

SAE (R)

व्यावसायिक परीक्षण रिपोर्ट  
COMMERCIAL TEST REPORT (Initial)

संख्या / No. : T-1088/1613/2017  
माह / Month : May, 2017



**SONALIKA DI-750 III HDM TRACTOR (Brand Name : RX)**



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

**CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE**

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Any visual damage, pitting & chipping of front axle transmission gear teeth : none  
 Clearance between centre pin and bush, mm : 0.12 to 0.16 | Against discard limit of 1.00 mm

- 14.6 Steering system:**  
 Visual condition of the components of complete steering assembly : Normal
- 14.7 Starter motor & Alternator:**  
 Presence of soil/oil in housing : None  
 Condition of bearings and other Components : Normal

### 15. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

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

### 16. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

**16.1** Evaluative (mandatory) / Non-evaluative (Non-mandatory) parameters 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 requirements (Yes/No)
1	2	3	4	5	6	7
<b>16.1.1</b>	<b>PTO Performance :</b>					
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 >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	32.0(D)	33.4	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	32.0(D)	33.4	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+ 5%	260 (D)	267	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	210 (D)	205.2	Yes



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1	2	3	4	5	6	7	
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10 percent, min.(R)	28.5	Yes	
f)	Maximum operating temperature ( <sup>o</sup> 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)	103	Yes
g)	Engine oil consumption, (g/kWh)		Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	1 % of SFC at max power under high ambient condition (D) 2.67 (R)	0.48	Yes
h)	Smoke level		Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	3.25 per metre	0.17	Yes

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	20.32 (D) 20.12 (R)	23.62	Yes
b)	Maximum drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	15.28 (D) 15.05 (R)	18.62	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	25.8 (D) 26.7 (R)	27.8	Yes
d)	Max. transmission oil temperature ( <sup>o</sup> C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	130 (D)	79	Yes

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1	2	3	4	5	6	7	
16.1.3	<b>Power lift and hydraulic pump performance :</b>						
a)	Maximum lifting capacity throughout the range of lift, (kN):						
	1)	At hitch points	Non Evaluative	[Tolerance of minus 10%]	14±1 (D)	16.60	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	10±1(D) 7.98 (R)	13.03	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 minute, (mm)		Non Evaluative	[Tolerance of plus 5 mm]	50 (D) 50 (R)	08	Yes

16.1.4	<b>Brake performance at 25 kmph:</b>						
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)	8.31	Yes
	2)	Hot brake	Evaluative	10	10 (R)	8.47	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s <sup>2</sup> (N)		Evaluative	600	600 (R)	399 to 418	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

16.1.5	<b>Noise measurement :</b>						
a)	Maximum ambient noise emitted by the tractor dB(A)		Evaluative	As per CMVR	88 (R)	84	Yes
b)	Maximum noise at operator's ear level dB(A)		Evaluative	As per CMVR	95 (R)	93	Yes

16.1.6	<b>Amplitude of mechanical vibrations at :</b>						
	1)	Left foot rest	Non Evaluative	100 microns (max)	100 (R)	190	No
	2)	Right foot rest				180	No
	3)	Seat (with driver seated)	Non Evaluative	100 microns (max)	100 (R)	70	Yes
	4)	Steering Wheel	Non Evaluative	100 microns (max)	100 (R)	130	No



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1	2	3	4	5	6	7
<b>16.1.7</b>	<b>Air Cleaner:</b>					
	Air cleaner oil pull over (%)	Non Evaluative	0.25 % (maximum)	Dry type air cleaner is provided	NA	NA
<b>16.1.8</b>	<b>Haulage requirements :</b>					
<b>a)</b>	Gross mass of the trailers, (tones):					
	1) Two wheel	Non	--	5.0 (D)	5.0	Yes
	2) Four wheel	Evaluative	--	6.5 (D)	6.5	Yes
<b>b)</b>	Distance travelled / litre of fuel consumption, (km/l):					
	1) Two wheel	Non	--	4.5 to 6.0 (D)	4.45 to 4.75	Yes
	2) Four wheel	Evaluative	--	4.5 to 6.0 (D)	4.36 to 4.48	No
<b>c)</b>	Fuel consumption (cc/km/tonne):					
	1) Two wheel	Non	--	30 to 40 (D)	42.10 to 44.97	No
	2) Four wheel	Evaluative	--	30 to 40 (D)	34.33 to 35.26	Yes

<b>16.1.9</b>	<b>Wetland cultivation :</b>					
	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		There should be no ingress of water and/or mud	No ingress of water and/or mud was observed
	1) Clutch assembly	-do-	If tractor does not meet the requirements of wetland cultivation, it may be recommended for dry land operation only.			Yes
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
	4) Engine oil	-do-				
	5) Transmission oil	-do-				

<b>16.1.10</b>	<b>Safety features :</b>					
<b>a)</b>	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes (As per IS 12239 part 2)	--	Provided	Yes
<b>b)</b>	Lighting arrangement	Evaluative	As per CMVR	--	Provided	Yes
<b>c)</b>	Sealing requirement (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 conform	Yes
<b>d)</b>	Technical requirements for PTO shaft	Non-Evaluative	Should meet the requirements of IS 4831 (as amended from time to time)	--	Conforms	Yes
<b>e)</b>	Dimension of three point linkage	Non-Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	--	Does not conform	Yes
<b>f)</b>	Specification of linkage and swinging drawbars	Non-Evaluative	Should meet the requirements of IS 12953 and IS 12362 (part 3) (as amended from time to time)	--	Conforms	Yes

<b>16.1.11</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 HP	SONALIKA	Yes	
	2) Model	Evaluative		DI - 750 III HDM	Yes	
	3) Year of manufacture	Evaluative		2015	Yes	
	4) Engine number	Evaluative		4100EL55F497396F16	Yes	
	5) Chassis number	Evaluative		EZUDU505606S3	Yes	
	6) Declaration of PTO power, (kW)	Evaluative		32.0	Yes	



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1	2	3	4	5	6	
<b>16.1.12</b>	<b>Discard limit for:</b>					
(a)	Cylinder bore diameter, (mm)	Evaluative	To specified by the manufacturer	100.35	100.02 to 100.04	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.45	0.099 to 0.118	Yes
(c)	<b>Ring end gap (mm):</b>					
	- Top comp. ring	Evaluative	-do-	2.0	0.54	Yes
	- 2 <sup>nd</sup> comp. ring		-do-	2.0	0.90 to 1.00	Yes
	- Oil ring		-do-	2.0	0.60	Yes
(d)	<b>Ring groove clearance (mm):</b>					
	- Top comp. ring	Evaluative	-do-	Tapered	Tapered	Yes
	- 2 <sup>nd</sup> comp. ring		-do-	0.20	0.042 to 0.062	Yes
	- Oil ring		-do-	0.20	0.047 to 0.063	Yes
(e)	<b>Clearance of main bearings (mm):</b>					
	- Diametrical clearance	Evaluative	-do-	0.35	0.037 to 0.109	Yes
	- Crankshaft end float	Evaluative	-do-	0.70	0.20	Yes
(f)	<b>Clearance of big end bearings (mm):</b>					
	- Diametrical clearance	Evaluative	-do-	0.35	0.069 to 0.133	Yes
	- Axial	Evaluative	-do-	1.00	0.30 to 0.40	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.10	0.072 to 0.121	Yes
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	1.00	0.118 to 0.161	Yes

<b>16.1.13</b>	<b>Literature (Submission to test agency):</b>					
(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

<b>16.1.14</b>	<b>CATEGORY OF BREAKDOWNS / DEFECTS :</b>				
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



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<b>16.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2014:</b>				
<b>S. No.</b>	<b>Characteristic</b>	<b>Requirements as per IS: 12207-2014</b>	<b>As observed</b>	<b>Whether meets the requirements (Yes/No.)</b>
1.	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	Not provided	Not applicable
2.	Accessories	Trailer hitch & linkage drawbar may be provided.	Provided	Yes
		front tow hook	Not provided	No

**16.3 Conformity with following IS:**

- i) Guide lines for declaration of power and specific fuel consumption and labelling of agricultural tractors (First revision) [IS10273: 1987 (Reaffirmed 2009)] : **Conforms**
- ii) Agricultural tractors - Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS:4931-1995 (Reaffirmed 2009)] : **Conforms**
- iii) Agricultural wheeled tractors - Three-point linkage: Part 2 Category 1N (Narrow Hitch) (Third Revision) [IS 4468 (Part-2):1993/ ISO 730-2:1979 (Reaffirmed 2009)] : **Does not conform**
- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed 2007)] : **Conforms**
- v) Agricultural tractors - Operator's seat technical requirement [IS 12343 –1998 (First revision) (Reaffirmed 2009)] : **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 2009)] : **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 2009)] : **Does not conform**
- viii) Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) IS: 8133-1983 (Reaffirmed 2009)] : **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 2009)] : **Does not conform**
- x) Agricultural Tractors and Machinery - Lighting device for travel on public roads (IS: 14683-1999) (Reaffirmed 2009)] : **Conforms**



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**16.4 Salient Observations:**

**16.4.1 Laboratory tests:**

**16.4.1.1 PTO performance:**

- i) The maximum power was observed **33.4 kW** against the declaration of **32.0 kW**. Which is within the tolerance limit of IS: 12207-2014.
- ii) The specific fuel consumption corresponding to maximum power was measured as **267 g/kWh** against the declaration of **260 g/kWh**, which is within the tolerance limit of IS: 12207-2014.
- iii) The backup torque was observed as **28.5 %**.

**16.4.1.2 Drawbar performance:**

- i) During ten hours drawbar test, the creeping on LHS and RHS IS tyre over the rim was observed 25 & 50 mm respectively. This should be looked into for necessary corrective action.

**16.4.1.3 Mechanical vibration:**

The amplitude of mechanical vibration on various assemblies marked as (\*) in Chapter-8 of this test report is on higher side, especially on the foot rest & steering wheel. This calls for dampening down of vibrations to improve the operator's comfort and service life of components.

**16.4.1.4 Three point linkage:**

The 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.

**16.4.1.5 Operator's Seat**

The dimension vertical distance from seat index point to the center of accelerator pedal, longitudinal distance from seat index point & vertical distance from seat index point to the center of steering control wheel does not meet the minimum requirements of IS: 12343-1998 (Re-affirmed in March,2009). This should be looked into for corrective action.

**16.4.1.6 Operator's work place:**

Operator's work place meets the requirements of IS-12239(part-I)--1996. Except the provision of Spark arrester.

**16.4.1.7 Symbols of operator's controls and other displays:**

The symbols for operator's controls such as grease lubricant frequency & oil lubricant, type & frequency has been not provided and does not meet the minimum requirements of IS: 6283(Part I & Part II)-1998.

**16.4.1.8 Location and movement of operator's controls:**

**Location and movement of operator's controls** such as fuel shut-off knob for stop does not remain in stop position without application of sustained manual effort and does not meet the minimum requirements of IS: 8133 -1983. This should be looked into for corrective action.

**16.4.1.9 Constructional requirement with regard to safety:**

The provision of PTO master shield & the working clearance between draft control lever and mudguard has not been provided as per IS: 12239 (Part-I)-1999. This should be looked into for corrective action.





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**16.4.2 Field performance test:**

**16.4.2.1 Wetland cultivation (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 wetland operation). Therefore, the tractor is found suitable for wetland operation (Puddling).

**16.4.2.3 Haulage performance:**

The distance travelled per liter of fuel consumption with four wheel trailer were observed as 4.36 to 4.48 against the declaration of 4.5 to 6.0 km/l and the fuel consumption with two wheel trailer were observed 42.10 to 44.97 against the declaration of 30 to 40 ml/km/tonne, and does not meet the requirement of IS: 12207-2014 and therefore, should be looked into for necessary corrective action.

**16.5 Maintenance / Service Problems:**

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

**16.6 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) The working clearance between draft control lever and mudguard should be provided as per the requirement of relevant Indian Standard.
- iii) The fuel shut-off knob for stop does not remain in stop position without application of sustains manual effort.
- iv) The dimension width of seat & distance from seat index point to the center of clutch pedals of operator's seat should be within the limit of easy handling of tractor.
- v) Provision of master shield for PTO shaft.
- vi) Provision of the symbols for operator's controls such as grease lubricant frequency & oil lubricant, type & frequency.
- vii) The dimension vertical distance from seat index point to the centre of accelerator pedal, longitudinal distance from seat index point & vertical distance from seat index point to the center of steering control wheel should be within the limit of easy handling of tractor.
- viii) Provision of front tow hook.

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

**16.7.1** The following literature was supplied with the tractor for reference during the testing.

- i) Operator's Manual in respect of Sonalika DI-750 III HDM tractors.
- ii) Tractor Parts Catalogue in respect of Sonalika DI-750 III HDM tractors.
- iii) Service Manual in respect of Sonalika DI-750 III HDM tractors.

**16.8.2** The printed literature supplied with the test sample is in English. The literature may be brought out as per IS: 8132 – 1999 (Reaffirmed in March, 2009) for the guidance of users and service personnel in national as well as other regional languages.

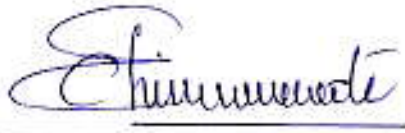
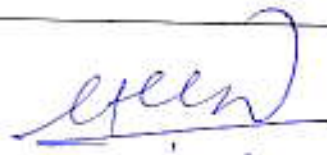
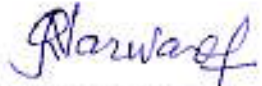


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### 17. CITIZEN CHARTER

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	12 Months (March, 2016 to February, 2017)	No	Due to non availability of field for testing

### TESTING AUTHORITY:

	
<b>C.V.CHIMOTE TEST ENGINEER</b>	<b>Y.K.RAO SENIOR AGRICULTURAL ENGINEER</b>
 <b>J.J.R.NARWARE DIRECTOR</b>	

This test report is compiled by Shri. Shwetabh Singh Senior Tech. Assistant

### 18. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's Comments
18.1	1.212, 1.21.6 & 16.4.1.4	Observation will be studied & necessary action will be incorporated.
18.2	16.4.1.5, 16.4.1.6, 16.4.1.7, 16.4.1.8 & 16.4.1.9	These are minor non conformance and will not affect the tractor performance, however necessary quality check implemented in quality system