



SONALIKA INTERNATIONAL, DI-30 RX BAAGBAN SUPER 4WD 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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1008/1532/2016

**SONALIKA INTERNATIONAL, DI - 30 RX BAAGBAN SUPER
4WD TRACTOR Commercial (Initial)**

Manufacturer : **M/s. International Tractors Limited.
Vill. Chak Gujran, P.O. Piplanwalan,
Jalandhar Road,
Hoshiarpur (Punjab) – 146 022**

Test requested by (applicant) : The Manufacturer
Selected for test by : The Applicant
Place of running-in : At manufacturer's works

Duration of said running-in (h):
- Engine : 35
- Transmission : Nil

Method of Selection : The tractor was submitted directly by the applicant for test. Hence, method of selection is not known.

SPECIFICATIONS

- 1.1 Tractor:**
Make : Sonalika International
Model : DI -30 RX Baagban Super 4WD
Variant, if any : None
Type : Four wheeled, Four wheel driven, General Purpose Agricultural Tractor.
Year of manufacture : 2014
Chassis number : JYHSE443610B
Country of Origin : India
- 1.2 Engine:**
Make : Sonalika International
Model : 2105 DL
Type : Four stroke, Naturally aspirated, water cooled, direct Injection, diesel engine.
Serial number : 2105DL43F424487F6
- Engine speed (Manufacturer's recommended production setting)(rpm):**
- Maximum speed at no load : 2200-2400
- Low idle speed : 600 to 700
- Speed at maximum torque : 1200 to 1400
- Rated speed, (rpm):**
- For PTO use : 2100
- For drawbar use : 2100
- 1.3 Cylinder & Cylinder Head:**
Number : Two
Disposition : Vertical, in-line
Bore/stroke, (mm) : 105/118
Capacity as specified by the applicant, (cc) : 2044 (apa)
Compression ratio, (apa) : 18.5 (± 0.2) :1
Type of cylinder head : Individual
Type of cylinder liners : Wet replaceable
Type of combustion chamber : Direct Injection re entrant
Arrangement of valves : Overhead, Inline



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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: 12207-2008	Values declared by the applicant/ requirement	As observed	Whether meets the requirements (Yes/No.)
1	2	3	4	5	6	7
16.1.1	PTO Performance (Repeat Test) :					
a)	- Max. 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	17.5	17.4	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	17.5	17.4	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	285 (D)	280	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	110 (D)	97.5	No
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10 percent, min (R) 7 percent, min (D)	23.42	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	118	Yes



1	2	3	4	5	6	7
	2) Coolant (water) details of	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	110	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.85 (D) 2.82 (R)	0.19	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 meter (R)	0.26	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	No drawbar ballast was recommended	NA	---
b)	Max. drawbar pull without ballasted corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast/ with standard ballast	9.30 (D) 9.18 (R)	12.66	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.	14.0 (D) 13.91 (R)	17.1	Yes
d)	Maximum transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	130	84	Yes



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1	2	3	4	5	6	7
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%]	12.0 (D)	11.88	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	6.0(D) 4.1 (R)	9.49	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	The observed value should not exceed 50 mm	50 (D)	19	Yes
16.1.4	Brake performance at 23.2 kmph:					
a)	Maximum stopping distance at a force, equal to or less than 600 N on brake pedal without ballasted tractor (as no road ballast recommended by the manufacturer), (m):					
1)	Cold brake	Evaluative	10	10	6.43	Yes
2)	Hot brake	Evaluative	10	10	6.70	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600	330 to 340	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	Yes	Yes
16.1.5	Noise measurement :					
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	85	82	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96	96	Yes



1	2	3	4	5	6	7
16.1.6	Amplitude of mechanical vibrations at :					
	1) Right foot rest	Non Evaluative	100 microns (max.)	100 micron (max)	120	No
	left foot rest				90	Yes
	2) Seat (with driver seated)				170	No
3) Steering control wheel	190				No	
16.1.7	Haulage requirements :					
a)	Gross mass of the trailers, (tones):					
	1) Two wheel	Non Evaluative	--	3.0	3.0	Yes
	2) Four wheel		--	4.0	4.0	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
	1) Two wheel	Non Evaluative	--	5 to 6	5.66 to 5.82	Yes
	2) Four wheel		--	5 to 6	5.30 to 5.66	Yes
c)	Fuel consumption (ml/km/tonne):					
	1) Two wheel	Non Evaluative	--	41 to 55	57.22 to 58.83	No
	2) Four wheel		--	50 to 60	44.12 to 47.14	No
16.1.8	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 water was observed during water proof test	Yes
	1) Clutch assembly	-do-				
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
	4) Engine Oil	-do-				
	5) Transmissi on Oil	-do-				
16.1.9	Safety features :					
a)	Guards against moving and hot parts	Evaluative	As per CMVR	...	Provided	Yes
b)	Lighting arrangement	Evaluative	As per CMVR		Provided	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



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1	2	3	4	5	6	7
d)	Technical requirements for PTO shaft	Non Evaluative	Should meet the requirements of IS: 4931 (As amended from time to time)	--	Does not Meet the requirements	No
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)	--	Does not Meet the requirements	Yes
	Swinging drawbar				Not Provided	Not applicable
16.1.10	Labelling of tractors (Provision of labelling plate):					
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	--	SONALIKA INTERNATIONAL	Yes
	2) Model	Evaluative		--	DI 30 RX Baagban Super 4WD	Yes
	3) Year of manufacture	Evaluative		--	2014	Yes
	4) Chassis number	Evaluative		--	JYHSE443610B	Yes
	5) Engine number	Evaluative		--	2105DL43F424487F6	Yes
	6) Declaration of PTO power, (kW)	Evaluative		--	17.5	Yes
16.1.11	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be declared by the manufacturer	105.319	105.05 to 105.07	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative	-do-	0.45	0.164 to 0.165	Yes
(c)	Ring end gap (mm):					
	- Top comp. ring.	Evaluative	-do-	2.0	0.50 to 0.55	Yes
	- 2 nd comp. ring.		-do-	2.0	0.95	Yes
	- Oil ring.		-do-	2.0	0.60 to 0.65	Yes
(d)	Ring groove clearance (mm):					
	- Top comp. ring.	Evaluative	-do-	0.20	--	--
	- 2 nd comp. ring.		-do-	0.20	0.079 to 0.087	Yes
	- Oil ring.		-do-	0.20	0.054 to 0.057	Yes
(e)	Clearance of main bearings (mm):					
	- Diametrical clearance	Evaluative	-do-	0.20	0.04 to 0.104	Yes
	- Crankshaft end float	Evaluative	-do-	0.60	0.20	Yes



1	2	3	4	5	6	7
	Clearance of big end bearings, (mm):					
	- Diametrical	Evaluative	To be declared by the manufacturer	0.20	0.072 to 0.082	Yes
	- Axial	Evaluative	-do-	0.60	0.30	Yes
(h)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	1.0	not measured due to design feature	--
(i)	Clearance between center pin and bush, (mm)	Non Evaluative	-do-	1.0	0.040 to 0.079	Yes
16.1.12	Literature					
(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
16.1.12	CATEGORY OF BREAKDOWNS / DEFECTS :					
Sl. 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.	One	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	One	Yes	

16.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2014:				
S. No.	Characteristic	Requirements as per IS: 12207-2014	AS observed	Remarks
1	2	3	4	5
1	Air cleaner oil pull over, max. oil pull over (%)	0.25% (max.)	Dry type	..
2.	Seating requirements	Should meet the requirements of IS: 12343-1998	Does not conform	No
3.	Fitment of ROPS	With a provision for fitment of ROPS. If ROPS fitted it should meet the requirement of IS: 11821-1992	Not provided	--

**16.4 Salient Observations:****16.4.1 Laboratory tests:****16.4.1.1 PTO Performance:**

- i) During PTO performance test, the maximum coolant temperature was noted as 119 °C against the maximum declared limit of 118 °C. As a result water flushed out from the radiator. The repeat PTO Performance test was carried out. After completion of the two hrs max PTO power test at higher ambient condition, 6.4% coolant consumption was noted, this needs to call the necessary improvement in the cooling system of the tractor.
- ii) The backup torque is 23.42%.

16.4.1.5 Mechanical Vibration:

The amplitude of mechanical vibration on various assemblies marked as (*) in Chapter-9 of this test report are on higher side, especially at Steering control wheel accelerator lever, clutch & brake pedals. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

16.4.2 Three point linkage:

- i) Many parameters as listed in Para no. 1.13.2 doesn't meet the requirement of IS: 4468 (Part-1)-1997. This should be looked into for necessary corrective action.

16.4.3 Operator's Seat: Meet the requirements of IS: 12343-1998, except following:-

- i) Width of the seat is less.
- iv) Vertical distance of steering control wheel from the SIP doesn't meet the requirements.

16.5 Maintenance / Service Problems:

No noticeable service or maintenance problem observed during the tests.

16.7 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 hand clutch lever may be provided as per IS: 12239 (Part-2) – 1999.

16.7 Field and haulage test

- i) During the haulage test, the fan belt was broken which was replaced with new one. It needed stringent quality improvement in spare parts.
- ii) Applicant recommended a 2 bottom Reversible M.B. Plough, for dry land cultivation. During field test it was noticed that the reversing mechanism of the plough could not be operated in easy from the operator seat. This should call for the corrective action.

16.8 Adequacy of Literature supplied with machine:**16.8.1** Following literature were supplied after issuing the draft test reports of this tractor, in reference to our comments

- i) Operator's manual
- ii) Service manual
- iii) Spare part's catalogue

The supplied literatures are found adequate. However tyre pressure in tractor for road & field operation may be included. The literature should also be provided in national as well as 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 + 4 Months (repeat test)	15 Months (January 2015 to March 2016)	No	Delayed by applicant side for repeat test on PTO performance test.

TESTING AUTHORITY:

P.C. MESHARAM
SENIOR AGRICULTURAL ENGINEER

C. R. LOHI
DIRECTOR

Test report compiled by Mr. Nitesh Kumar Verma , Senior Technical Assistant

18. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
18.1	1.20 2	We will take care to it in production of this model
18.2	16.7 ii)	The point has been forwarded to our design department and will be take care accordingly.
18.3	16.4.1.1	The matter already takes up by 9our R & D for rectification.
18.4	16.4.2	The point is under discussion with our r & D