व्यावसायिक परीक्षण रिपोर्ट COMMERCIAL TEST REPORT (Initial)

संख्या / No. : T-992/1516/2015

माह / Month: November, 2015

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SWARAJ 744 XM FXDCPS540 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.) ४६६ ४४५

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO: 9001 - 2008 Certified Institute)

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SWARAJ 744 XM FXDCPS540 TRACTOR - Commercial (Initial)

Manufacturer

: M/s. Mahindra & Mahindra Limited,

Farm Equipment Sector.

Swaraj Division, Phase-IV, Industrial

Area, S.A.S. Nagar, Mohali

Punjab-160 055

Test requested by (applicant)

: M/s. Mahindra & Mahindra Limited,

Farm Equipment Sector,

Swaraj Division, Phase-IV, Industrial

Area, S.A.S. Nagar, Mohali

Punjab-160 055

Place of running-in

: At Applicant's works

Duration of said running-in, (h):

- Engine

28

Transmission

: 32

Method of Selection

: The tractor was submitted directly by the applicant for test. Hence, method of selection

is not known.

1. SPECIFICATIONS

1.1 Tractor:

Make

: Swaraj

Model

: 744 XM FXDCPS540

Type

: Four wheeled, rear-wheel driven.

construction general purpose, agricultural

tractor

Year of manufacture

: 2014

Chassis number

: WXCL 49906107624

Country of origin

: India

1.2 Engine:

Make

: Swaraj engines Ltd & Kirloskar oil engines Ltd.

Model

: RB 30 XM

Type

: Four stroke, water cooled, naturally aspirated,

direct injection, diesel engine

Serial number

: 43.3019 / STL 18732S

Engine speed(Manufacturer's recommended production setting), (rpm): 1.2.1

Maximum speed at no load

: 1900 to 2000

- Low idle speed

: 580 to 700

Speed at maximum torque

: 1000 to 1400

Rated speed, (rpm):

1800

- For PTO use - For drawbar use

: 1800

1.3 Cylinder & Cylinder Head:

Number

: Three

Disposition

Vertical, Inline

Bore/stroke, (mm)

: 100/116

Capacity as specified by the applicant, : 3307

(cc)

Compression ratio

: 19.5 (± 0.5):1

Type of cylinder head

: Integral, C.I.

Type of cylinder liners

: Wet, replaceable

Type of combustion chamber

Arrangement of valves

: Re-entrant : Overhead, inline

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SWARAJ 744 XM FXDCPS540 TRACTOR - Commercial (Initial)

16. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

S. No.	Adjustments/Defects/Breakdowns and repairs	Tractor run hours
1.	Nil	

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: 12207-2014 for acceptance of the

tractor for the purpose of subsidies/NABARD financing are summarized as under: Whether Values declared by meets Category As the applicant/ the Requirements Characteristic (Evaluative SI (D) requireobserved as per IS: 12207-2014 / Non No. Requirement ments Evaluative) (R) (Yes/No) 5 6 7 4 2 3 1 PTO Performance: 17.1.1 Declared value to be achieved Maximum power under with a tolerance of: -5 / +10% for PTO power >26 kW. -2 h test. (kW) Evaluative 7.5/+10% for PTO power < 26 28.0 28.3 Yes ambient kW or-5 / +10% for Engine power >26 kW. -7.5/+10% for (Natural condition) Engine power ≤ 26 kW Non b) Power at rated engine 28.3 Yes 28.0 -do-Evaluative speed, (kW) Specific fuel Non consumption c) 258 (D) 250 Yes Evaluative ± 5% corresponding to maximum power, (g/kWh) Non d) Maximum equivalent 181.7 Yes 188 (D) Evaluative crankshaft torque, (Nm) ±8% 21.1 Yes 10 percent, min. 10 % min. (D) Non Back-up torque, percent e) Evaluative Maximum operating temperature, (°C) f) The declared value should not exceed the max. value 130 (D) 99 Yes Engine oil Non specified by the oil 1) company and the Evaluative observed value under high ambient condition should exceed not declaration. The declared value should 2) Coolant (water) Evaluative not exceed the boiling temperature of coolant 115 (D) 85 Yes under the pressurized or otherwise and observed value under high ambient condition should exceed the not declaration. Not exceeding 1% of SFC Evaluative 3) Engine oil g) 0.172 Yes 2.51 (R) at max. power under High consumption. ambient conditions (g/kWh) Maximum light absorption Smoke level 4) h) coefficient of 3.25 per 3.25 per 0.21 Yes Evaluative OF equivalent metre metre BOSCH No. 5.2 or 75 (R) Hatridge value (As per CMVR)

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1		2	3	4	5	6	
17.1.2	water to be a second or the second	wbar performanc	e:				
a)	with ballast corresponding to 15		t Non	Minimum 65% of static mass with ballast	18.87 (R) min.	22.40	Y
	(kN				21, min (D)	22.40	
b)	Max with		t Evaluative	Minimum 65% of static	13.70 (R) min.		
	perd (kN)	cent wheel slip		mass of tractor without ballast		16.48	Y
c)	c) Maximum drawbar power without ballast, (kW). Evaluative Evaluative Minimum 80 % or power as referred in i) a) of PTO perform case of tractors having static mass > 15 Minimum 75 % or power as referred in i) a) of PTO perform case of light weight having 1500 kg total mass of tractor Minimum % of the engine power ferred in SI No. i engine performance of tractors which is series.		The second of th	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	22.6 (R) Minimum	25.5	Ye
			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.	25 (D) min.			
d)	Maximum transmission oil temperature (°C)		Non Evaluative	The declared value should not exceed the maximum value specified by oil company	110 (D)	78	Ye
17.1.3	Pow	er lift and hydraul	c pump perfo	ormance :			-
a)	Maxii	mum lifting capacit	throughout th	ne range of lift, (kN):			-
	1)	At hitch points	Non Evaluative	[Tolerance of minus 10%]	14.71 (D)	20.86	Ye
	2) With stand) With the Evaluative standard frame	The lift capacity should at least be 24 kg/PTO kW. and it should be 21.5 kg/engine kW	6.66 (R) Minimum	14.68	Ye	
	provide		where the tractor is not provided with a PTO shaft	10.78 (D)			
7.1.4	Brake	performance at 2	25 kmph:				
a)		William and American Control of the	and the same of th	, equal to or less than 600 N	on brake pedal	with road	balla
	1)	Cold brake	Evaluative	10	10 (R)	8.87	Yei
b)	2) Mavin	Hot brake	Evaluative	10	10 (R)	9.00	Ye
5)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)		Evaluative	600	600 (R)	406 to 437	Yei
c)	Whether parking brake is effective at a force		Evaluative	Yes / No	Yes (R)	Yes	Yes

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Ye

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Yes

Yes

Yes

Yes

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Yes Yes

Yes

Yes

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1		2	3	4	5	_	6	7
7.1.5		e measurement :				-		
a)		mum ambient noise led by the tractor,	Evaluative	As per CMVR	88 (R)	82	Yes
b)	Maxi	mum noise at ator's ear level,	Evaluative	As per CMVR	96 (R)		95	Yes
7.1.6		litude of mechanical	vibrations at :					
	1)	Left foot rest					100	Yes
	2)	Right foot rest	Non	400	7.222.124		40	Yes
	3)	Seat (with driver seated)	Evaluative	100 microns (max)	100 (R)	90	Yes
	4)	Steering Wheel					70	Yes
7.1.7		lage requirements :						
a)	Gros	s mass of the trailers,	(tones):		F 0 /D		E0 1	Yes
	1)	Two wheel	Non	**	5.0 (D		5,0	THE PERSON NAMED IN
	2)	Four wheel	Evaluative		6.0 (D)	6.0	Yes
b)	Dist	ance travelled / litre of	fuel consumption	on, (km/l):				
77 N	1)	Two wheel	Non	**	5 to 6 (5.34 to 5.91	Yes
	2)	Four wheel	Evaluative		4 to 5 (D)	5.04 to 5.51	Yes
c)		consumption (ml/km/				dent.	00.054.07.10	V
-34	1)	Two wheel	Non		30 to 40		33.85 to 37.48	Yes
	2)	Four wheel	Evaluative		30 to 40	(D)	30.22 to 33.04	Yes
17.1.8	Wet	tland cultivation:						
TOTAL PERSON		ling for the	Evaluative	The identified				
		wing assemblies:		assemblies should				
	1)	Clutch	-do-	essentially meet the				
	.7	assembly	3000	requirement of IS:			No ingress	Yes
	23	Brake housings	-do-	11082. No water ingress in the identified should to				
	3)	Front axle hubs	-do-			500 m		
	-	The second secon	-do-	assembly given in	no ingre	of mud and /		
	4)	Engine oil Transmission	-do-	column-2.			or water was observed	
	5)	oil	-40-	If tractor does not meet the require-ments of wetland cultivation, it may be recommended for dry land operation only.	and/or mud			
	0.0							
17.1.9		ety features :		Date debine mulleur a	iloneor		Meets the	
a)	Gua	rds against ing and hot parts	Evaluative	Belt drives, pulley, s hydraulic pipes (As 12239 (part 2) -1999	per IS	-	requirement	Yes
b)	(Tra	ting arrangement ctor having more 1 1150 mm rear k width)	Evaluative	As per CMVR 14603-1999			Meets the requirement	Yes
c)	Sea (Tra than	Seating requirement (Tractors having more than 1150 mm rear track width)		Should meet the requirements of IS 12343 (as amended from time to time)		-	Does not meets the requirement	No
d)	Tec	Technical Non- requirements for PTO Evaluative		Should meet the requirements of IS 4931 (as amended from time to time)		Ne	Meets the requirement	Ye
e)	Dim	ension of three at linkage	Non- Evaluative	Should meet the requirements			Does not meets the requirement	N
f)	link	ecification of age and swinging wbars	Non- Evaluative	Should meet the requirements		-	Does not meets the requirement	N

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17.1.10	1 1 24	2	3	4	5	6	T
	1)	pelling of tractors (Pr	Evaluative	lling plate):			
	-		Should		-	Swaraj	
	2)	Model	Evaluative	conform to	-	744 XM FXDCPS540	
	3)	Year of manufacture	Evaluative	requirements		wx	
	4)	Engine number	Evaluative	of CMVR along-with declared	-	43.3019 / STL 18732S	Ī
	5)	Chassis number	Evaluative	value of PTO	-	WXCL49906107 624	T
	6)	Declaration of PTO power, (kW)	Evaluative		**	28.0	
17.1.11		card limit for:					+
(a)	Cylin (mm	nder bore diameter,	Evaluative	To be specified by the	110.225	110.00 to 110.02	1
(b)	pisto	arance between on & cylinder liner at , (mm)	Non Evaluative	manufacturer	0.60	0.154 to 0.165	
(c)	Ring	end gap (mm):					L
0000	-	Top comp. ring.		-do-	1.75	0.55	-
	- 2 nd comp. ring.		Evaluative	-do-	1.75	0.55	-
				-do-	1.75	0.50 to 0.55	H
(d)	Ring	groove clearance (n	nm):	do	1.75	0.50 to 0.55	1
7	-	Top comp. ring.	-	-do-		Topos sines	-
	•	2 nd comp. ring.	Evaluative	-do-	0.25	Taper rings 0.060 to 0.065	
	-	Oil ring.		-do-	0.25	0.055 to 0.066	+
(e)	Clea	rance of main bearin	gs (mm):		0.20	0.033 (0 0.000	1
	-	Diametrical clearance	Evaluative	To be specified by	0.30	0.030 to 0.70	
		Crankshaft end float	Evaluative	the manufacturer	0.50	0.20	
(f)	Clea	rance of big end bear	rings, (mm):				-
1	-	Diametrical	Evaluative	-do-	0.30	0.030 to 0.052	П
		Axial	Evaluative	-do-	0.60	0.20	
(g)	pin a	rance between king nd bush, (mm)	Non Evaluative	-do-	0.60	0.107 to 0.113	
(h)	Clearance between centre pin and bush, (mm)		Non Evaluative	-do-	0.80	0.147 to 0.156	,
7.1.12	Litera	ature (Submission to	test agency)				-
(a)	Operator manual		Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	,
	2008-008-	Catalogue	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	
	Workshop/Service manual		Evaluative .	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	1

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Yes

Yes

Yes Yes

Yes

Yes

Yes Yes

Yes

Yes

Yes

Yes

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S. No.	CATEGORY OF Category of breakdowns	Cate (Evalu	egory lative / on lative)	Requirements as per IS: 12207-2014	As observed	Whether meets the requirements (Yes/No.)	
1.	Critical		uative	No critical breakdown	None	Yes	
2.	Major	Eval	uative	Not more than two and neither of them should be repetitive in nature	None	Yes	
3.	Minor	Eval	Not more than five and frequency of each should not be more than two.		None	Yes	
4.	Total breakdowns	Eval	uative	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 require	ements	as per C	lause-4 (Table-2) of IS:12207-2014			
S. No.	Characteris			Requirements as per IS: 12207-2014	As observed	Whether meets the requirements (Yes/No.)	
1	Maximum oil pu	ill over,	0.25%	(max.)	0.215	Yes	
2.	Fitment of ROPS	3		provision for fitment of ROPS.	Not provided		
			require	PS fitted it should meet the ment of IS: 11821-1992	ROPS not fitted	Yes	
3.	Accessories		Trailer hitch, front tow hook, linkage drawbar may be provided. Meets the requirement				
17.3 i) ii)	and labeling of (Reaffirmed in N Agricultural trace and 3 (third revi- Agricultural who	declarati agricult March, 20 stors – F sion)[IS: seled tra es 1, 2,	on of poural trace (009)] Rear mo (4931-19 (actors - (3 & 4 (f	ower and specific fuel consumption stors (First revision) [IS 10273:198] unted power take-off - Types 1, 1995 (Reaffirmed in March, 2009)] Rear mounted three-point linkage ourth revision) [IS 4468(Part-I):199	2 : (e: : (Conforms Conforms	
iv) v)	(Reaffirmed in N Agricultural trac	March, 20 ctors - 0	007)] Operator	ors - Link type [IS 12953:199 r's seat technical requirement (Fir rmed in March, 2009)]		not conform	
vi)		uiremen	ts (first	perator of agricultural tractors: Pa revision) :[IS 12239 (PT-1)-199 0 4254-1:1989]		not conform	
vii)	means for ens	uring sa	fety Pa	griculture and forestry – Technic rt 2: Tractors (first revision) [(IS in March, 2009)]		not conform	
viii)	Tractors and m and garden equal displays [IS: 6	achinery uipment 283 (Pa	for agr - Symbart-1)-20	iculture and forestry, powered law ools for operator controls and othe 06 (Reaffirmed in March, 2009) are	er	Conforms	
ix)	IS:6283 (Part-2)-2007 (Reaffirmed in March, 2009)] Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) (IS: 8133 – 1983 (Reaffirmed in March, 2009)]						
x)	Agricultural Tra	ctor & M	lachiner	y Lighting device for travel on publi ned in March, 2009)]	ic : (Conforms	

17.4 Salient Observations:

17.4.1 Laboratory tests:

17.4.1.1 Drawbar performance:

During drawbar performance test, rear tyre creeping was observed as 40 & 25 mm LHS and RHS tyres respectively which is on higher side and calls for necessal corrective action.

17.4.1.2 Hydraulic performance test :

The lifting capacity at hitch point & on standard frame was recorded as 14.68 kN 20.86 kN respectively. The moment about rear axle was computed as 17.94 & 21 kN-m respectively, which is on higher side in compare to the moment about front a i.e. 17.48 kN-m. Therefore, it is recommended that the lifting capacity should reduced suitably or standard mass at front axle may be provided to avoid front lifting tractor.

17.4.1.3 Mechanical Vibration:

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

17.4.1.4 Three point linkage:

i) The lateral distance from lower hitch point to center line of tractor does not me the requirements of IS: 4468 (Part I)-1997. This should be looked into necessary corrective action.

17.4.1.5 Operator's seat:

- Vertical distance from SIP the centre of clutch & brake pedal does not meet a requirements of IS: 12343:1998 & call for necessary corrective action
- Longitudinal distance from SIP to centre of steering control wheel does not me the requirements of IS: 12343:1998 & call for necessary corrective action

17.4.1.6 Drawbar linkage:

Width of drawbar (dimension "B" & DØ) does not meet the requirement of IS 12953-1995 & call for necessary corrective action.

17.4.2 Field performance test:

Wet land cultivation (Puddling operation):

No ingress of mud and / or water was noticed during puddling operation of the tractand meet the requirements of IS: 11082-1984 (Technical requirements of agriculturatractors for wetland operation). Therefore, the tractor is recommended as suitable to wetland operation (Puddling).

17.5 Labelling plate details:

The year of manufacture on labelling plate is given in the coded form in chassis no, the should be provided in the numerical form as per relevant IS for better understanding users. The year of manufacture should be provided in specialized column on labelling plate.

17.6 Maintenance / Service Problems:

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

17.7 Recommendation with regard to safety on tractor:

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

- Provision for spark arresting device in exhaust system.
- ii) Provision of differential lock.
- iii) Width of step.
- iv) Adequately gripable working clearance around the position control lever.

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17.8 Adequacy of Literature supplied with machine:

17.8.1 i) Operator's Manual for Swaraj 744 XM FXDCPS540

Parts Catalogue for Swaraj 744 XM FXDCPS540

iii) Service Manual for Swaraj 744 XM FXDCPS540

17.8.2 The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.

18. Citizen charter

Duration of Test	Test duration under citizen charter	Whether the report released within time frame given citizen charter	Remark, if any
10 Months	09 Months (February, 2015 to October 2015)	Yes	None

TESTING AUTHORITY:

P.C.MESHRAM SENIOR AGRICULTURAL ENGINEER

C.R.LOHI DIRECTOR

Test Report compiled by: - Chanchlesh Singh Raghuwanshi, Senior Technical Assistant.

19. Applicant's Comments

Para No.	Our Reference	Applicant's comments		
19.1	1.20.4(i),(ii),1.20.5(i) &17.7(i),(ii),(iii),& (iv)	These requirements are being revisited for necessary corrective action at our end.		
19.2	17.3(iii),(iv),(v0,(vi),(vii)& 17.4.1.1,17.4.1.2	Study and trails are under progress for necessar corrective action.		
19.3	17.4.1.3,17.4.1.4 (i),17.4.1.5(i),(ii),17.4.1.6(i)	These requirements are being revisited for necessary corrective action at our end.		
19.4	17.7 (i)(ii)(ii) & (iv)	Study and trails are under progress for necessary corrective action.		
19.5	17.8.2	Literatures are already printed in all regional language for end user.		