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व्यावसायिक परीक्षण रिपोर्ट, (प्रारंभिक)
COMMERCIAL TEST REPORT, (Initial)

संख्या / No. : T-1089/1614/2017
माह / Month : May, 2017



SONALIKA DI-35 HDM (BRAND NAME : RX) TRACTOR



सत्यमेव जयते

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

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16. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

16.1 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:

S. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	Values declared by the applicant (D)/ Requirement (R)	As observed	Whether meets the require- ments (Yes/No.)
1	2	3	4	5	6	7
16.1.1	PTO Performance :					
a)	Maximum power under 2 hour test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: -5 / +10% for PTO power >26 kW. - 7.5/+10% for PTO power ≤ 26 kW or -5 / +10% for engine power >26 kW. - 7.5/+10% for engine power ≤ 26 kW	24.6 (D)	24.6	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	24.6 (D)	24.6	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+5%	265 (D)	238	No
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	150 (D)	145.2	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10 percent, min. (R)	11.3	Yes
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.	132 (D)	113	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.	118 (D)	98	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.50 (R)	0.38	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)	0.06	Yes

1	2	3	4	5	6	7
16.1.2	Drawbar performance :					
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	16.45 (D) 16.38 (R) Minimum	19.07	Yes
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	12.62 (D) Minimum 12.56 (R) Minimum	15.05	Yes
c)	Maximum drawbar power without 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.	19.7 (D) 19.7 (R) Minimum	20.6	Yes
d)	Max. transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	130 (D)	77	Yes
16.1.3	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%]	11.0 (D)	13.0	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	8.0 (D) 5.79 (R) Minimum	11.15	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)	0	Yes
16.1.4	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)	8.61	Yes
	2) Hot brake	Evaluative	10	10 (R)	8.65	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (R)	257 to 305	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



1	2	3	4	5	6	7
16.1.5	Noise measurement :					
a)	Maximum ambient noise emitted by the tractor, dB(A)	Evaluative	As per CMVR	88 (R)	80	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96 (R)	90	Yes
16.1.6	Amplitude of mechanical vibrations at :					
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R)	160	No
	2) Right foot rest			100 (R)	180	No
	3) Seat (with driver seated)			100 (R)	90	Yes
	4) Steering wheel			100 (R)	130	No
16.1.7	Air cleaner oil pull over :					
	Air cleaner oil pull over test	Non Evaluative	0.25 % (Max)	0.25 % (Max)	Not applicable	Yes
16.1.8	Haulage requirements :					
a)	Gross mass of the trailers, (tones):					
	1) Two wheel	Non	--	5.5 (D)	5.5	Yes
	2) Four wheel	Evaluative	--	6.0 (D)	6.0	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
	1) Two wheel	Non	--	4.50 to 6.00 (D)	6.36 to 6.51	No
	2) Four wheel	Evaluative	--	4.50 to 6.00 (D)	5.91 to 6.22	No
c)	Fuel consumption (ml/km/tonne):					
	1) Two wheel	Non	--	28 to 38 (D)	27.91 to 28.57	Yes
	2) Four wheel	Evaluative	--	28 to 38 (D)	26.80 to 28.21	Yes
16.1.9	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 (R)	No ingress of water and/or mud was observed	Yes
	1) Clutch assembly	-do-				
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
16.1.10	Safety features :					
a)	Guards against moving and hot parts	Evaluative	As per CMVR	--	Meet the requirements	Yes
b)	Lighting arrangement	Evaluative	---do---	--	-do-	Yes
c)	Sealing 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)	--	-do-	Yes
d)	Technical requirements for PTO shaft	Non Evaluative	Should meet the requirements of IS: 4931 (As amended from time to time)	--	-do-	Yes



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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	Non Evaluative	Should meet the requirements of IS 12953 and IS 12362 (Part 3) (As amended from time to time)	--	Meet the requirements	Yes
	Swinging drawbar			--	Not Provided	---
16.1.11	Labelling of tractors (Provision of labelling plate):					
1)	Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	--	Sonalika	Yes
2)	Model	Evaluative		--	DI-35 HDM (Brand Name : RX)	Yes
3)	Year of manufacture	Evaluative		--	UE(i.e July,2015)	Yes
4)	Engine serial number	Evaluative		--	3100FLU530501562F8	Yes
5)	Chassis number	Evaluative		--	EYASU509437S3	Yes
6)	Declaration of PTO power, (kW)	Evaluative		--	24.6 (33)	Yes
16.1.12	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	100.346	100.03 to 100.09	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.45	0.148 to 0.149	Yes
(c)	Ring end gap (mm):					
-	Top comp. ring.	Evaluative	-do-	2.00	0.55 to 0.60	Yes
-	2 nd comp. ring.		-do-	2.00	0.80 to 0.85	Yes
-	Oil ring.		-do-	2.00	0.60 to 0.70	Yes
(d)	Ring groove clearance (mm):					
-	Top comp. ring.	Evaluative	-do-	--	Taper rings	--
-	2 nd comp. ring.		-do-	0.150	0.045 to 0.054	Yes
-	Oil ring.		-do-	0.130	0.039 to 0.060	Yes
(e)	Clearance of main bearings (mm):					
-	Diametrical clearance	Evaluative	-do-	0.35	0.051 to 0.94	Yes
-	Crankshaft end float	Evaluative	-do-	0.70	0.20	Yes
(f)	Clearance of big end bearings, (mm):					
-	Diametrical	Evaluative	-do-	0.35	0.042 to 0.082	Yes
-	Axial	Evaluative	-do-	1.00	0.45	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	1.00	0.084 to 0.558	Yes
(h)	Clearance between centre pin and bush,(mm)	Non Evaluative	-do-	1.00	0.111 to 0.179	Yes



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1	2	3	4	5	6	7
16.1.13	Literature (Submission to test agency)					
(a)	Operator manual	Evaluative	Provided/ Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
(b)	Parts Catalogue	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
(c)	Workshop/Service manual	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes

16.1.14 CATEGORY OF BREAKDOWNS / DEFECTS :					
S. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	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

16.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2014:				
	Characteristic	Requirements as per IS: 12207-2014	As observed	Whether meets the requirements (Yes/No.)
1.	Fitment of ROPS	With a provision for fitment of ROPS.	Not provided	--
		If ROPS fitted it should meet the requirement of IS: 11821- 1992	ROPS not fitted	--
2.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Provided	Yes

16.3 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)]	Does not conforms
iv)	Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in March, 2007)]	Conforms
v)	Agricultural tractors - Operator's seat technical requirement (First revision) [IS 12343:1998 (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, 2007)]/ISO 4254-1:1989] : Conforms
- 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 Conforms
- viii) Tractors and machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays [IS: 6283 (Part-1)-2006 (Reaffirmed in March, 2009) and IS:6283 (Part-2)-2007 (Reaffirmed in March, 2009)] : Conforms
- ix) Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) (IS:8133-1983 (Reaffirmed in March, 2009)) : Does not Conforms
- x) Agricultural Tractor & Machinery Lighting device for travel on public roads [(IS: 14683-1999 (Reaffirmed in March, 2009))] : Conforms

16.4 Salient Observations:

16.4.1 Laboratory tests:

16.4.1.1 PTO Performance:

- i) The specific fuel consumption corresponding to maximum power was measured as **238 g/kWh** against the declaration of **265 g/kWh**, which does not meets the requirement of **IS: 12207-2014** with regard to tolerance.
- ii) The backup torque was observed as **11.5%**

16.4.1.2 Hydraulic Performance:

During the hydraulic performance test lifting capacity at coupled frame it was observed that the lower link does not lower & stucked in raised position .It was occurred continuously throughout the test .There after hydraulic top cover was dismantled & oil was cleaned & refilled it.

16.4.1.3 Mechanical Vibration:

The amplitude of mechanical vibration on various assemblies marked as (*) in Chapter-9 of this test report is on higher side, especially at the operator's seat and steering control wheel. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

16.4.1.4 Three point linkage:

- i) 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 for necessary corrective action.
- ii) Some of the parameters of the three point linkage conform to Cat. I and some of them conform to Cat.II. Keeping in view of the spirit of standardization, the necessary improvements may be incorporated.

16.4.1.5 Symbols of operator's control and other displays:

The symbol of fuel level (1/4, 1/2, 3/4, full) has not been provided on fuel level gauge as per **IS: 6283 (Part-2)-2007**. This should be looked into for necessary corrective action.

16.4.2 Wetland operation (Puddling operation):

No ingress of mud and / or water was noticed during puddling operation of the tractor and meet the requirements of **IS: 11082-1984** (Technical requirements of agricultural tractors for welland operation). Therefore, the tractor is found suitable for wetland operation (Puddling).



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- 16.5 Maintenance / Service Problems:**
 i) During the hydraulic performance test lifting capacity at coupled frame it was observed that the lower link does not lower & stucked in raised position .It was occurred continuously the test .There after hydraulic top cover was dismantled & oil was cleaned & refilled it. This should be looked into for necessary corrective action.
- 16.6 Recommendation with regard to safety on tractor:**
 The following requirements, inter alla, may be considered for incorporation on the tractor
 i) Provision of safety against accidental start of the engine.
 ii) Provision for spark arresting device in exhaust system.
 iii) Provision for retaining the fuel shut-off lever in "STOP" position.
 iv) Provision of PTO shaft master shield.
- 16.7 Adequacy of Literature supplied with machine:**
 The following literature has been supplied with the tractor
 i) Operator's manual (For Sonalika DI-35 HDM tractors).
 ii) Service manual (For Sonalika I DI-730 II HDM ,DI -35 SM Plus , DI-35 HDM, DI-750 III Power Plus, DI 47 4WD W tractors).
 iii) Spare part's catalogue (For Sonalika DI-35 HDM tractors).
- 16.7.1** The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.

17. 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	11 Months (April, 2016 to February, 2017)	No	Due to pre-occupied of test setups.

TESTING AUTHORITY:


C.S. RAGHUWANSHI
 AGRICULTURAL ENGINEER


C.V. CHIMOTE
 TEST ENGINEER


Y.K. RAO
 SENIOR AGRICULTURAL ENGINEER


J.J.R. NARWARE
 DIRECTOR

18. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
18.1	1.20.3(i),(ii),1.20.4(i),1.20.5(i),(ii)& (iii)	Observation will be studied & necessary action will be incorporated.
18.2	16.3 (vii) & (ix)	These are minor non conformance and will not affect the tractor performance; however necessary quality check implemented in quality system.