

Application Reference No. 28/2023-24/30

(यह परीक्षण रिपोर्ट 28/02/2029 तक वैध है / THIS TEST REPORT IS VALID UPTO 28/02/2029)



Make of Agricultural Tractor : SWARAJ  
Model : 735 FE V1  
Manufactured by : M/s. Mahindra & Mahindra Ltd.  
Farm Equipment Sector, Swaraj  
Division. Phase- IV, Industrial  
Area, S.A.S. Nagar, Mohali, Punjab  
– 160 055



भारत सरकार

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

GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS' WELFARE

(DEPARTMENT OF AGRICULTURE & FARMERS' WELFARE)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

ट्रैक्टर नगर, बुदनी (म.प्र.) 466 445

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

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

(An ISO 9001:2015 Certified Institute)

T-1824/2355/2024	SWARAJ, 735 FE V1 TRACTOR - INITIAL COMMERCIAL TEST
	THIS TEST REPORT IS VALID UPTO: 28/02/2029

## IMPORTANT INFORMATION

The Government of India, Ministry of Agriculture and Farmers' Welfare has directed, vide a OM No. 13-17/2021-M&T (I&P) dated 28.07.2022, that since 15<sup>th</sup> August, 2022, only mandatory tests will be carried out on a tractor unless applicant has expressly requested for optional tests as well, mentioned in the above captioned OM.

In the instant case, there is no request from the applicant to carry out the optional tests hence only Mandatory Tests, as given below, have been conducted and reported in this report: -

1. PTO performance
2. Hydraulic performance
3. Drawbar performance
4. Brake performance

Month: February	Test Report No.: T-1824/2355/2024	Year: 2024
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[C]	Tractor manufacturer's name and address	:	<b>M/s. Mahindra &amp; Mahindra Ltd. (Farm Equipment Sector),</b> Swaraj Division, Phase- IV, Industrial Area, S.A.S. Nagar, Mohali, Punjab – 160 055
[C]	Submitted for test by (Applicant)	:	The Manufacturer
[C]	Selected for test by	:	The Ministry vide OM No. 13-17/2021 - M&T (I&P) dated 28.07.2022, has allowed the applicant to submit the test sample directly to the Institute without requiring any random selection for Initial Commercial Testing. Thus, the applicant directly submitted the test sample to the Institute for test.
[D]	Duration of running-in, (h):		
	-Engine	:	28
	-Transmission	:	32
[C]	Location of test	:	Government of India, Central Farm Machinery Training and Testing Institute, P.O. - Tractor Nagar, BUDNI – 466445 (M.P.), INDIA

## 1. SPECIFICATIONS OF TRACTOR

### 1.1 Identification:

#### 1.1.1 Denomination

[C]	Make of tractor	:	SWARAJ
[C]	Model	:	735 FE V1
[C]	Type	:	Rear Wheel Drive, Standard Agricultural Tractor.
[C]	Month & year of manufacture	:	09/23
[D]	Country of origin	:	India

#### 1.1.2 Numbers:

[D]	1 <sup>st</sup> Serial No. or prototype	:	MBNAN48AENTF14616
[C]	Serial No.	:	MBNCA49AHPTL06766

### 1.2 Engine:

[D]	Manufacturer's address	:	M/s. Swaraj Engines Ltd. Plot No. 2, Industrial Area, Phase-9, Mohali, Punjab-160 062
[C]	Make	:	Swaraj
[C]	Model	:	RV3XT
[C]	Type	:	Four stroke, naturally aspirated, liquid cooled, direct injection, diesel engine
[C]	Serial No.	:	39.1360/SFL27087

#### 1.2.1 Cylinders:

[C]	Number/disposition	:	Three / vertical inline
[D]	Bore / Stroke, (mm)	:	100 / 116
[D]	Capacity, cm <sup>3</sup>	:	2734
[D]	Compression ratio	:	20.4 (±0.5) :1
[D]	Arrangement of valves	:	Overhead
[D]	Cylinder liners	:	Wet, replaceable
[D]	Type of combustion chamber	:	Re-entrant cavity on piston crown

**1.2.3 Supercharging : Not Available**

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## 6. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

6.1 On the basis of test conducted the performance results have been summarized as evaluative (mandatory) / Non-evaluative (Non-mandatory) parameters applicable for Qualifying Minimum Performance criteria as per Clause-4 (Table-1) of IS: 12207-2022 for acceptance of the tractor for the purpose of subsidies/NABARD financing are summarized as under:

S. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2022	Values declared by the applicant/ (D) Requirement (R)	As observed	Whether meets the requirements (Yes/No)
1	2	3	4	5	6	7
<b>MANDATORY TESTS: (As per Ministry's Office Memorandum No. 13-17/2021-M&amp;T (I&amp;P) dated 28<sup>th</sup> of July, 2022).</b>						
<b>6.1.1 PTO Performance:</b>						
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: $\pm 5\%$ for PTO power and or engine power $> 26$ kW. $\pm 10\%$ for PTO power and or engine $\leq 26$ kW.	26.1 (D)	26.2	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	26.1 (D)	26.2	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	Should not be more than 10% of declared value	258 (D)	243	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	$\pm 8\%$	172 (D)	172.9	Yes
e)	Back-up torque, percent	Evaluative	Should be minimum 12 percent	12 (D) 12 (R) Minimum	24.2	Yes
f)	Maximum operating temperature, ( $^{\circ}\text{C}$ ):					
	1) Engine oil	Evaluative	The declared value should not exceed the Max value specified by the oil company and the observed value under natural ambient/high ambient condition should not exceed the declaration	130 (D)	104	Yes
	2) Coolant	Evaluative	Observed value should not exceed the declared value or boiling point of coolant at radiator cap pressure whichever is lower. The boiling point of the coolant at radiator pressure shall be provided by the applicant.	115 (D)	106	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under natural ambient conditions.	2.43 (R) Maximum	0.24	Yes
h)	Smoke level, $\text{m}^{-1}$	Evaluative	Max Smoke level shall be reported out of 6 readings tested as per IS 12062 and observed value should be well within the required limits.	3.25 per meter (R) Maximum	0.30	Yes

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1	2	3	4	5	6	7
<b>6.1.2</b>	<b>Drawbar performance:</b>					
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non-Evaluative	Minimum 70% of static mass of tractor with ballast.	*	*	*
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 70% of static mass of tractor without ballast or with standard ballast, as the case may be.	12.6 (D) 12.60 (R) Minimum	13.22	Yes
c)	Maximum drawbar power without ballast/ with standard ballast, (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.	20.9 (D) 21.0 (R)	23.9	Yes
d)	Maximum transmission oil temperature, (°C)	Evaluative	The declared value should not exceed the maximum value specified by oil company	110 (D)	77	Yes
(*) Applicant vide letter no. SD/Budni/ICT/23-24/735 FEV1/A-08/L-01 dated 23.11.2023 has requested not to conduct the ballasted drawbar performance & ten-hour drawbar test which was allowed as per the additional guidelines for testing of tractors as per new regime of testing of tractors vide a OM No. 13-32/2023-M&T(I&P) (FTS-125476) dated 16.05.2023. Accordingly, only unballasted drawbar performance test was conducted.						
<b>6.1.3</b>	<b>Power lift and hydraulic pump performance:</b>					
a)	Maximum lifting capacity throughout the range of lift, (kN):					
1)	At hitch points	Evaluative	Should not be less than 90% of declared value.	14.71 (D) 13.24 (R) Minimum	13.89	Yes
2)	With the standard frame	Evaluative	The lift capacity should at least be 24 kg/PTO kW and it should be 21.5 kg/engine kW where the tractor is not provided with a PTO shaft.	11.03 (D) 6.17(R) Minimum	12.58	Yes
b)	Maximum drop in the height of the point of application of the force after each 5 minutes interval for a total duration of 30 Minutes, (mm)	Non-Evaluative	The observed value should not exceed 50 mm	50 (D) Maximum	20	Yes

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1	2	3	4	5	6	7
<b>6.1.4</b>	<b>Brake performance at 25 kmph:</b>					
<b>a)</b>	Maximum stopping distance at a force, equal to or less than 600 N on brake pedal without ballast, (m):					
	1) Cold brake	Evaluative	10	10 (R)	7.01	Yes
	2) Hot brake	Evaluative	10	10 (R)	7.39	Yes
<b>b)</b>	Whether parking brake is effective at a force of 600 N at foot pedal (s) or 400 N at hand lever	Evaluative	Yes / No	Yes	Yes	Yes
<b>6.1.5</b>	<b>OPTIONAL TESTS: As the applicant has not applied for any optional tests, therefore no optional tests was conducted.</b>					
<b>6.1.6</b>	<b>Safety features:</b>					
<b>a)</b>	Guards against moving and hot parts	Evaluative	Belt drives, pulleys, silencer, hydraulic pipes [As per IS 12239 (Part2)]	Meets the requirement	Yes	
<b>b)</b>	Lighting arrangement	Evaluative	As per CMVR	Meets the requirement	Yes	
<b>c)</b>	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)	<b>Does not meet the requirement</b>	<b>No</b>	
<b>d)</b>	Technical requirements for PTO shaft	Non Evaluative	Should meet the requirements of IS: 4931 (As amended from time to time)	Meets the requirement	Yes	
<b>e)</b>	Dimensions of three-point linkage	Non Evaluative	Should meet the requirements of IS: 17231-2019 (As amended from time to time)	<b>Does not meet the requirement</b>	<b>No</b>	
<b>f)</b>	Specifications of linkage drawbar	Non Evaluative	Should meet the requirements of IS: 12953 (As amended from time to time)	Meets the requirement	Yes	
<b>g)</b>	Specifications of Swinging drawbar (wherever fitted)	Non Evaluative	Should meet the requirement of IS: 12362 (Part-3) (As amended from time to time)	Not provided	Not applicable	
<b>h)</b>	Audible warning signal on tractor	Evaluative	If tractor travel speed in reverse gear exceeds 20 kmph, an audible warning signal on tractor shall get activated. A sticker to the effect that "operating the tractor beyond 20 kmph speed in reverse gear is not safe" should be prominently displayed.	Not fitted (10.79 kmph in HR gear)	Not applicable	
<b>6.1.7</b>	<b>Labelling of tractors (Provision of labelling plate):</b>					
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO in kW, Specific fuel consumption (SFC) corresponding to maximum power in g/kWh and year of manufacture in numerical form MM YY Digit 01-12 in box No. 1 for MM will represent the month and next two digit in the box No. 2 for YY will represent the year of manufacturing	SWARAJ	Yes	
	2) Model	Evaluative		735 FE V1	Yes	
	3) Month & Year of manufacture	Evaluative		09/23	Yes	
	4) Engine number	Evaluative		39.1360/SFL2 7087	Yes	
	5) Chassis number	Evaluative		MBNCA49AH PTL06766	Yes	
	6) Maximum PTO power, (kW)	Evaluative		26.1	Yes	
	7) Specific fuel consumption, g/kWh	Evaluative		258	Yes	

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1	2	3	4	5	6	7
<b>6.1.8</b>	<b>Literature (Submission to test agency):</b>					
(a)	Operator manual	Evaluative	The printed literature in booklet form should be provided as per IS 8132 and should submit along with the test sample.	Provided	Yes	
(b)	Parts Catalogue	Evaluative		Provided	Yes	
(c)	Workshop/ Service manual	Evaluative		Provided	Yes	
<b>6.1.9</b>	<b>Fitment of Roll Over Protective Structures (ROPS):</b>					
	For tractor having more than 1150 mm rear track width	Evaluative if fitted	ROPS should meet the requirement of IS:1182 or OECD code or equivalent International Standard	Not fitted	Not applicable	
<b>6.1.10</b>	Standard Accessories	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with tractor	Provided	Yes	
<b>6.1.11</b>	Accessories (optional)	Non Evaluative	Ballast weight, if fitted, should meet the requirement of CMVR	Not fitted	Not applicable	

<b>6.2 CATEGORY OF BREAKDOWNS / DEFECTS (As per clause 5.0 of IS:12207-2022):</b>					
S. No.	Category of break-downs	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2022	As observed	Whether meets the Requirements (Yes/No)
1.	Critical	Evaluative	There is no 'critical breakdown' during the course of testing	None	Yes
2.	Major	Evaluative	There are not more than 2 major break downs and neither of them should be of repetitive nature.	None	Yes
3.	Minor	Evaluative	There are not more than 5 minor defects during the test and neither of them should of repetitive nature.	None	Yes
4.	Total breakdowns	Evaluative	In no case, the total number of break downs should exceed five that is, (2major + 3 minor) or (1 major + 4 minor) or 5 minor breakdowns.	None	Yes

**6.3 Conformity with following IS:**

- i) Guidelines for declaration of power and specific fuel consumption and labeling of agricultural tractors (First revision) [IS:10273 -1987 (Reaffirmed Year 2019)] : Conforms
- ii) Agricultural tractors - Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS:4931-1995 (Reaffirmed Year 2019)] : Conforms
- iii) Agricultural wheeled tractors – Rear mounted three-point linkage: Categories 1N,1,2N, 2, 3N, 3,4N & 4 [ IS: 17231:2019] : **Does not conform**
- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed Year 2022)] : Conforms
- v) Agricultural tractors- Operator's seat technical requirement [IS12343 - 2021] : **Does not conform**
- vi) Guide for safety & comfort of operator of agricultural tractors:Part 1 General requirements (first revision):[IS 12239 (Part 1) - 2018] : **Does not conform**
- vii) Tractors and machinery for agriculture and forestry – Technical means for ensuring safety Part 2: Tractors (first revision) (IS 12239 (Part 2) 1999) (Reaffirmed Year 2019)] : **Does not conform**

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- viii) Guide lines for location and operation of operator controls on agricultural tractors and machinery [IS: 8133 - 2021] : **Does not conform**
- ix) Tractors and machinery for agriculture and forestry, powered lawn and garden equipment - Symbols for operator controls and other displays Part2 Symbols for agricultural tractors and machinery [IS: 6283(Part-1) - 2006 (Reaffirmed Year 2019) and IS: 6283 (Part-2) – 2007 (Reaffirmed Year 2019)] : Conforms
- x) Agricultural Tractors and Machinery-Lighting device for travel on public roads (IS:14683-1999) (Reaffirmed Year 2019)] : Conforms

**6.4 Salient Observations:**

**6.4.1 Three-point linkage:**

The dimensions viz. diameter of hitch pin hole & width of ball of upper hitch points, diameter of hitch pin hole & width of ball of lower hitch points and lateral distance from lower hitch point to centre line of tractor does not meet the requirements of IS: 17231-2019. This should be looked into for corrective action.

**6.4.2 PTO master shield:**

PTO master shield has not been provided on tractor as per IS: 12239-1999 (Part-2). This should be looked into for necessary corrective action.

**6.4.3 Operator's seat:**

The following parameters does not meet the requirement of IS: 12343-2021:

- i) Height of upper edge of back rest above SRP was measured 240 mm against the minimum requirement of 260 mm.
- ii) Inclination of back rest was measured 24° against the required range of 10 ± 5°.
- iii) Vertical distance from SIP to centre of accelerator pedal was measured 535 mm against the required range of 230 to 460 mm.
- iv) Vertical distance from SIP to foot rest was measured 610 mm against the required range of 450 to 520 mm.

Therefore, all of the above should be looked into for necessary corrective action.

**6.4.4 Operator's work place:**

**Operator's work place meets the requirements of IS: 12239 (Part-I) 2018, except the following:**

- (i) Provision of vertical retainers at inner sides of clutch pedal.
- (ii) Provision of spark arresting device in the exhaust system.

Therefore, all of the above should be looked into for necessary corrective action.

**6.5 Maintenance / Service Problems:**

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

**6.6 Recommendation with regard to safety on tractor:**

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

- i) Identification of control levers by colour has not been provided as per the requirement as laid down in Table - 5 of IS: 8133-2021.
- ii) The distance between engine stop control and start control was measured 375 mm against the maximum requirement of 150 mm.
- iii) The hand accelerator lever, when moved away from the operator (i.e., forward) decreases the engine speed, which does not meet the requirement as laid down in Table – 1 of IS: 8133-2021.
- iv) PTO master shield has not been provided as per IS: 12239 (Part-2).
- v) Fuel shutoff knob does not remain in stop position as per the requirement of IS: 8133-2021.

All of the above should be looked into for necessary corrective action.



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**6.7 Adequacy of Literature supplied with machine:**

**6.7.1** Literature was supplied with the tractor for reference during the test.

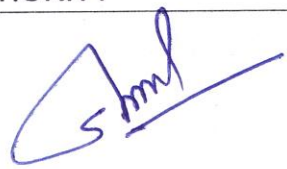


- a) Operator's manual for "Swaraj 735 FE V1" tractors model
- b) Part's catalogue for "Swaraj 735 FE V1" tractors model
- c) Service manual for "Swaraj 735 FE V1" tractors model

**6.7.2** The operator manual may be brought out for the guidance of users and service personnel as per IS:8132-1999 incorporating, inter alia, the following:

- i) Safe hitch height while using trailer
- ii) Engine to PTO speed ratio

TEST CARRIED OUT AT C.F.M.T. & T.I., BUDNI (M.P.), INDIA

TESTING AUTHORITY

SHIVKUMAR SHARMA AGRICULTURAL ENGINEER	
R.P. PANDEY SENIOR INSTRUMENTATION ENGINEER	
A. K. UPADHYAY DIRECTOR (I/C)	

Draft Test Report compiled by **Vithato Keyho**, Senior Technical Assistant

**7. APPLICANT'S COMMENTS**

Para No.	Our reference	Applicant's comments
7.1	Clause no. 6.4.1, 6.4.2 & 6.4.3	These requirements are being revisited for necessary corrective action at our end.
7.2	Clause no. 6.4.4 & 6.6	Study and trials are under progress for necessary corrective action.
7.3	Clause no. 6.7.2	Necessary changes suggested by the institute will be incorporated in the manual for end user.

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**ANNEXURE-I**

**TRACTOR RUN HOURS DURING TEST**

<b>A.</b>	<b>LABORATORY AND TRACK TESTS:</b>	<b>HOURS</b>
1.	Running-in	Applicant has declared it to be conducted on their work place.
2.	PTO performance test	11.6
3.	Power lift and hydraulic pump performance test	0.9
4.	Drawbar performance test	5.2
5.	Brake performance test	1.0
6.	Nominal speed test	0.8
<b>B.</b>	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test.	5.2
<b>TOTAL:</b>		<b>24.7</b>