



SWARAJ 855 FE TRACTOR



सत्यमेव जयते

भारत सरकार

कृषि एवं किसान कल्याण मंत्रालय
कृषि, सहकारिता एवं किसान कल्याण विभाग
मशीनीकरण एवं प्रौद्योगिकी प्रभाग

GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS WELFARE

(Department of Agriculture, Cooperation & Farmers Welfare, Mechanization & Technology Division)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान
ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO : 9001 - 2015 Certified Institute)

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Manufacturer : M/s. Mahindra & Mahindra Ltd.
Farm Equipment Sector,
Swaraj Division, Phase- IV, Industrial
Area, S.A.S. Nagar, Mohali,
Punjab – 160 055

Test requested by : The manufacturer
 Selected for test by : The testing authority
 Place of running-in : At manufacturer's works
 Duration of said running-in, (h):
 - Engine : 28
 - Transmission : 32

Method of Selection : The test sample was selected randomly out of Five tractors from the production line by the representative of testing authority.

Tractors made available for random selection :

Sr. No.	Chassis serial number	Engine serial number
i)	MBNBF53AGKCN87269	50.4001/SAM22722
ii)	MBNBF53AGKCN87266	50.4001/SAM22721
iii)	MBNBF53AGKCN87265	50.4001/SAM22723
iv)	MBNBF53AGKCN87268	50.4001/SAM22720
v)	MBNBF53AGKCN87267	50.4001/SAM22724

2. FUEL AND LUBRICANTS

2.1 Fuel : The High-speed diesel oil supplied by M/s Indian Oil Corporation Limited having density of 0.836 g/cc at 15°C was used.

2.2 Lubricants:

S. No.	Particulars	As recommended by the manufacturer	As used during the test
1.	Air cleaner oil	SAE 30	As recommended
2.	Engine lubricating oil	SAE 20W40	Oil originally filled in the tractor's system was not changed
3.	Transmission, Hydraulic and brake system	IOCL Transtrac 30	--do--
4.	Steering housing	IOCL Transtrac 30	--do--
5.	Grease	MP Grease	MP Grease

3. ESSENTIAL TESTS

3.1. SPECIFICATIONS

	<u>Previous sample</u>	<u>Present sample</u>
3.1.1 Tractor:		
Make	:	Swaraj
Model	:	855 FE
Brand name	:	Swaraj
Type	:	Four wheeled, rear wheel driven, unit construction, general purpose, agricultural tractor
Month & Year of manufacture	:	2016 11 / 19
Chassis number	:	WYCN61929930085 MBNBF53AGKCN87266
Country of origin	:	India
3.1.2 Engine:		
Make	:	M/s. Swaraj Engines Ltd.
Model	:	RB33TR RB33TR1
Type	:	Four stroke, liquid cooled, naturally aspirated, direct injection, diesel engine.
Serial number	:	47.5004/SWN16368 50.4001/SAM22721
Year of manufacture	:	2016 2019
Country of origin	:	India

4. OTHER APPLICABLE TESTS

--None--

5. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

S. No.	Adjustment/Defect/Breakdown and Repairs	Category of Breakdown	Tractor run hours
--- None ---			

6. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

- 6.1 On the basis of test conducted the performance results have been summarized as evaluative (mandatory) and non – evaluative (not mandatory) parameters applicable for qualifying Minimum Performance Criteria as per clause-4 table-1 of Indian Standard **12207: 2019** for acceptance of tractor for the purpose of subsidies/NABARD financing for the applicable features for this tractor model.

Sl. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	Values declared by the applicant/ requirement		As observed		Whether present model meets the requirements (Yes/No.)
				Previous sample	Present sample	Previous sample	Present sample	
1	2	3	4	5 a	5 b	6 a	6 b	7
6.1.1 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.	33.8 (D)	33.8 (D)	33.8	33.4	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	33.8 (D)	33.8 (D)	33.8	33.4	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% Max.	265 (D)	257 (D)	257	249	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	$\pm 8\%$	173.6 (D)	173.6 (D)	205.1	204.4	Yes
e)	Back-up torque, percent	Evaluative	12 percent, min.	12 (R)	12 (R)	26.8	28.2	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 high ambient condition should not exceed the declaration.	130 (D)	130 (D)	103	97	Yes
2)	Coolant (liquid)	Evaluative	The declared value should not exceed the boiling temperature of coolant under the pressurized or otherwise and the observed value under high ambient condition should not exceed the declaration.	115 (D)	115 (D)	96	93	Yes



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1	2	3	4	5 a	5 b	6 a	6 b	7
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.60 (Max.) (R)	2.60 (Max.) (R)	0.62	0.18	Yes
h)	Smoke level, (m ⁻¹)	Evaluative	Maximum light absorption coefficient of 3.25 per metre or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	3.25 per meter (Max.) (R)	3.25 per meter (Max.) (R)	0.28	0.37	Yes
6.1.2 Safety features :								
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulleys, silencer, hydraulics pipes(as per IS-12239 Part 2)			Meet the requirements		Yes
b)	Lighting arrangement	Evaluative	As per CMVR				Meet the requirements	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 meet the requirements			No
d)	Technical requirements for PTO shaft	Evaluative	Should meet the requirements of IS: 4931 (As amended from time to time)				Meet the requirements	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 meet the requirements			No
f)	Specifications of linkage drawbar	Evaluative	Should meet the requirements of IS 12953 (As amended from time to time)				Meet the requirements	Yes
g)	Specifications of Swinging drawbar (wherever fitted)	Evaluative	Should meet the requirements of IS 12362 (Part 3) (As amended from time to time)				Not provided	Not applicable
h)	1) Maximum travelling speed at rated engine speed in reverse gears, kmph	Evaluative	Should not exceed 20 Kmph				12.88 kmph (Meet the requirements)	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.				Not required	Not applicable
6.1.3 Labeling of tractors (Provision of labeling plate):								
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO in kW and year of manufacture in numerical 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			855 FE			Yes
	3) Month & Year of manufacture	Evaluative			11 / 19			Yes
	4) Engine number	Evaluative			50.4001/SAM2 2721			Yes
	5) Chassis number	Evaluative			MBNBF53AGKC N87266			Yes
	6) Declaration of PTO power, kW	Evaluative			33.8			Yes
6.1.4 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



6.2	Conformity with following IS:	Previous sample	Present sample
i)	Guide lines for declaration of power and specific fuel consumption and labelling of agricultural tractors (First revision) [IS10273: 1987 (Reaffirmed 2014)]	Conformed	Conforms
ii)	Agricultural tractors - Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS:4931-1995 (Reaffirmed 2014)]	Conformed	Conforms
iii)	Agricultural wheeled tractors - Rear mounted three-point linkage: Part 1 Categories 1, 2, 3 & 4 (fourth revision) [IS 4468(Part-I):1997/ISO 730-1:1994 (Reaffirmed in March, 2009)]	Did not conform	Does not conform
iv)	Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed October, 2017)]	Conformed	Conforms
v)	Agricultural tractors - Operator's seat technical requirement [IS 12343 –1998 (First revision) (Reaffirmed 2014)]	Did not conform	Does not conform
vi)	Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision): [IS 12239 (Pt-1) 1996/ISO 4254-1:1989 (Reaffirmed October, 2017)]	Did not conform	Does not conform
vii)	Tractors and machinery for agriculture and forestry – Technical means for ensuring safety Part 2: Tractors (first revision) (IS 12239 (Pt-2) 1999) (Reaffirmed 2014)]	Did not conform	Does not conform
viii)	Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) IS: 8133-1983 (Reaffirmed 2014)]	Conformed	Does not conform
ix)	Tractors and machinery for agriculture and forestry, powered lawn and garden equipment - Symbols for operator controls and other displays Part 2 Symbols for agricultural tractors and machinery [IS:6283 (Part-1)- 2006 and IS: 6283 (Part-2)-2007 (Reaffirmed 2014)]	Conformed	Conforms
x)	Agricultural Tractors and Machinery - Lighting device for travel on public roads (IS: 14683-1999) (Reaffirmed 2014)]	Conformed	Conforms

6.3 Salient Observations:

6.3.1 Laboratory tests:

6.3.1.1 PTO Performance Test:

- The maximum PTO power was recorded as **33.4 kW** against the declaration of **33.8 kW**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
- The specific fuel consumption corresponding to maximum power was recorded as **249 g/kWh** against the declaration of **257 g/kWh**, which is within the tolerance limit of IS: 12207-2019.
- The maximum equivalent crankshaft torque was recorded as **204.4 N-m** against the declaration of **173.6 N-m**, which is within the permissible limit as specified in IS: 12207-2019.
- The backup torque is **28.2 %** and meets the requirement of IS:12207-2019.
- The drop in maximum PTO power of **5.1 %** in high ambient condition was observed as compare to natural ambient condition which was considered on higher side.

6.3.1.2 Specifications of three point linkage:

- The lateral distance from lower hitch point to centre line of tractor does not meet the requirement of IS: 4468 (Part-1) -1979 (Reaffirmed 2014). This should be looked into for necessary corrective action.
- Some of the parameters of three point linkage conform to Cat. I and some of them conform to Cat.II. Keeping in view the spirit of standardization, necessary improvement may be incorporated.

**6.3.2 Maintenance / Service Problems:**

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

6.3.3 Recommendation with regard to safety on tractor:

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

- i) Vertical distance from Seat Index Point to centre of clutch pedal should meet the minimum requirement as per relevant standard.
- ii) Vertical retainer should be provided on both side of clutch pedal.
- iii) There should be provision for spark arresting device in exhaust system.
- iv) There should be provision of differential lock.
- v) The fuel shut-off knob should remain in stop position.
- vi) The working clearance between the position and draft control lever should be provided as per relevant standard.
- vii) There should be provision to attach trailer brake valve.

6.3.4 Adequacy of Literature supplied with machine:

Following literatures of tractor models was supplied with the test sample for reference during the test.

- i) Operator Manual of Swaraj 855 FE tractor models
- ii) Spare Parts Catalogue of Swaraj 855 FE tractor models
- iii) Service Manual of Swaraj 855 FE tractor models


6.3.4.1 The supplied literature was found adequate; except the following

- i) Service schedule and maintenance chart is not provided on operator and service manual.

6.3.4.2 However, these literatures should be brought out in other vernacular languages of India for guidance of users**7. CITIZEN CHARTER**

Time frame for Testing & Evaluation as per Citizen Charter	Duration of Test	Whether the Test Report is released within the time frame given in Citizen Charter	Remarks
10 Months	04 Months (April, 2020 to, July, 2020)	Yes	--None--

TESTING AUTHORITY:


RAJNEESH PATEL
AGRICULTURAL ENGINEER


C.V. CHIMOTE
TEST ENGINEER


J.J.R. NARWARE
DIRECTOR

The report compiled by: **Smt. Poonam Khurasia**, Senior Technical Assistant.

8. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
8.1	3.1.20.3, 3.1.20.4, 3.1.20.5, 6.1.2 (c), (e) and 6.3.3	These requirements are being revisited for necessary corrective action.
8.2	6.2 (iii), (v), (vi), (vii), 6.3.1.1 (v) and 6.3.1.2	Study & trials are under progress for necessary corrective action

**ANNEXURE- I****TRACTOR RUN HOURS DURING TEST**

A.	LABORATORY AND TRACK TESTS	HOURS
1.	Running -in	60.00
2.	PTO Performance Test	12.43
3.	Theoretical speed test	1.00
B.	Miscellaneous test and other run hours, including idle run transportation, trial and preparation for test.	18.07
Total		92.92