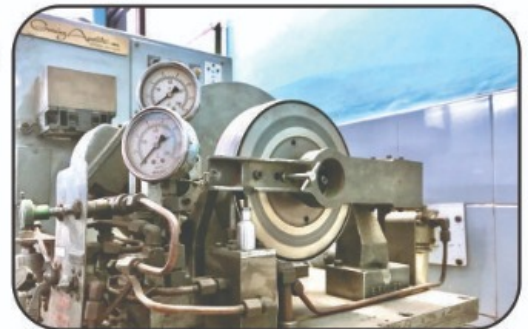
Brake Industry is one of the fastest growing Auto Component sectors in India and so the demand for reliable quality Friction Materials viz, Brake Linings , Brake shoes, Brake Pads for Motor cycles to cars and commercial vehicles have been witnessing many fold increase in domestic and export markets as well. Malfunctioning of these critical parts not only endanger safety of lives and properties but also challenge a company's very existence in the business. Unlike in the West / EU / SA / GCC countries , India yet to formulate legislative / technical / safety & health requirements for Friction Materials being used in the after - market. But of late, it became mandatory for Indian exporters to comply above standards (E` mark / Edge code etc.) of importing countries and Fricmart provide them with complete testing and technical solutions to meet the standard requirements.

Fricmart™ is a team of Technocrat - Entrepreneurs with decades of experience in Design Manufacturing, R & D and Testing of Friction Materials and one of the leading Technical know-how providers in the field of Friction Materials viz Brake Liners , Brake pads , Brake Shoes used in Automotives, Industrial /off high ways and Railways. **Fricmart** have many clients in domestic and international markets. The Lab is recognized as a neutral, 3 rd party and referral test lab by reputed manufacturers of Friction Materials, Brake system and Vehicle OEMs ; Homologation Labs , Indian Railways, Defence , Universities , Academicians and Research scholars from India and abroad.

TEST FACILITIES

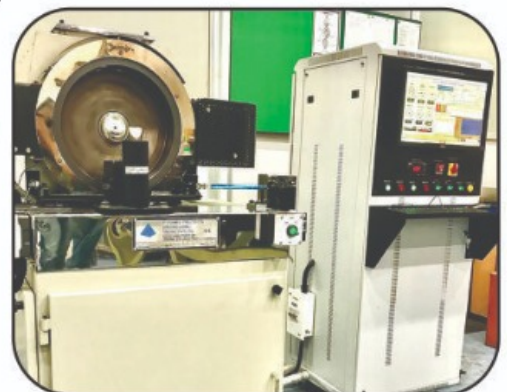
FAST

- ▶ Friction Assessment and Screening Test (FAST) Machine uses small , flat test specimen of 0.50 sq. inch , with a solid disc / rotor.
- ▶ Operates in either constant clamping force or friction force under constant rubbing speed of about 7 mtr./sec can Measure.
- ▶ Dynamic Friction vs. Load vs. Temp.
- ▶ Static Friction • Residual Drag • Indication of squeal.
- ▶ Important QA / R & D tool used for initial screening of specimens of Brake linings, Pads, Clutch facings etc.



CHASE

- ▶ CHASE Friction Material Testing machine uses small radiused test specimen of 1.0 sq. inch and a dedicated brake drum as per SAE specifications.
- ▶ Designed to operate under a Normal load of 0 -200 lbs and Friction force of 0- 100 lbs. with wide range of speed (0 – 1000 rpm) and temp. (550 °C)
- ▶ To test as per international standards SAE J661 / IS 2742 / BSAU:142 / ISO 7881 / JASO-C418 etc.
- ▶ Important QA / R & D tool for direct comparison of sample to sample and bench mark / certification & edge coding of Brake Linings and Brake Pads.
- ▶ Normal and Hot / Coefficient of friction • Static Friction
Fade & Recovery • Specific wear rate
Good indicator of squeal / black dust / scoring and glazing.



COMPRESSIBILITY

- ▶ The Compressibility Tester measures deflection of friction materials viz; Drum brake linings , Disc brake pads and Truck brake blocks in microns upon compression at ambient and elevated temperatures up to 600 °C with excellent precision and reproducibility.
- ▶ This is one of the criteria of acceptance as per ECE-R 90 - COP Test and has high influence on NVH Behaviour when tested in accordance with ISO 6310 / JASO C-444 and SAE J-2468 standards.



DYNAMOMETER

▶ Brake Inertia Dynamometer popularly called 'Dyno Test' is a full scale testing of Brake shoes , Brake pads using actual Brake calliper / Drum / Disc and moment of inertia according to GVW etc. of the vehicle . Reports have direct comparison to vehicle test parameters viz;

- Dry and Wet friction
- Stopping Distance and Time
- Speed / Pressure sensitivity
- Emergency stop & Wear rate
- NVH properties .

▶ Popular International standards recommended by OEMs for Dyno test includes AK Master / FMVSS / SAE / JASO -C406 / IS 13453 / ECE- R90 etc.



KRAUSS TESTER

▶ Krauss Test though a full scale testing of Brake shoes , Brake pads using actual caliper/ drum / disc, however minus the use of inertia.

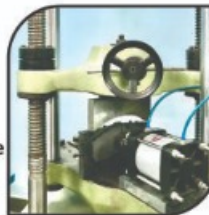
- ▶ Developed by ATE - Krauss GmbH as a short duration and low cost test when compared to Dyno Test but rated as most 'severe' due to continuous drag at temp. as high as 550°C
- ▶ Useful to assesses preliminary effectiveness , cold and hot performance of the friction material when tested as full sample .
- ▶ Considered as one of the criteria of acceptance of COP test as per ECE-R 90 for wide range of products viz, Brake Shoes , Linings, Brake Pads and CV Pads / Linings .



PHYSICAL - CHEMICAL - MECHANICAL TESTING :

(Standards as per ISO 2039 , ISO 6311 , ISO 6312 , ISO 6313 , ISO 6314 & ISO 6315 , JASO: C444 , IS:2742)

- ▶ Density ● Surface Hardness
- ▶ Bond Shear ● Plain shear ● Internal shear
- ▶ CBS ● TRS ● Rivet Holding strength
- ▶ Tensile ● Elastic Modulus ● Thermal Expansion
- ▶ Weathering Resistance ● Seizure to Metallic surface
- ▶ Acetone Extraction ● Volatile / Ignition Loss
- ▶ Porosity ● Heat / Water Swell



ASBESTOS DETECTION & ANALYSIS

▶ This is a qualitative analysis to confirm and certify whether the friction materials used in the brakes are free from banned Asbestos fibre or 100% asbestos free. Performed as per ISO 22262-1 standard recommended by Environment Protection Agency (EPA) under UNO using Stereo - PLM - Polarized Light Microscopy and Dispersion Staining technique. Extensive Gravimetric procedures used to prepare samples for analysis.

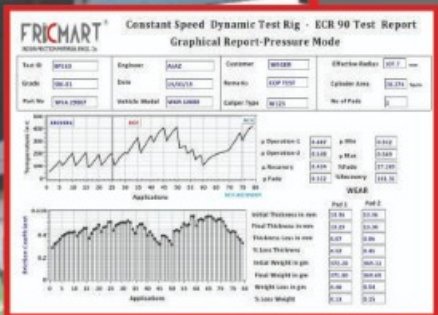
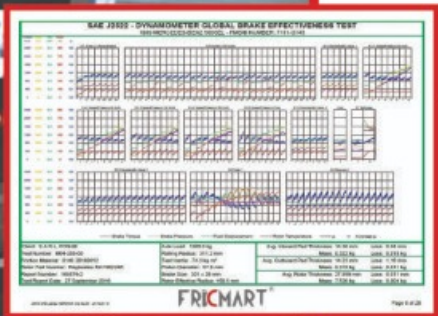
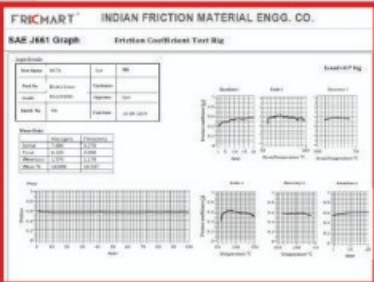
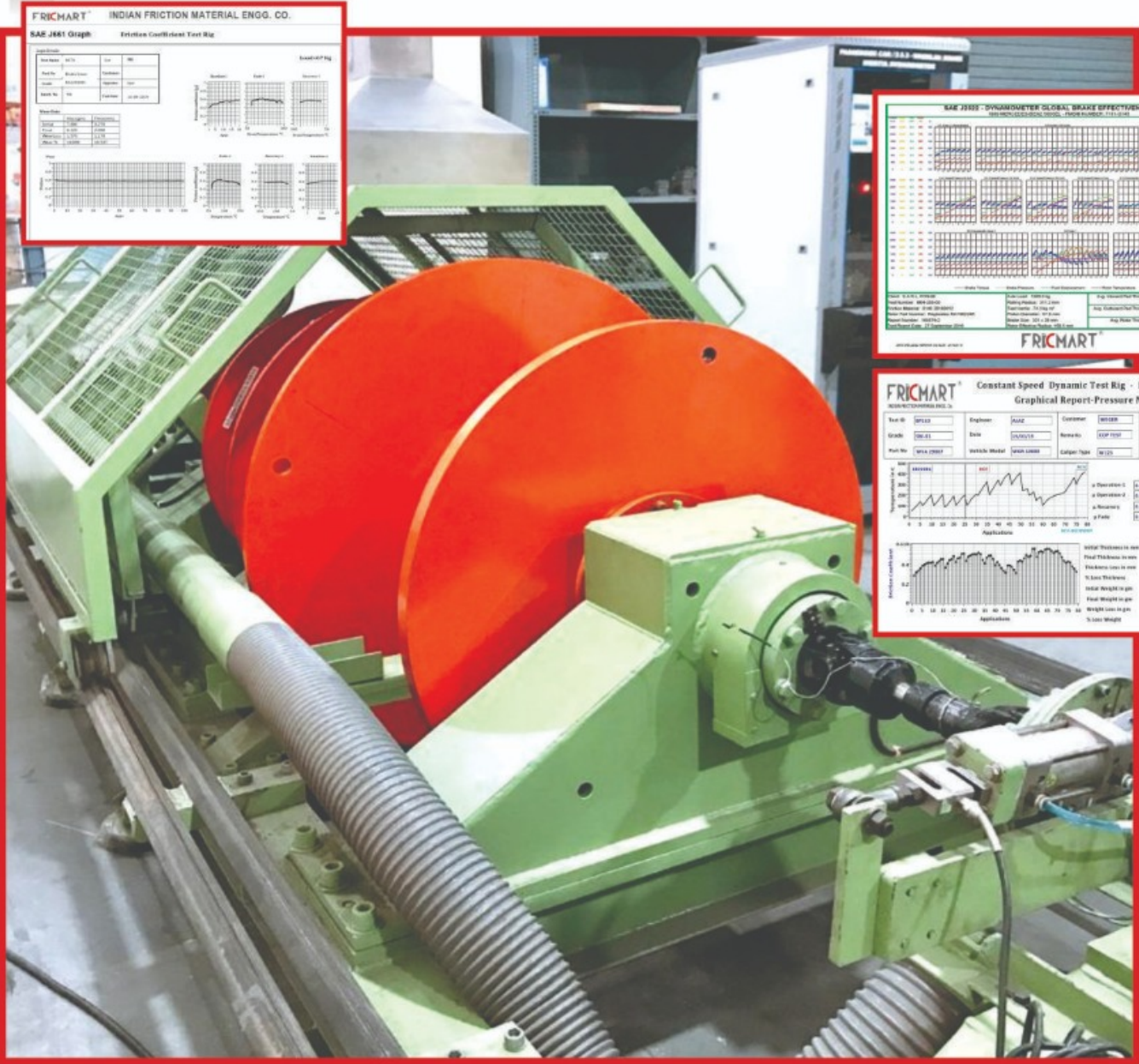


PROTOTYPE LAB

- ▶ **Fricmart's** strength includes the state of art in-house manufacturing and R & D facility for Brake Linings , Brake Shoes and Brake Pads.
- ▶ Equipments include Plough shear mixer ,battery of automatic Hydraulic Presses (60 – 250 Tons) Molds, Curing Ovens , Grinders etc.
- ▶ The R & D wing handles more than 150 raw material and additives used in friction material formulations in phase with international R & D hubs.



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SERVICES OFFERED

- ▶ Raw Materials
- ▶ Speciality Additives
- ▶ Master Batch & Mixes
- ▶ Technical Reports
- ▶ Testing & Equipments
- ▶ Process Engineering
- ▶ Plant & Machinery
- ▶ Turnkey Projects
- ▶ Tribology Solutions
for Friction Materials

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● BRAKE LININGS ● BRAKE SHOES ● BRAKE PADS ● CLUTCH FACINGS ● SINTERED FRICTION MATERIALS

Sl. No.	Name of Test	Unit	Method/Standard
1	Density / Sp. Gravity	gm/cc	BS:AU 142/JASO C-444/IS2742
2	Hardness / Rockwell	HR - R, L, S	ISO 2039-2/ IS2742-2014
3	Porosity	%	JASO C-444
4	Acetone Extraction	% wt	BS: AU 142/JASO C-444/ IS2742
5	Loss on Ignition/ Ash Content	% wt	BS: AU 142/ JASO C-444/ IS2742
6	Heat Expansion	%	ISO 6313 &
7	Compressibility Cold / Hot Test	%	ISO 6310 / SAE J-2468
8	Heat Swell	mm	IS 2742 - 2014/SAE J-160
9	Water Swell	mm	IS 2742 -2014
10	Bond Shear Strength	kg/cm ²	ISO 6312 / SAE J-840
11	Internal Shear / Plain Shear	kg/cm ²	ISO 6311 / IS 2742-2014
12	Cross Breaking (CBS) / Transverse Rupture Strength (TRS)	kg/cm ²	IS 2742-2014/ BS:AU 142
13	Seizure to Ferrous Strength surface due to corrosion	Force - N	ISO 6315
14	Internal Shear Strength after prolonged exposure to Water, Salt Water Lube Oil, Brake Fluid etc.	kg/cm ²	ISO 6311,6312 & ISO 6314 (Group I-V)
15	Coeff. of Friction & Wear (F.A.S.T. TEST) Mean Coeff. of Friction Friction vs Time/Temp./Drag Specific wear Rate	μ in 3 / HP / Hr	Ford Motors Std.
16	Coeff. of Friction & Wear (CHASE TEST) Normal Friction Coeff. Hot Friction Coeff. Wear in thickness Wear in weight Rating Edge Code	μ μ mm grams Edge Code	BS : AU 142/SAE J661/ISO7881 ISO 7881/ IS 2742-2014 JASO C- 418SAE J866
17	Coeff. of Friction & Wear (KRAUSS TEST) Mue - Cold/ Operation / Perfomance Mue - Lowest / Minimum / Fade Mue Highest / Max/ Recovery Wear in thickness Wear in weight	μ μ μ mm grams	ECE - R 90 (Rev. 3 Amend.2 Annex-9 Part-A. Sec. 2/Sec.3)
18	Coeff. of Friction & Wear (SCALE RIG TEST) Normal friction coeff. Hot Friction Coeff. Wear in thickness / Weight	μ μ mm / grams	IS 3649-2001
19	(FULL SCALE INERTIA DYNAMOMETER TEST) For 2 / 3 WHEELER & PASSENGER CARS- As per Special / OEM Std.- Perf. Wear & Fade Schedules.		IS 13453 / AK Master / FMVSS/ JASO C406 / SAE J2522 / SAE J 2430
20	NON ASBESTOS TEST Identification & Qualitative Analysis : Presence of Asbestos fibers / Non Asbestos	Affirming Non - Asbestos	ISO 2262 - 1 Stereo - PLM & DS Technique.

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