SERVICE CIRCULAR

TATA MOTORS

SC/ 2013/09	Model : SFC 407 Refresh BS III	Group: 00	Jan'13

All Dealers / TASS

Subject: Introduction of SFC 407EX & SFC 407EX2 Refresh BS-III with Mechanical F.I.P.

We are pleased to inform you about the introduction on SFC 407 Refresh with new front face. This vehicle would also feature the proven 4SP TCIC engine with Mechanical FIP meeting BS III emission norms. Both SFC 407Ex & SFC 407 Ex2 would be available with this new configuration. The existing front face will continue on SFC407 Pick up & SFC 407 HT.

Representative picture given below:

Existing 407Ex2

New 407Ex2 Refresh

Chassis type	VC No.	Chassis type designation
455040	55320131R	SFC407EX/31WB I BS-III REFRESH CLB
455041	55320231R	SFC407EX/31WB I BS-III REFRESH HDLB
455042	55320331R	SFC407EX/31WB I BSIII REFRESH CAB w/LB
455043	55320431R	SFC407EX2/31WB I BS-III REFRESH PS DLB
455044	55320531R	SFC407EX/31WB I BS-III REFRESH TT CLB

We are enclosing below the following information:

1. Technical specifications (Annexure – 1)
2. Salient features (Annexure – 2)
3. EGR system schematic diagram (Annexure – 3)
4. Sensors & actuators of EGR system & its functions (Annexure – 4)
5. Troubleshooting of EGR system (Annexure – 5)
6. Blink code diagnostics for EGR (Annexure – 6)
7. Head lamp bulb removal & refitment Procedure (Annexure – 7)
8. Recommended Lubricants, warranty & free service (Annexure – 8)

Annexure -1 TECHNICAL SPECIFICATIONS

ENGINE	407 EX Refresh	407 EX2 Refresh
Model	TATA 4SP TURBO INTERCOOLED (BHARAT STAGE-III)	
Type	Water cooled direct injection Diesel Engine	
No. of Cylinder	4 inline	
Bore/Stroke	97 mm x 100 mm	
Capacity	2956 cc	
Max. Engine Output	55.2Kw (75Ps)at 3050 rpm as per DOC/MOST/CMVR/TAP-115/116	
Max. Torque	245Nm at 1400-1600 rpm as per DOC/MOST/CMVR/TAP-115/116	
Compression Ratio	19:01	
Firing Order	1-3-4-2	
Engine Oil Capacity	Max: 7 liters, Min: 5 liters	
Fuel injection Pump	Rotary type-BOSCH with potentiometer	
Timing	With automatic advance	
Governor	Mechanical all speed	
Weight Of Engine	295 kg (Dry)	
Air Filter	Dry type	
Oil Filter	Full flow paper type	
Fuel Filter	Two stage pre & fine filtration	
CLUTCH		
Type	Single plate dry friction type	
Outside Dia.	280 mm	
GEAR BOX		
Model	TATA G-380 Synchromesh	
No of gears	5 Forward 1 Reverse	
Gear Ratio	1st - 6.01; 2nd - 3.483; 3rd - 2.033; 4th - 1.362; 5th - 1.00; Rev - 5.846	
REAR AXLE		
Type	Single reduction, hypoid gears, fully floating axle shafts	
Ratio	4.125:1 (33/8)	
FRONT AXLE		
Type	Heavy duty forged I beam, Reverse Elliot type	
STEERING		
Type	Variable ratio steering	Power Steering
Ratio	25:1 to 28:1	18.8
BRAKES		
Type	Vacuum assisted dual circuit hydraulic with tandem master cylinder	
Brake drum Dia.	308mm	
FRAME		
Type	Ladder type frame with riveted/bolted cross members.	
SUSPENSION		
Front	Semi elliptical spring	
Rear	Semi elliptical spring	
TYRE		
Size	8.25 x 16 -16PR Diagonal Ply	
FUEL TANK		
Capacity	60 liters	
CAB		
Type	All steel semi-forward control driver's cab.	
ELECTRICALS		
System	12 Volts	
Batteries	12V,70 Ah capacity	
Alternator	75 Amps with vacuum pump	
PERFORMANCE		
Max. Speed	110 Kmph	
CHASSIS DIAMENSION (mm)		
Wheel Base	3100	
Track Front	1630	
Track Rear	1610	
WEIGHT (Kgs)		
Bare Chassis Kerb wt	2526	
Max. Permissible GVW	5950	

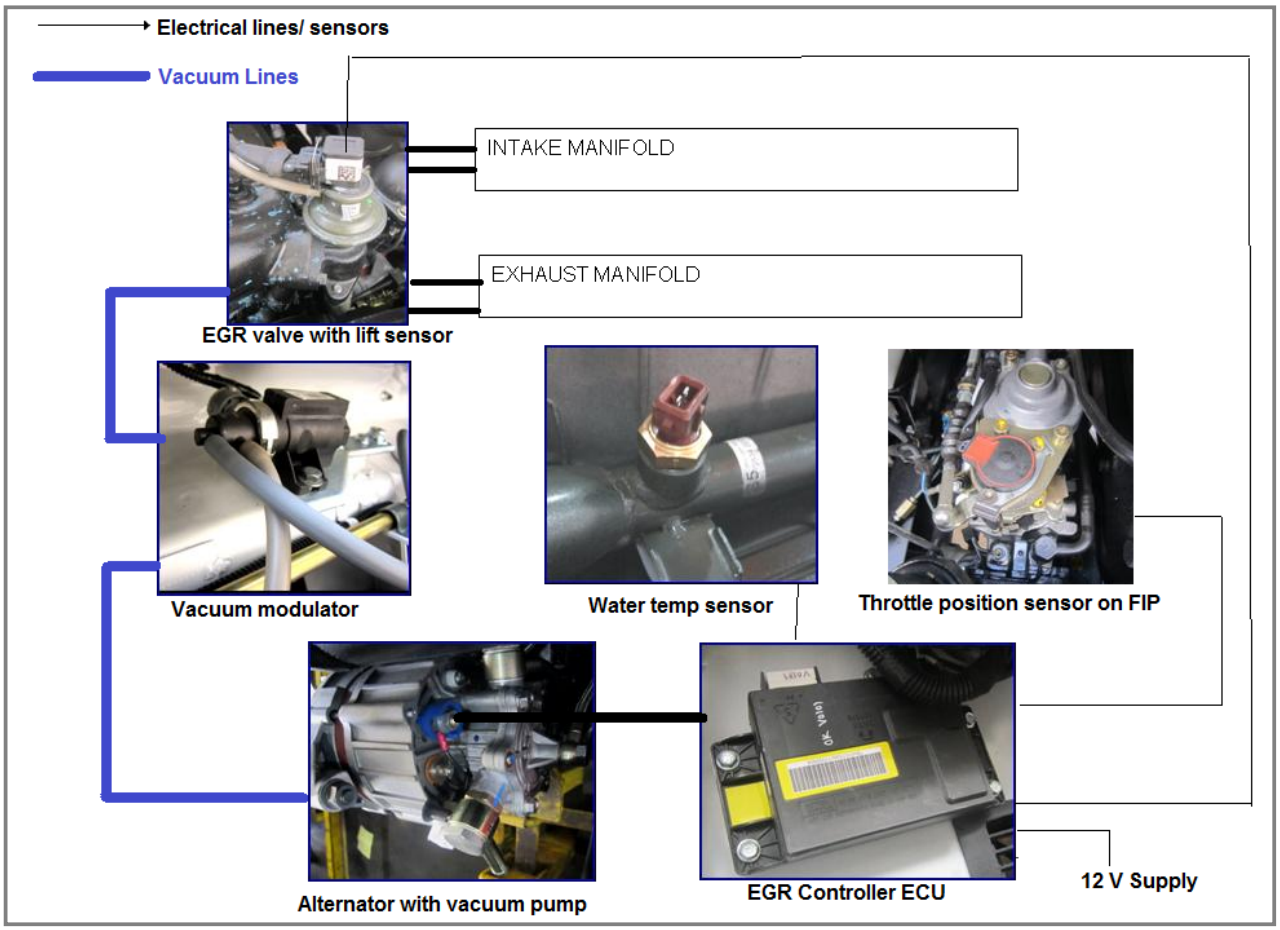
ANNEXURE –2 SALIENT FEATURES

Sr No	Salient Feature	Sr No.	Salient Feature
1	New wrap around combined head lamp 	6	Throttle position sensor on FIP 
2	New stylish bezel & stylish centre grill  	7	Vacuum modulator for actuation of EGR valve 
3	New Stylish Plastic black color bumper 	8	Vacuum pump on alternator 
4	Mechanical FIP & governor 	9	EGR controller ECU 
5	Progressive EGR with lift sensor for reducing NOx 	10	Compact engine oil cooler on oil filter head 

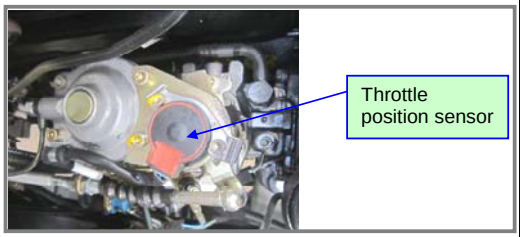
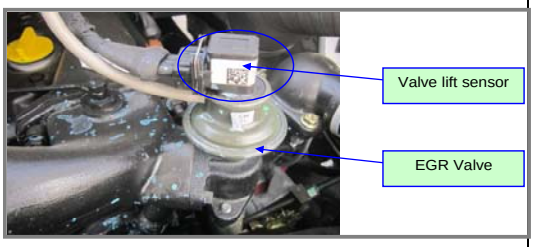
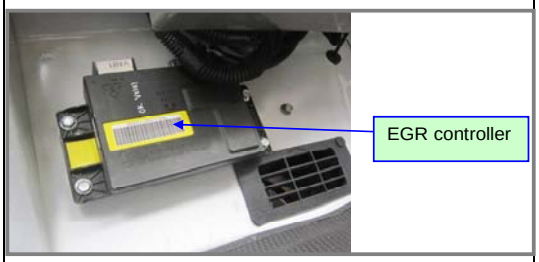
ANNEXURE – 3 EGR SYSTEM SCHEMATIC DIAGRAM

Progressive EGR system

Progressive EGR system is being used in SFC 407 BS III vehicles to meet stringent BS III emission norms.
In case of progressive EGR, desired flow rate of exhaust gas can be achieved at any operating conditions based on engine speed, throttle position and coolant temperature. The conditions for EGR valve open & close are mapped into the program inside the EGR controller ECU. The schematic diagram of EGR circuit is as given below



ANNEXURE – 4 SENSORS & ACTUATORS OF EGR SYSTEM

Components	Photo	Function
Engine speed sensor		Engine Speed Signal given to EGR controller from 'W' terminal on alternator
Coolant temp. sensor		Coolant temp. Sensor is mounted on upper cooling line, senses the coolant temp. and sends the signal to EGR controller.
Throttle position sensor		Potentiometer sensor is mounted on FIP to sense the throttle position and sends the signal to EGR controller.
EGR valve & Valve lift sensor		EGR valve mounted on intake elbow & regulates the exhaust gas recirculation into the intake depending upon the vaccum from vaccum modulator. Valve lift sensor (Feedback sensor) is provided on top of the valve which measures the valve lift & sends signals to EGR controller for accurate adjustment of the EGR valve(closed loop feedback)
Vaccum modulator		Vaccum modulator mounted inside the engine compartment near bonnet. It adjusts the input vaccum from alternator mounted vaccum pump. Based on input from EGR controller and admit controlled vaccum to actuate the EGR Valve.
EGR controller		EGR controller is mounted on fire wall from inside the cab on co-driver side. EGR controller receives the signals from Throttle position sensor, Engine speed sensor, Coolant temp. Sensor, valve lift sensor. Based on the input signals EGR controller decides the EGR valve lift & sends the output signal to vaccum modulator to adjust the vaccum to achieve the desired valve lift. In addition to this it provides the 12 V supply to KSB unit on full injection pump for advancing the fuel injection timing below 25° coolant temperature.

ANNEXURE – 5 TROUBLESHOOTING OF EGR SYSTEM

Malfunction of EGR system could lead to excessive black smoke and low pick-up especially at higher vehicle speeds. For ensuring the proper EGR valve operations, following methodologies can be adopted.

A. Visual Inspection of EGR valve operation:

1. Remove the vacuum tube and Valve lift sensor (feed back sensor on top of EGR valve) connector from the existing EGR valve and connect to the spare EGR valve by keeping the spare EGR valve just outside the engine cab.

2. Switch 'ON' the ignition and start the engine. Visually inspect the valve opening

3. Raise the engine rpm from around 1600 to 2600 rpm gradually and see the EGR valve opening. Valve should be in **opened condition.**

4. Press the accelerator to full throttle position (fly-up) and see the valve opening. EGR valve should be in fully **closed condition.**

B. EGR valve lift measurement

1. Tap the voltage across the pin no 3 (+ve) and pin no 2 (ground) of the EGR valve feed back sensor by using a Multimeter without removing the connector from EGR valve (pin no is written on the connecter).

2. Switch 'ON' the ignition and start the engine. Voltage measured on Multimeter should be as follows

   Idling : 4.5 V
   Fly-up: 0.4 V

4.5 V is the voltage corresponds to the fully open position and 0.4 V is the voltage corresponds to the fully closed position of the EGR valve. If EGR valve remains open at fly-up during the visual inspection or voltage across the valve lift sensor is above the specified limit at fly-up, excessive black smoke will be observed from the vehicle at higher vehicle speeds.

In this case, do the following steps one by one and check the valve opening:

- Check the vacuum line connections on vacuum modulator. Vacuum tube towards EGR valve should be connected on bigger outlet and tube from alternator vacuum pump should be connected on smaller outlet on modulator.
- Measure throttle position sensor voltage settings and send the FIP to BOSCH dealer for adjustment if it is not as per specification
- Replace the EGR valve
- Replace the vacuum modulator
- Replace the EGR controller

Note: Do the following if EGR valve operation is found ok and heavy black smoke is occurring from exhaust.

- FIP to be checked for timing and delivery (at BOSCH dealer)
- Injector for spray and Nozzle Opening Pressure (at BOSCH dealer)

Clean the system as per the procedure given below:

1. Remove the Air intake Elbow, & wipe the *Exhaust gas recirculation path* of the elbow, with clean cloth.

2. Remove the tappet cover & wipe the *air intake region* of the tappet cover, with clean cloth.

3. Clean the *intake & exhaust port* on the cylinder head for black soot.

4. Finish it further by wiping the ports with *cloth moistened* in kerosene solution.

5. Remove the *Exhaust manifold* & dip in kerosene solution. Use a brush to remove the soot & dry the manifold with compressed air.

6. Clean the *EGR tube & Valve* with compressed air.

7. Clean the *Silencer pipes & muffler* thoroughly with compressed air.

8. Clean the *Catalytic Converter* by blowing compressed air in reverse direction. If the deposition quantity is heavy then heated it upto 60 deg centigrade & pat with mallet to unsettle the soot & then blow air in reverse direction.

***** Compressed air pressure should be at least 2 bar.**

C. Throttle position sensor settings measurement

1. Tap the voltage across the pin no 2 (+ve) and pin no 3 (ground) of throttle position sensor connector (three pin connector connected to the male connector mounted on the FIP bracket) by using a multimeter without removing the connector from the sensor (pin no is written on the connecter).

2. Switch ON the ignition and start the engine. Voltage measured across the throttle position sensor by multimeter should be as follows

   Idling : 0.45+/- 0.03 V
   Fly-up: 4.60+/-0.05V

Send the FIP to BOSCH dealer if throttle position sensor setting is not as per specification

ANNEXURE – 6 BLINK CODE DIAGNOSTIC FOR EGR

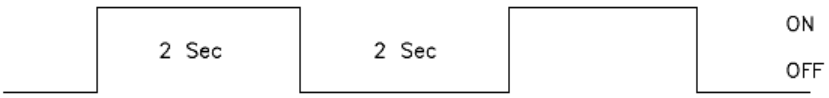
There is a check engine lamp provided in the instrument cluster which also acts as blink code lamp.

In normal condition i.e. no fault in EGR system the lamp will glow for 4 seconds and goes off automatically when the ignition is turned ON.

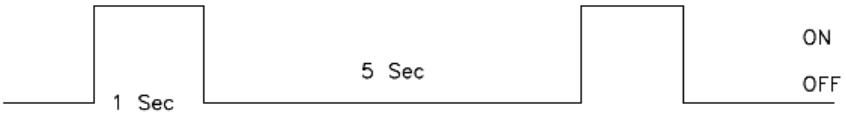
In case of any fault in the system the lamp will start blinking with ignition key in ON condition. The blinks have carefully read as per the chart given below & correlated with the probable fault.

a) Operational mode: 'NO fault' indication.

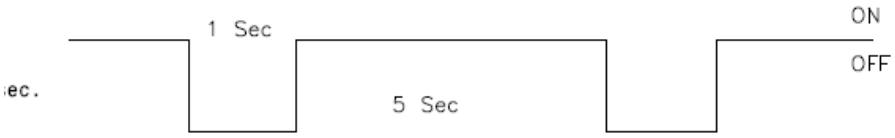
b) Operational Mode: 'No throttle pot. signal fault indication.



c) Operational mode : 'Thp.setting error' fault indication.

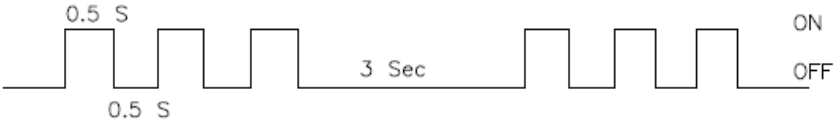


d) Operational mode 'Coolant temp sensor open/short to supply/short to GND' fault indication.

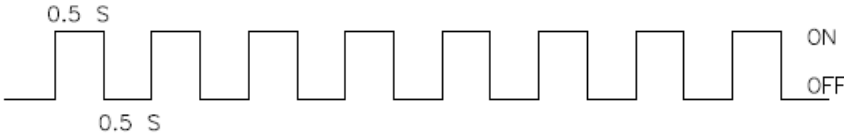


e) Operational Mode: 'EGR Valve Sensor No signal fault indication.

f) Operational Mode: 'EGR Valve not lifting fault indication.

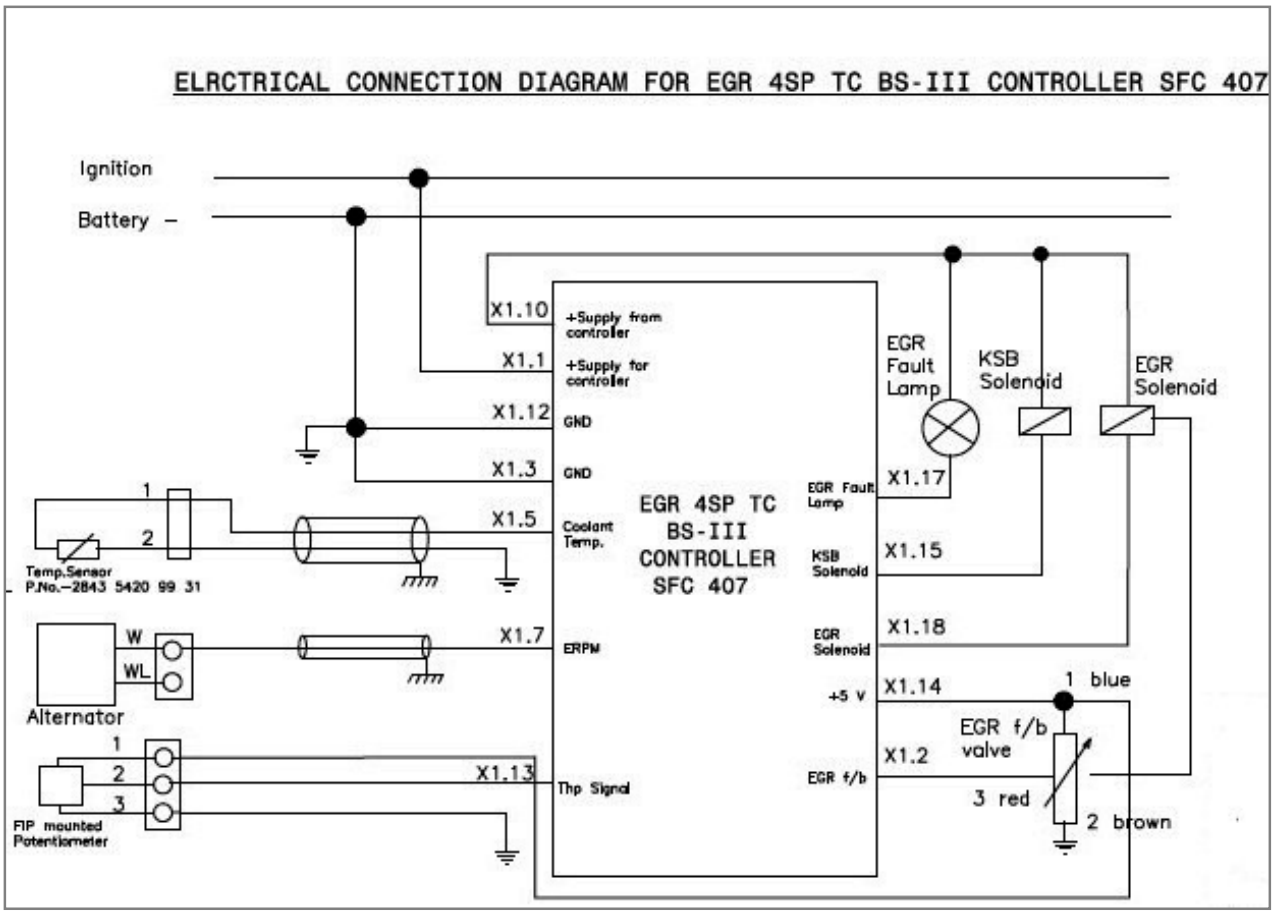


g) Operational Mode: 'EGR Valve not closing' fault indication.



Sr. No.	Fault	Fault Indication	Availability
1	EGR ECU No fault	Blink code lamp ON for 4 sec & OFF continuous	Yes
2	Throttle Position Supply Open	Blink code lamp, 2sec. ON & 2 Sec OFF	yes
3	Throttle Position centre open		
4	throttle position setting error	Blink code Lamp 1 sec. ON & 5 sec. OFF	yes
5	Coolant temp. sensor open	Blink code Lamp, 5 secs. ON & 1 sec. OFF	yes
6	Coolant temp. sensor short to supply / GND		
7	EGR valve sensor NO signal	Blink code Lamp (0.5 sec. ON & 0.5 sec. OFF) twice & OFF for 3 sec.	Yes
8	EGR valve not lifting	Blink code Lamp (0.5 sec. ON & 0.5 sec. OFF) thrice & OFF for 3 sec.	yes
9	EGR valve not closing	Blink code lamp continuous blink	Yes

Electric connection Diagram for EGR



ANNEXURE – 7 HEAD LAMP BULB REMOVAL & REFITMENT PROCEDURE

New wrap around combined head lamp is introduced on this vehicle.
It consists of High / low beam, Parking / position lamp and turn indicator in single unit. A main beam to give maximum light well ahead of the vehicle, and a dipped beam which is shorter and lower so that it will not dazzle on-coming drivers and can be used in low visibility area.

1. Main/Low Beam
2. Parking/Position lamp
3. Turn Indicator

Replacement of Head Lamp Assembly

- Place the ignition key in 'OFF' position`
- Open the front flap to access head lamp assembly.
- Head Lamp assembly locking & Bulbs can be accessed from area as indicated in fig.

Step No.	Procedure	Photo
1	Remove the head lamp bezel screws (4 nos. each) & nuts (2 nos) whose access is from opening provided on fender	
2	Remove the head lamp mounting screws(3 nos. each)	
3	Tilt the head lamp assembly towards the bulb side & insert the finger behind the dongle holder & pull the head lamp assembly toward the bulb side	
Note: 2 nos. of inserts to be replaced at every head lamp assembly removal & refitment		

Replacement of Head Lamp bulb

Step No.	Procedure	Photo
Head lamp Bulb Replacement		
1	To replace the main beam bulb slightly lift the dust cap.	
2	Release the bulb holder clip.	
3	Take out bulb with holder.	
4	Remove the bulb from holder.	
5	After replacement of bulb, properly lock the bulb holder clip and connect the electrical connections.	
Position Lamp Bulb replacement		
1	To remove the position Lamp bulb, turn the bulb holder and replace the bulb.	
Turn signal Bulb replacement		
1	To remove turn indicator bulb, turn the bulb holder and replace the bulb.	

ANNEXURE – 8 RECOMMENDED LUBRICANTS AND WARRANTY TERMS

Recommended Lubricants & coolants

Aggregate	Frequency of oil change	Grade/Specification	Recommended Brands			
			Castrol	BPCL	IOCL	Shell
Engine	20,000Kms	SAE 15W40 / API CH4 and MB 228.3	Castrol RX turbo 15W40 (CH4)	MAK TATA Motors Genuine 15W40 (CH4)	-----	Shell Rimula T3 15W40(CH4)
Coolant	20,000 Kms or 2 years	Non-Amino base	Castrol Long Life Coolant	MAK TATA Motors Super Kool	Servo Kool TM	-----
Gearbox	80,000 Kms	SAE 80W90 with 7% Anglomol 6097 by weight/API GL4	Castrol Extra Long life gear oil 80W90	MAK TATA Motors Spirol LL 80W90	Servo Synchro TM	Shell Rimula T2 G 80W90
Rear Axle	80,000 Kms	SAE 85W140 with 7% Anglomol 6043 by weight / API GL5	Castrol Extra long life Rear Axle oil 85W140	MAK TATA Motors Spirol LL 85W140	Servo Gear Axle TM	Shell Spirax T2 A 85W140
Power Steering	80,000 Kms	DEXTRON IID	Castrol TQD	MAK TATA Motors AUTRAN II	Servo Steer TM	Shell Spirax T2 ATF

Warranty terms:

All warranty terms & conditions remain same as per existing SFC 407 BSIII.

Warranty: 3 years or 3,00,000 Kms from date of sale of vehicle whichever occurs earlier

Free Service:

Sr No	Service	Kms Covered	Months
1	First	19,500 to 20,500	12
2	Second	39,500 to 40,500	24
3	Third	59,500 to 60,500	36