



**INTERNATIONAL TRACTORS LIMITED,
SONALIKA INTERNATIONAL DI-30 BAAGBAN SUPER TRACTOR**



भारत सरकार

GOVERNMENT OF INDIA

कृषि मंत्रालय (कृषि एवं सहकारिता विभाग, मशीनीकरण एवं प्रोद्योगिकी प्रभाग)

Ministry of Agriculture (Deptt. of Agri. & Co-op, Mechanization & Technology Division)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO : 9001-2008 Certified Institute)

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T- 867/1378/2013

**INTERNATIONAL TRACTORS LIMITED,
SONALIKA INTERNATIONAL DI-30 BAAGBAN SUPER
TRACTOR Commercial (Initial)**

Manufacturer : M/s. International Tractors Limited,
Vill. Chack 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.

1. SPECIFICATIONS

- 1.1 Tractor:**
Make : International Tractors Limited
Model : Sonalika International DI 30 Baagban Super
Variant, if any : None
Type : Four wheeled, Rear-wheel driven, standard
Agricultural Tractor.
Year of manufacture : 2012
Chassis number : AZWSD283808/5
Country of Origin : India
- 1.2 Engine:**
Make : International Tractors Ltd.
Model : 2105DL
Type : Four stroke, naturally aspirated, water
cooled, direct injection, diesel engine.
Serial number : 2105DL23C284491F6
Engine speed (Manufacturer's recommended production setting)(rpm):
- Maximum speed at no load : 2200 to 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, inline
Bore/stroke, (mm) : 105 / 118 (apa)
Capacity as specified by the applicant, : 2044
(cc)

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16. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

S. No.	Adjustment/ Defects/ breakdowns and Repairs	Tractor run hours
1.	During the drawbar performance test, the maximum drawbar power was observed as 12.9 kW against the minimum requirement of 14.2 kW as per IS: 12207-2008. Upon inspection, the primary and secondary fuel filters were found in dirty condition and choked. So, both primary and secondary fuel filters were replaced with new ones.	24.9

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:

S. 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	17.5 (D)	17.7	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	17.5 (D)	17.7	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	285 (D)	272	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	110 (D)	110.6	Yes
e)	Back-up torque, percent	Non Evaluative	7 percent, min.	7 percent, min. (R)	37.4	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)	93	Yes
2)	Coolant (water)	Evaluative	The declared value should not exceed the boiling temperature of coolant under the pressurized or otherwise the observed value under high ambient condition should not exceed the declaration.	118 (D)	88	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.74 (R)	0.48	Yes



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1	2	3	4	5	6	7
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 meter (R)	0.17 per metre	Yes
17.1.2	Drawbar performance :					
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass of tractor without ballast	Not applicable	Not applicable	--
Remark: The manufacturer has not recommended ballasting for drawbar test. So, the maximum power test under ballasted condition was not conducted.						
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	9.37 (D) Minimum 9.37 (R) Minimum	10.81	Yes
c)	Maximum drawbar power without ballast, (kW).	Evaluative	Min. 80% of PTO power as referred in 16.1.1 (a) of PTO performance	14.0 (D) 14.2 (R) Minimum	14.8	Yes
d)	Max. transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	130 (D)	63	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%]	10.78 (D)	12.68	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	7.84 (D) 4.19 (R) Minimum	8.95	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	[Tolerance of plus 5 mm]	50 (D)	10	Yes
17.1.4	Brake performance at 23 kmph(maximum attainable speed):					
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)	6.39	Yes
2)	Hot brake	Evaluative	10	10 (R)	6.86	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (R)	525	Yes
Remark: The manufacture has not recommended ballasting for road test. Therefore, the brake test was conducted under unballasted condition only.						



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1	2	3	4	5	6	7
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 (R)	80	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	98 (R)	93	Yes
17.1.6	Amplitude of mechanical vibrations at :					
1)	Left foot rest	Non Evaluative	100 microns (max)	100 (R)	130	No
2)	Right foot rest			100 (R)	180	No
3)	Seat (with driver seated)			100 (R)	130	No
4)	Steering wheel			100 (R)	170	No
17.1.7	Haulage requirements :					
a)	Gross mass of the trailers, (tones):					
i)	Two wheel	Non Evaluative	--	3.0 (D)	3.0	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
i)	Two wheel	Non Evaluative	--	5.0 to 6.0 (D)	5.75 to 6.02	Yes
c)	Fuel consumption (ml/km/tonne):					
i)	Two wheel	Non Evaluative	--	41 to 55 (D)	55.4 to 57.9	No
Remarks: The manufacturer has recommended that the tractor is not suitable for haulage test with four wheel (double axle) trailer. Hence, the haulage test with four wheel trailer was not conducted.						
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 (R)	The manufacturer has recommended that the tractor is not suitable for wet land cultivation (puddling) test. Therefore, the wet land cultivation (puddling) test has not been conducted.	--
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 requirements	Provided	Yes
b)	Lighting arrangement	Evaluative	As per CMVR	--	Provided	Yes



1	2	3	4	5	6	7
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	--	International Tractors Ltd.	Yes
2)	Model	Evaluative		--	Sonalika International DI-30 Baagban Super	Yes
3)	Year of manufacture	Evaluative		--	2012	Yes
4)	Engine number	Evaluative		--	2105DL23C284491 F6	Yes
5)	Chassis number	Evaluative		--	AZWSD283808/5	Yes
6)	Declaration of PTO power, (kW)	Evaluative		--	17.5	Yes
7.1.11	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	105.074	105.04	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.145 to 0.149	0.127 to 0.129	Yes
(c)	Ring end gap (mm):					
	- Top comp. ring.	Evaluative	-do-	2.00	0.60 to 0.65	Yes
	- 2 nd comp. ring.		-do-	2.00	0.90 to 0.95	Yes
	- Oil ring.		-do-	2.00	0.60 to 0.65	Yes
(d)	Ring groove clearance (mm):					
	- Top comp. ring.	Evaluative	-do-	0.150	--Taper rings--	--
	- 2 nd comp. ring.		-do-	0.150	0.094 to 0.099	Yes
	- Oil ring.		-do-	0.130	0.048 to 0.049	Yes
(e)	Clearance of main bearings (mm):					
	- Diametrical clearance	Evaluative	-do-	0.20	0.068 to 0.078	Yes
	- Crankshaft end float	Evaluative	-do-	0.60	0.25	Yes
(f)	Clearance of big end bearings, (mm):					
	- Diametrical	Evaluative	-do-	0.20	0.066 to 0.068	Yes
	- Axial	Evaluative	-do-	1.00	0.40	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	1.00	0.07 to 0.09	Yes
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	1.00	2.16 to 2.17	No



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	Air cleaner oil pull over, max. Oil pull over (%)	0.25% (max.)	0.18	Yes
2.	Seating requirements	Should meet the requirements of IS: 12343-1998	Does not meet the requirements	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 ROPS not fitted	No --
4.	Technical requirements for PTO shaft	Should meet the requirements of IS: 4931 -1995	Does not meet the requirements	No
5.	Dimensions of three point linkage	Should meet the requirements of IS: 4468 (Part-I)-1997	Does not meet the requirement	No
6.	Specifications of linkage drawbar	Should meet the requirements of IS: 12953-1990.	Meets the requirement	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 Conformity with following IS:**
- i) Guidelines for declaration of power and specific fuel consumption and labelling 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)] : **Does not conform**



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- iii) Agricultural wheeled tractors - Rear mounted three-point linkage: Part 1 Categories 1, 2, 3 & 4 (fourth revision) [IS 4468(Part-1):1997 (Reaffirmed in February, 2012)] : Does not conform
- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in February, 2012)] : Conforms
- v) Agricultural tractors - Operator's seat technical requirement [IS 12343 –1998 (First revision) (Reaffirmed in March, 2009)] : Does not conform
- vi) Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision) : [IS 12239 (Part-1) 1996 (Reaffirmed in February, 2012) /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 (Part-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 - Symbols for Agricultural Tractors & Machinery [IS: 6283 (Part-2) – 2007 (Reaffirmed in March, 2009) /ISO 3767-2:1991]] : Does not conform
- ix) Guidelines for location and operation of operator controls on agricultural tractors and machinery (first revision) IS: 8133-1983 (Reaffirmed in March, 2009)] : Conforms
- x) Agricultural Tractors and 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 37.4%.
- ii) The specific fuel consumption corresponding to maximum power was measured as 272 g/kWh against the declaration of 285 g/kWh and which meet the requirement of IS: 12207-2008 with regard to tolerance.
- iii) The PTO speed corresponding to maximum high idling speed of engine (2277 rpm) was recorded as 891 rpm only during the test. Thus, the Standard PTO speed of 1000 ± 25 rpm is not available even at maximum high idling speed of engine. So, it was not possible to measure the power at standard power take-off speed. This should be looked into for necessary corrective action.

17.4.1.2 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, operator's seat, left and right foot rest. This calls for dampening down of vibrations to improve the operational comfort and service life of components.



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17.4.1.3 Three point linkage:

- i) The diameter of hitch pin hole of upper hitch points does not meet the requirements of IS: 4468 (Part-1)- 1997. This should be looked into for necessary corrective action.
- ii) The distance from end of power take-off to centre of lower hitch point (lower links in horizontal position) does not meet the requirement of IS: 4468 (Part-1)- 1997. This should be looked into for necessary corrective action.
- iii) 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.

17.4.1.4 Linkage drawbar:

Some of the parameters of linkage drawbar conform to Cat. I and some of them conform to Cat. II. In view of the spirit of standardization, necessary improvements may be incorporated.

17.4.1.5 Operator's Seat:

Length of seat and vertical distance from SIP to centre of steering wheel does not meet the requirements of IS: 12343-1998. This should be looked into for necessary corrective action.

17.4.2 Field performance test:

17.4.2.1 Wetland cultivation (Puddling operation):

The manufacturer has recommended that the tractor is not suitable for wetland cultivation (puddling operation). Hence, the wetland cultivation (puddling operation) was not conducted. **Therefore, the declaration of the fact that the tractor is not suitable for Wetland cultivation (Puddling operation) should be mentioned clearly and boldly in all the literature relevant of this tractor model.**

17.4.2.2 Haulage performance:

- i) The fuel consumption with two wheel trailer was observed as 55.4 to 57.9 ml/km/tonne against the declaration of 41 to 55 ml/km/tonne and which does not meet the requirement of IS: 12207-2008. This should be looked into for necessary corrective action.
- ii) The manufacturer has recommended that the tractor is not suitable for haulage test with four wheel (double axle) trailer. Hence, the haulage test with four wheel trailer was not conducted.

17.4.3 Component/assembly inspection:

The clearance between centre pin and bush was recorded as 2.16 to 2.17 mm against the specified discard limit of 1.00 mm and does not meet the requirement of IS: 12207-2008. This should be looked into for necessary corrective action.

17.5 Maintenance / Service Problems:

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

17.6 Recommendation with regard to safety on tractor:

The following requirements, inter alia, 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.
- v) The working clearance between the position control lever and the draft control lever may be provided as per IS: 12239 (Part-2) – 1999.
- vi) The hydraulic discharge pipe may be insulated so as to avoid inadvertent contact during normal operation.



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

17.7.2 Details of all variant models and their features at a glance should be included in the operator's manual of the tractor.**18. CITIZEN CHARTER**

Time frame for Testing & Evaluation as per Citizen Charter	Duration of Test	Whether the report released within time frame given in citizen charter	Remark
10 Months	10 Month (June, 2012 to March, 2013)	Yes	--

TESTING AUTHORITY:C. V. CHIMOTE
TEST ENGINEERP. K. VERMA
SENIOR AGRICULTURAL ENGINEER
C.R.LOHI
DIRECTOR

Test Report compiled by: Shri. Pramod Yadav, Senior Technical Assistant.



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Para No.	Our Reference	Applicant's comments
19.1	17.4.1.1(iii)	We will look into for necessary corrective action & improvement to maintain standard PTO speed of 1000 ± 25 rpm.
19.2	17.4.1.2	We will look into for necessary corrective action regarding damping of vibrations to improve the operational comfort and service life of components.
19.3	17.4.1.3 (i), (ii), (iii) & 17.4.1.4, 17.4.1.5	We will look into necessary corrective action & improvement.
19.4	17.4.2.2 (i)	We will look into for necessary corrective action regarding fuel consumption.
19.5	17.4.3	We will look into for necessary corrective action regarding clearance.
19.6	17.6	We will consider these safety features.

ANNEXURE - I**BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST**

S. No.	Item	Disc Plough	Rotavator
1.	Make	M & M	Farm Implement India
2.	Type	Mounted	Mounted
3.	No. of discs/blades	Two	364 in 7 flange
4.	Type of discs/blades	Plain concave	Hatchet
5.	Size of discs/blades, (mm)	525	150 x 60 x 7
6.	Spacing of discs/flanges, (mm)	510	230
7.	Lower hitch point span, (mm)	750	720
8.	Mast height, (mm)	460	510
9.	Overall dimensions, (mm):		
	- Length	1560	930
	- Width	990	760
	- Height	1100	940
10.	Gross mass, (kg)	320	275



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A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	PTO performance test	12.7
3.	Drawbar performance test	12.1
4.	Power lift and hydraulic pump performance test	4.7
5.	Turning ability	0.4
6.	Location of centre of gravity	0.2
7.	Operator's field of vision	--
8.	Brake test	0.8
9.	Noise measurement	2.0
10.	Mechanical vibration test	1.0
11.	Theoretical speed test	0.5
12.	Air cleaner oil pull over test	3.5
B.	FIELD TEST:	
1.	Disc ploughing	15.5
2.	Rotavation	20.9
C.	HAULAGE TEST:	9.0
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	29.9
	TOTAL:	121.5