

व्यावसायिक परीक्षण रिपोर्ट (वैरिंट)
COMMERCIAL TEST REPORT (Variant)

संख्या/No. : T-1609/2140/2021
माह/Month : December, 2021

[ONLINE TESTING]

(यह परीक्षण रिपोर्ट 31/12/2024 तक वैध है / THIS TEST REPORT IS VALID UPTO 31/12/2024)



SWARAJ, 744 FE | 4x4 TRACTOR



भारत सरकार

कृषि एवं किसान कल्याण मंत्रालय
(कृषि, सहकारिता एवं किसान कल्याण विभाग)

GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS WELFARE

(DEPARTMENT OF AGRICULTURE, CO-OPERATION AND FARMERS WELFARE)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

ट्रैक्टर नगर, बुदनी (म.प्र.)-466 445

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO 9001: 2015 Certified Institute)

TRACTOR NAGAR, BUDNI (M.P.) - 466 445

E-mail: fmti-mp@nic.in, Web site: fmttibudni.gov.in, Telephone: 07564-234729

T-1609/2140/2021	SWARAJ, 744 FE I 4x4 TRACTOR - Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO: 31/12/2024

- Noise level test
- Turning Ability
- Location of Centre of Gravity

2. FUEL AND LUBRICANTS

2.1 Fuel : The High-speed diesel oil supplied by M/s Indian Oil Corporation Limited having density of 0.822 g/cc at 15°C was used.

2.2 Lubricants:

	Particulars	As recommended by the manufacturer	As used during the test
1.	Engine oil	SAE 20W40	As recommended
2.	Air cleaner oil	SAE 30	As recommended
3.	Gearbox, rear differential, rear axle, front axle, rear final drive, steering, brake and hydraulic oil	IOCL Transtrac 30	Oil originally filled in the tractor systems were not changed
5.	Grease	MP grease	As recommended

3. ESSENTIAL TESTS

3.1. SPECIFICATIONS

3.1.1 Tractor:	<u>Base Model</u>	<u>Variant Model</u>
Make	Swaraj	
Model	744 FE	744 FE I 4x4
Brand name	Swaraj	
Type	Four Wheeled, Rear Wheel Driven, Unit construction, General purpose, Agricultural Tractor.	Four Wheeled, Four Wheel Driven, Unit construction, General purpose, Agricultural Tractor.
Month & Year of manufacture	02 / 20	05 / 21
Chassis number	MBNAV53ACLCB47908	MBNAW53ACMCF88722
Country of Origin	India	
3.1.2 Engine:		
Make	M/s. Swaraj Engines Ltd.	
Model	RB30TR	
Type	Four stroke, naturally aspirated, liquid cooled, direct injection, diesel engine.	
Serial number	DC.3009/SBA02070	DC.4007/SDF13975
Engine speed (Manufacturer's recommended production setting),(rpm) :		
- Maximum speed at no load	2100 to 2200	
- Low idle speed	580 to 700	
- Speed at maximum torque	1200 to 1600	
Rated speed, (rpm):		
- For PTO use	2000	
- For drawbar use	2000	
3.1.3 Cylinder & Cylinder Head:		
Number	Three	
Disposition	Vertical, Inline	
Bore/stroke, (mm)	110 / 110	
Capacity as specified by the applicant, (cc)	3136	
Compression ratio, (apa)	18.5 (± 0.5) : 1	
Type of cylinder head	Individual	
Type of cylinder liners	Wet, replaceable	
Type of combustion chamber	Cavity torroidal on piston crown	
Arrangement of valves	Over head, inline	

T-1609/2140/2021	SWARAJ, 744 FE I 4x4 TRACTOR - Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO: 31/12/2024

7. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

7.1 On the basis of tests conducted the performance results have been summarized as evaluative (mandatory) and non-evaluation (not-mandatory) parameter applicable for qualifying Minimum Performance Criteria as per Clause-4 (Table-1) of IS: 12207-2019 for acceptance of the tractor for the purpose of subsidies/NABARD financing are summarized as under:-

Sl. No.	Characteristic	Category (Evaluative /Non-Evaluative)	Requirements as per IS: 12207-2019	Values declared by the applicant/ requirement		As observed		Whether variant model meets the requirements (Yes/No.)
				Base model	Variant Model	Base model	Variant model	
1	2	3	4	5 a	5 b	6 a	6 b	7
7.1.1	PTO Performance:							
a)	Max. power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: $\pm 5\%$ for PTO power or engine power >26 kW, $\pm 10\%$ for PTO power or Engine power ≤ 26 kW.	30.1 (D)	30.1 (D)	30.3	31.4	Yes
b)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% Max.	265 (D)	265 (D)	250	259	Yes
7.1.2	Drawbar performance:							
a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 70% of static mass with ballast	19.29 (D) 19.29 minimum (R)	21.72 (D) 21.86 minimum (R)	23.78	26.98	Yes
b)	Maximum drawbar pull with unballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 70% of static mass of tractor without / standard ballast	14.21 (D) 14.21 minimum (R)	16.09 (D) 16.23 minimum (R)	17.25	20.93	Yes
c)	Maximum drawbar power without ballast, or with standard ballast as the case may be, kW	Evaluative	Minimum 80 % of PTO power as referred in SI No. i) a) of PTO performance in case of tractors having total static mass > 1500 kg Minimum 75 % of PTO power as referred in SI No. i) a) of PTO performance in case of light weight tractors having 1500 kg total static mass of tractor Minimum 75 % of the engine power as referred in SI No. i) a) of engine performance in case of tractors which do not have a PTO shaft.	26.8 (D) 24.2 minimum (R)	24.1 (D) 25.1 minimum (R)	26.4	26.2	Yes
d)	Maximum transmission oil temperature ($^{\circ}$ C)	Evaluative	The declared value should not exceed the maximum value specified by oil company.	110 (D)	110 (D)	81	77	Yes

T-1609/2140/2021	SWARAJ, 744 FE I 4x4 TRACTOR - Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO: 31/12/2024

1	2	3	4	5	6	7
7.1.3 Noise measurement :						
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	88 dB (A) for >1.5 tonne GVW and 85 db (A) for <1.5 tonne GVW (as per CMVR)	83	82	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	96 (as per CMVR)	94	95	Yes
7.1.4 Safety features:						
a)	Guards against moving and hot parts	Evaluative	Belt drives, pullies, silencer, hydraulic pipes (As per IS 12239 (Part2).	Meets the requirement	Yes	
b)	Lighting arrangement	Evaluative	As per CMVR	Meets the requirement	Yes	
c)	Seating requirements (Tractors having more than 1150 mm rear track width)	Non Evaluative	Should meet the requirements of IS: 12343 (As amended from time to time).	Does not meets the requirement	No	
d)	Technical requirements for PTO shaft	Evaluative	Should meet the requirements of IS: 4931 (As amended from time to time).	Meets the requirement	Yes	
e)	Dimensions of three point linkage	Non Evaluative	Should meet the requirements of IS: 4468 (Part-I) (As amended from time to time).	Does not meets the requirement	No	
f)	Specifications of linkage drawbar	Evaluative	Should meet the requirements of IS: 12953 (As amended from time to time).	Meets the requirement	Yes	
g)	Swinging drawbar (wherever fitted)	Evaluative	Should meet the requirement of IS: 12362 (Part 3) (As amended from time to time).	Not fitted	Not applicable	
h)	1) Maximum travelling speed at rated engine speed in reverse gears, Kmph	Evaluative	Should not exceed 20 Kmph	11.44 kmph (Meets the requirement)	Yes	
	2) Audible warning signal on tractor	Evaluative	As soon as the travelling speed in reverse gear reaches to 20 kmph, an audible warning signal on tractor shall be activated. The safety aspects about the operation of shuttle technology shall be brought in operation and manufacturer/dealer shall ensure the training on this aspect to operator before the delivery of tractor.	Not applicable	Not applicable	

T-1609/2140/2021	SWARAJ, 744 FE I 4x4 TRACTOR - Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO: 31/12/2024

1	2	3	4	5	6	7	
7.1.5	Labelling of tractors (Provision of labelling plate):						
1)	Make	Evaluative	Should conform to the requirements of CMVR along with maximum PTO Power in kW and year of manufacture in numerical form. <table border="1" style="margin: 0 auto;"> <tr> <td style="width: 40px;">MM</td> <td style="width: 40px;">YY</td> </tr> </table> Digit 01 – 12 in box No.1 for MM will represent the months and next two digits in box No.2 for YY will represent the year of Manufacturing.	MM	YY	Swaraj	Yes
MM	YY						
2)	Model	Evaluative		744 FE I 4x4	Yes		
3)	Month & Year of manufacture	Evaluative		05 / 21	Yes		
4)	Engine number	Evaluative		DC.4007/SD F13975	Yes		
5)	Chassis number	Evaluative		MBNAW53A CMCF88722	Yes		
6)	Declaration of PTO power, (kW)	Evaluative		30.1	Yes		
7)	Specific fuel consumption, (g/kWh)	Evaluative	265	Yes			
7.1.6	Literature (Submission to test agency):						
(a)	Operator manual	Evaluative	Provided/ Not Provided	Provided	Provided	Yes	
(b)	Parts Catalogue	Evaluative	Provided/Not Provided	Provided	Provided	Yes	
(c)	Workshop/Service manual	Evaluative	Provided/Not Provided	Provided	Provided	Yes	
7.1.7	Fitment of Roll Over Protective Structures (ROPS):						
	For tractor having more than 1150 mm rear track width	Evaluative	ROPS should meet the requirement of IS:1182 or OECD code or equivalent International Standard.	Not Provided	Not fitted	Not Applicable	
7.1.8	Standard Accessories	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with tractor.	Provided	Provided	Yes	
7.1.9	Accessories (optional)	Non Evaluative	Ballast weight, if fitted, should meet the requirement of CMVR.	Provided	Provided	Yes	

7.2 CATEGORY OF BREAKDOWNS / DEFECTS:					
Sl. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	As observed	Whether meets the Requirements (Yes/No.)
1.	Critical	Evaluative	No critical breakdown.	None	Yes
2.	Major	Evaluative	Not more than two and neither of them should be repetitive in nature.	None	Yes
3.	Minor	Evaluative	Not more than three and frequency of each should not be more than two.	None	Yes
4.	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed five, that is, (2 major + 3 minor) or 5 minor breakdowns.	None	Yes

7.2 Salient Observations:

7.2.1 Laboratory tests:

7.2.1.1 PTO performance:

During PTO performance test under natural ambient condition, the maximum power was recorded 31.7 kW against the declaration of 30.1 kW, which is 5.3 % higher than the declared value and does not meet the evaluative requirements of IS:12207-2019.

On the request of applicant, following checking / adjustment were carried out:-

T-1609/2140/2021	SWARAJ, 744 FE I 4x4 TRACTOR - Commercial (Variant)	
	THIS TEST REPORT IS VALID UPTO: 31/12/2024	

(a) Tappet clearance, mm:

Cylinder no.	Declared		Observed		Corrected	
	Inlet	Exhaust	Inlet	Exhaust	Inlet	Exhaust
1	0.25 to 0.30	0.30 to 0.35	0.15	0.25	0.30	0.30
2	0.25 to 0.30	0.30 to 0.35	0.20	0.25	0.30	0.30
3	0.25 to 0.30	0.30 to 0.35	0.15	0.30	0.30	0.30

(b) Fuel injection timing was checked and found correct.

After above checking / adjustment, PTO test was re-conducted.

7.2.1.2 Drawbar performance test:

During ten hours drawbar performance test, creeping of LHS & RHS rear tyre over the rims was recorded as **15 & 20 mm** respectively. This should be looked into for necessary corrective action.

7.2.1.3 Operator's seat:

- i) The vertical distance from Seat Index Point to centre of brake pedal is less than the minimum requirement.
- ii) The vertical distance from Seat Index Point to centre of clutch pedal is less than the minimum requirement.

7.2.1.4 Three point linkage:

- i) Lateral distance from lower hitch point to centre line of tractor does not meet the requirements of IS: 4468- (Part-1) -1997 (Reaffirmed in Oct., 2017). This should be looked into for necessary corrective action.
- ii) Distance from end of power take-off to centre of lower hitch point (lower links in horizontal position) does not meet the Category II of IS: 4468 (Part-1)- 1997 (Reaffirmed in Oct., 2017). This is recommended to looked into for necessary corrective action.
- iii) Some of the parameters conform to Cat. I and some of them conform to Cat. II. Keeping in view the spirit of standardization, necessary improvements may be incorporated.

7.3 Maintenance / Service Problems:

No noticeable maintenance or service problem was observed during the test.

7.4 Recommendation with regard to safety on tractor:

The following requirements, inter alia, may be considered for incorporation on the tractor:




- i) The vertical distance from seat index point to the centre of clutch pedal should be provided as per IS: 12343-1998, (Reaffirmed in January, 2019).
- ii) The vertical distance from seat index point to the centre of brake pedal should be provided as per IS: 12343-1998, (Reaffirmed in January, 2019).
- iii) The fuel shut Off knob should be provided as per IS:8133-1983 (Reaffirmed in January, 2019)
- iv) Differential local pedal has not been provided.
- v) The spark arrester in the exhaust system should be provided as per IS: 12239 (Part-1)-2018.
- vi) Vertical retainer should be provided on inner side of clutch pedal as per IS: 12239 (Part-1)-2018.
- vii) Width of foot step does not meet the requirement of IS: 12239 (Part-1)-2018. This should provided as per the above referred standards.
- viii) The working clearance between the draft control lever and position control lever should be provided as per the requirement of IS: 12239 (Part-2) - 1999, (Reaffirmed in January, 2019).
- ix) PTO master shield should be provided on tractor as per IS:4931-1995 (Reaffirmed in January, 2019).

T-1609/2140/2021	SWARAJ, 744 FE I 4x4 TRACTOR - Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO: 31/12/2024

- 7.5 Adequacy of Literature supplied with machine:
- 7.5.1 Following literature of following tractor models were supplied with the test sample for reference during the test.
- Service Manual of Swaraj 744 FE I 4x4 tractor model.
 - Parts Catalogue of Swaraj 744 FE I 4x4 tractor model.
 - Operator's manual of Swaraj 744 FE I 4x4 tractor model.
- 7.5.2 The supplied literature was found adequate as per IS: 8132-1999 (Reaffirmed in 2019)

The results of the tests carried out on variant model "Swaraj 744 FE I 4x4" tractor have been compared with those on base model "Swaraj 744 FE" tractor tested vide test report No. T-1115/1641/2017 (November, 2017) & Administrative Extension report vide test report No. T-1314/1841/2020 (March, 2020) which was found within the limit, as specified in IS: 12207-2019.

TESTING AUTHORITY:

C.V. CHIMOTE TEST ENGINEER	
Y.K.RAO SENIOR AGRICULTURAL ENGINEER	
P.K. PANDEY DIRECTOR	

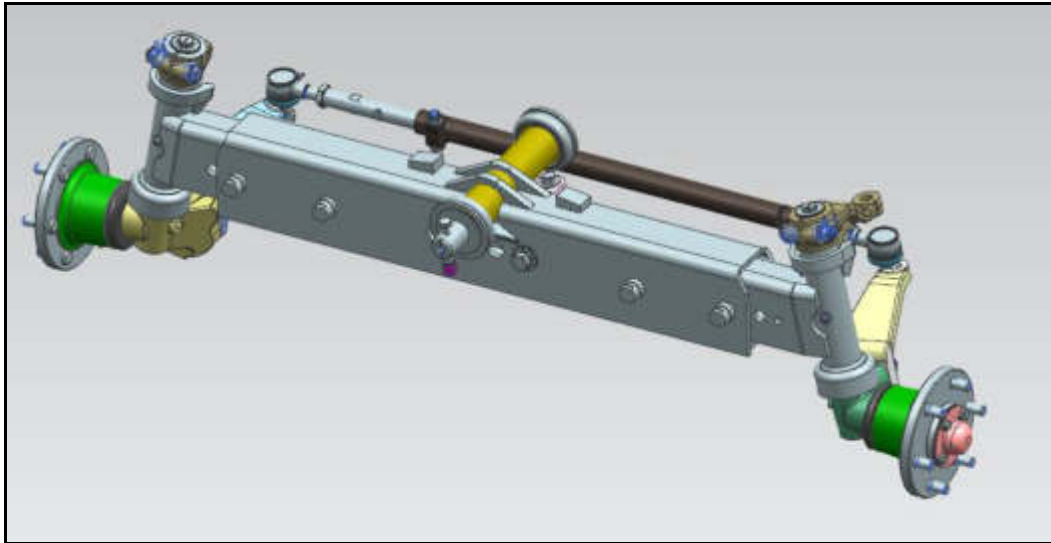
Test report is compiled by: **Vithato Keyho**, Senior Technical Assistant

8. APPLICANT'S COMMENTS

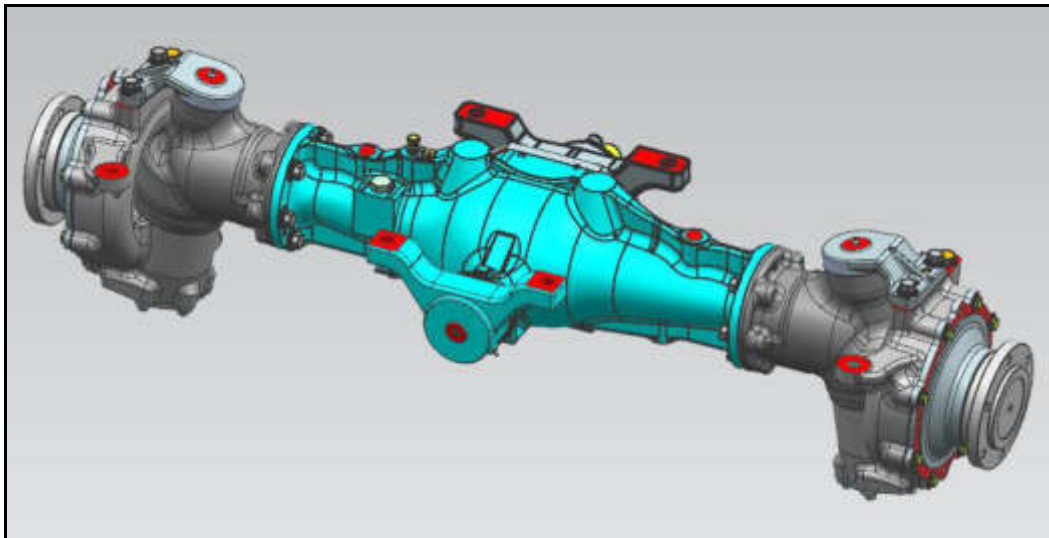
Para No.	Our Reference	Applicant's comments
8.1	7.2.1.1, 7.2.1.2, 7.2.1.3, 7.2.1.4 & 7.4	These requirements are being revisited for necessary corrective action at our end.

ANNEXURE-I

FRONT AXLE DESIGN ON BASE MODEL SWARAJ 744 FE



FRONT AXLE DESIGN ON VARIANT MODEL SWARAJ 744 FE I 4x4



T-1609/2140/2021	SWARAJ, 744 FE I 4x4 TRACTOR - Commercial (Variant)
	THIS TEST REPORT IS VALID UPTO: 31/12/2024

ANNEXURE-II

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS	<u>HOURS</u>
1.	Running – in	61.8
2.	PTO performance test	6.7
3.	Nominal speed test	1.3
4.	Drawbar Performance Test	17.0
5.	Noise Measurement	2.0
6.	Location of Centre of Gravity	0.8
7.	Turning ability	0.7
B.	Miscellaneous test and other run hours, including idle run transportation, trial and preparation for test.	2.6
Total		92.9