



SWARAJ 855 FE XTRA TRACTOR



भारत सरकार
कृषि मंत्रालय
(कृषि एवं सहकारिता विभाग)

GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE
(DEPARTMENT OF AGRICULTURE & CO-OPERATION)

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

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

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

E-mail : fmti-mp@nic.in Web site : cfmtti.dacnet.nic.in



T- 852/1362/2012

SWARAJ 855 FE XTRA TRACTOR - Commercial (Initial)

T- 852

SCOPE OF TEST

1.2.1

Initially the firm had submitted Swaraj 855 FE tractor for its initial commercial testing with major modifications in previously tested tractor 'Swaraj 855' FE tested vide test report No T- 469/934 March 2003 and furnished an undertaking vide letter No 20/1108 047 dated 04.08.2011.that they will cease the production of Swaraj 855 FE having technical specification in test report No T- 469/934 March 2003.

Later, vide letter No 20/1209080 dated 21.09.2012, the firm withdrawn the request and submitted that they will continue the production of tractor Swaraj 855 FE having technical specification in test report No T- 469/934 March 2003 & further requested to test the tractor under test with a name as Swaraj 855 FE Xtra.

1.3

The applicant request was accepted by the competent authority and the test report is released as following.

- Manufacturer** : M/s. Mahindra & Mahindra Ltd.
Farm Equipment Sector
Swaraj Division,
Pase IV, Industrial Area,
S.A.S. Nagar (Mohali)
Near Chandigarh-160055
- Test requested by : The manufacturer
- Selected for test by : Applicant
- Place of running-in : At applicant's works
- Duration of said running-in, (h):
- Engine : 28
- Transmission : 40
- Method of Selection** : The tractor was submitted directly by the applicant for test. Hence method of selection is not known.

1.4

1.4.1

1. SPECIFICATIONS

- 1.1 Tractor:**
- Make : SWARAJ
- Model : 855 FE Xtra
- Brand name : Swaraj
- Variants. If any: NONE
- Type : Four wheeled two wheel drive, General purpose, agricultural tractor.
- Year of manufacture : 2011
- Chassis number : WWCH 51618145921
- Country of origin : India
- 1.2 Engine:**
- Make : M/s Swaraj Engines Ltd.
- Model : RB33XM+
- Type : Water cooled, four stroke, direct injection naturally aspirated ,diesel engine
- Serial number : 47.1403/SPA 00763
- Country of origin : India

1.4.2

1.4.3

1.4.4



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Clearance between centre pin and bushes, (mm) : 0.14 to 0.16

Against the discard limit of 0.80 mm

15.6 Steering system:

Visual condition of the components of complete steering assembly : Normal

15.7 Starter motor & Alternator:

Presence of soil/oil in housing : None

Condition of bearings and other components : Normal

16. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

Sl. No.	Adjustments/Defects/Breakdowns and Repairs	Tractor run hours
--	None	--

17. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

17.1 Evaluative (mandatory) / Non-evaluation (Non-mandatory) parameter applicable for qualifying Minimum Performance criteria as per Clause-4 (Table-1) of IS: 12207-2008 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: 12207-2008	Values declared by the applicant/ (D) Requirement (R)	As observed	Whether meets the requirements (Yes/No.)
1	2	3	4	5	6	7
17.1.1	PTO Performance :					
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: -5 / +10% for PTO power >35hp. -7.5/+10% for PTO power ≤ 35 hp	33.8 (D)	33.6	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	33.8 (D)	33.6	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+ 5%	258 (D)	253	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	210 (D)	213.0	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10% (R)	19.66	Yes



1	2	3	4	5	6	7	
f)	Maximum operating temperature, (°C)						
	1)	Engine oil	Non 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)	101	Yes
	2)	Coolant (water)	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)	99	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.57 (R)	0.34	Yes	
h)	Smoke level	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 metre (R)	0.25	Yes	

17.1.2 Drawbar performance :

a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	19.89 (R)	24.14	Yes
				24.0 (Minimum) (D)		
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	13.39 (R)	16.52	Yes
				16.0 (Minimum) (D)		
c)	Maximum drawbar power without ballast, (kW).	Evaluative	Min. 80% of PTO power as referred in 15.1.1 (a) of PTO performance	26.88 (R)	29.0	Yes
				27.5 (Minimum) (D)		
d)	Maximum transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	110 (D)	77	Yes

17.1.3 Power lift and hydraulic pump performance :

a)	Maximum lifting capacity throughout the range of lift, (kN):						
	1)	At hitch points	Non Evaluative	[Tolerance of minus 10%]	14.71 (D)	17.24	Yes
	2)	With the standard frame	Evaluative	The lift capacity should at least be 18 kg/PTO hp. and it should be 16 kg/engine hp where the tractor is not provided with a PTO shaft	8.06 (R) (Minimum)	12.79	Yes
					10.78 (D)		



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1	2	3	4	5	6	7
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	[Tolerance of plus 5 mm]	50 (R)	38	Yes
17.1.4 Brake performance at 25 kmph:						
a)	Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with road ballast, (m):					
1)	Cold brake	Evaluative	10	10 (R)	5.49 to 7.17	Yes
2)	Hot brake	Evaluative	10	10 (R)	8.24	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (R)	190 to 217	Yes
c)	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 (R)	Yes	Yes
17.1.5 Noise measurement :						
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	88 (Maximum) (R)	83	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	98 (Maximum) (R)	94	Yes
17.1.6 Amplitude of mechanical vibrations at :						
1)	Left foot rest	Non Evaluative	100 microns (max)	100 (Maximum) (R)	90	Yes
2)	Right foot rest				100	Yes
3)	Seat (with driver seated)				90	Yes
4)	Steering Wheel				90	Yes
17.1.7 Haulage requirements :						
a)	Gross mass of the trailers, (tones):					
1)	Two wheel	Non Evaluative	--	5.0 (D)	5.0	Yes
2)	Four wheel	Evaluative	--	7.0 (D)	7.0	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
1)	Two wheel	Non Evaluative	--	5.0 to 6.0 (D)	5.17 to 5.25	Yes
2)	Four wheel	Evaluative	--	5.0 to 6.0 (D)	4.50 to 4.79	No
c)	Fuel consumption (ml/km/tonne):					
1)	Two wheel	Non Evaluative	--	30.0 to 40.0 (D)	38.08 to 38.68	Yes
2)	Four wheel	Evaluative	--	25.0 to 35.0 (D)	29.79 to 31.73	Yes

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d)	Ring
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	- 2'
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17.1.8	Wetland cultivation :					
	Sealing for the following assemblies:	Evaluative	The identified assemblies should essentially meet the requirement of IS: 11082. No water ingress in the identified assembly given in column-2. If tractor does not meet the requirements of wetland cultivation, it may be recommended for dry land operation only.	There should be no ingress of water and/or mud	No ingress of mud and / or water was observed	Yes
	1) Clutch assembly	-do-				
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
17.1.9	Safety features :					
a)	Guards against moving and hot parts	Evaluative	As per CMVR	At present no provided		Yes
b)	Lighting arrangement	Evaluative	As per CMVR	-	Provided	Yes
17.1.10	Labelling of tractors (Provision of labelling plate):					
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	-	Swaraj	Yes
	2) Model	Evaluative		-	855 FE Xtra	Yes
	3) Year of manufacture	Evaluative		-	WW (2011)	Yes
	4) Engine number	Evaluative		--	47.1403/SPA 00763	Yes
	5) Chassis number	Evaluative		--	WWCH 51618145921	Yes
	6) Declaration of PTO power, kW(Ps)	Evaluative		--	33.8 (46.0)	Yes
17.1.11	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	110.225 (D)	110.03 to 110.04	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.60 (D)	0.161 to 0.169	Yes
(c)	Ring end gap (mm):					
	- Top comp. ring.	Evaluative	-do-	1.75	0.45 to 0.50	Yes
	- 2 nd comp. ring.		-do-	1.75	0.40 to 0.45	Yes
	- Oil ring.		-do-	1.75	0.35 to 0.45	Yes
(d)	Ring groove clearance (mm):					
	- Top comp. ring.	Evaluative	-do-	0.25	Taper Ring	Yes
	- 2 nd comp. ring.		-do-	0.25		
	- Oil ring.		-do-	0.25	0.044 to 0.046	Yes
(e)	Clearance of main bearings (mm):					
	- Diametrical clearance	Evaluative	To be specified by the manufacturer	0.30	0.071 to 0.105	Yes
	- Crankshaft end float	Evaluative		0.50	0.25	Yes



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(f)	Clearance of big end bearings, (mm):					
	- Diametrical	Evaluative	-do-	0.30	0.082 to 0.094	Yes
	- Axial	Evaluative	-do-	0.60	0.20	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.6	0.09 to 0.11	Yes
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.8	0.14 to 0.16	Yes

17.1.12 CATEGORY OF BREAKDOWNS / DEFECTS :

S. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2008	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 five 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

17.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2008:

S. No.	Characteristic	Requirements as per IS: 12207-2008	AS observed	Whether meets the requirements (Yes/No.)
1	Maximum oil pull over, (%)	0.25% (max.)	0.05 %	Yes
2.	Seating requirements	Should meet the requirements of IS: 12343-1998	Meets the requirements	Yes
3.	Fitment of ROPS	With a provision for fitment of ROPS.	Not provided	No
		If ROPS fitted it should meet the requirement of IS: 11821-1992	ROPS not fitted	--
4.	Technical requirements for PTO shaft	Should meet the requirements of IS: 4931 -1995	Meets the requirements	Yes
5.	Dimensions of three point linkage	Should meet the requirements of IS: 4468 (Part-I)-1997	Does not meets the requirements	No
6.	Specifications of linkage drawbar	Should meet the requirements of IS: 12953-1990.	Meets the requirements	Yes
	Specification of swinging drawbar	Should meet the requirements of IS: 12362 Part 3-1994.	Not provided	--
7.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Provided	Yes

17.3 Cont

i) Guide cons revis

ii) Agric Type (Rea

iii) Agric point revisi 2007

iv) Draw 1295

v) Agric requi (Rea

vi) Guide tractor [IS 2009

vii) Tractor Techn (first March

viii) Tractor power opera & Part ISO 3

ix) Guide contro revisi 2009) x) Agric travel March

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17.3 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 in March, 2009)] : **Conforms**
- ii) Agricultural tractors – Rear mounted power take-off - Types 1, 2 and 3(third revision)[IS: 4931-1995 (Reaffirmed in March, 2009)] : **Conforms**
- iii) Agricultural wheeled tractors - Rear mounted three-point linkage: Part 1 Categories 1, 2, 3 & 4 (fourth revision) [IS 4468 (Part-I):1997 (Reaffirmed in March, 2007)/ISO 730-1:1994] : **Does not conform**
- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in March, 2007)] : **Conforms**
- v) Agricultural tractors - Operator's seat technical requirement [IS 12343 -1998 (First revision) (Reaffirmed in March, 2009)] : **Conforms**
- vi) Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision) : [IS 12239 (PT-1)-1996 (Reaffirmed in March, 2009)/ISO 4254-1:1989] : **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 in March, 2009)] : **Does not conform**
- viii) Tractors and machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays [IS: 6283 (Part-1 & Part-2) –2006 & 2007(Reaffirmed in March, 2009)/ISO 3767-2:1991]] : **Does not conform**
- ix) Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) (IS: 8133 – 1983) (Reaffirmed in March, 2009)] : **Conforms**
- x) Agricultural Tractor & Machinery Lighting device for travel on public roads (IS: 14683-1999) (Reaffirmed in March, 2009)] : **Conforms**

17.4 Salient Observations:

17.4.1 Laboratory tests:

17.4.1.1 PTO Performance:

- i) The backup torque is. **19.66 %**.
- ii) The specific fuel consumption corresponding to maximum power was measured as **253 g/kWh** against the declaration of **258 g/kWh**, which is within the tolerance limit of IS: 12207-2008.



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17.4.1.2 Mechanical Vibration:

The amplitude of mechanical vibration on various assemblies marked as (*) in Chapter-9 of this test report is on higher side, especially at mud guard and battery base. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

17.4.1.3 Three point linkage:

Lateral distance from lower hitch point to center line of tractor does not meet the requirements of **IS-4468-(Part I)-1997**. This should be looked into

17.4.2 Field performance test:

17.4.2.1 Dry land operation :

Excessive wheel slippage (21.52 %) was observed during M.B, Ploughing operation. This should be looked in to.

17.4.2.2 Wet land cultivation (Puddling operation):

The tractor meets the requirements for wet land cultivation

17.5 Maintenance / Service Problems:

No service/maintenance problem was observed during testing of tractor

17.6 Recommendation with regard to safety on tractor:

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

- i) Provision for spark arresting device in exhaust system.
- ii) Vertical retain ness in not provided on both sides of clutch pedal. It should be provide as per requirements of IS 12239-(Part I)

17.7 Adequacy of Literature supplied with machine:

The following literature has been supplied by the applicant

- i) Operator's Manual
Swaraj 855FE Xtra,855 XM, 744 FE Xtra, 744 Xm
- ii) Spare part's catalogue
Swaraj 855FE Xtra,744 FE Xtra

17.7.1 The following literature should be developed for guidance of user.

- i) Service manual

17.7.1

TESTING

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Para
No.

18.1

18.2

18.3

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17.7.1 The literature should also be developed in other regional languages

TESTING AUTHORITY:


R.K.NEMA
AGRICULTURAL ENGINEER


P.K.VERMA
SENIOR AGRICULTURAL ENGINEER


C.R.LOHI
DIRECTOR

18.0 APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
18.1	17.3 (iii), 17.4.1.3	These requirements are being revisited for necessary corrective action at our end.
18.2	17.4.1.2 , 17.4.2.1	Study and trials are under progress for necessary corrective action.
18.3	17.6.(i), 17.6 (ii), 17.3(vi, vii, viii)	These requirements are being revisited for necessary corrective action at our end.



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ANNEXURE - I

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	PTO performance test	12.71
3.	Power lift and hydraulic pump performance test	3.44
4.	Drawbar performance test	13.86
5.	Air cleaner oil pull over test	3.50
6.	Turning ability	0.20
7.	Location of centre of gravity	0.10
8.	Operator's field of vision	0.10
9.	Brake test	1.70
10.	Noise measurement	1.50
11.	Mechanical vibration test	1.0
12.	Theoretical speed test	0.58
B.	FIELD TEST:	
1.	M B Ploughing	10.3
2.	Rotavation	10.1
3.	Puddling test (including water proof test)	15.3
C.	HAULAGE TEST:	9.36
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	13.25
	TOTAL:	97.2

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ANNEXURE - II

BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST

S. No.	Item	M.B. plough	Rotavator	Puddler
1.	Make	Anil Industries Bina	Green System	Not available
2.	Type	Mounted	Mounted	Mounted
3.	No. of disc/blades	Three	42, in 9 flanges	12, (6 in each gang)
4.	Type of discs/blades	General purpose	Hatchet	Notched
5.	Size of bottom/blades. (mm)	320	170X140X5	460
6.	Spacing of bottom/flanges. (mm)	260	245.	164
7.	Lower hitch point span, (mm)	750	870	680
8.	Mast height (mm)	570	470	460
9.	Overall dimensions (mm):			
	- Length	2100	1150	1190
	- Width	1180	1950	1810
	- Height	1220	1040	1330
10	Gross mass. (kg)	355	490	240

BRIEF SPECIFICATION OF CAGE WHEEL

S. No.	Items	Specification
1.	Type	Half cage wheel
2.	Diameter, (mm)	1085
3.	Width, (mm)	340
4.	No. and type of lugs	12, straight lugs made of MS angle section welded to angle iron frame
5.	Size of angle section, (mm)	50x50x5
6.	Length of lugs, (mm)	340
7.	Spacing of lugs, (mm)	275
8.	Weight of each cage wheel, (kg)	60