



**INTERNATIONAL TRACTORS LIMITED,
SONALIKA INTERNATIONAL DI - 35 SM TRACTOR**



सत्यमेव जयते

भारत सरकार

कृषि एवं किसान कल्याण मंत्रालय
कृषि, सहकारिता एवं किसान कल्याण विभाग
मशीनीकरण एवं प्रौद्योगिकी प्रभाग

GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS WELFARE

(DEPARTMENT OF AGRICULTURE, CO-OPERATION & FARMERS WELFARE, MECHANIZATION & TECHNOLOGY DIVISION)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान
ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO : 9001 - 2015 Certified Institute)

Tractor Nagar, Budni (M.P.) 466 445

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2. ESSENTIAL TESTS**2.1. SPECIFICATIONS**

The following are the brief specifications of the tractor. However, for detail specifications of the tractor, the test report No. T-910/1425/2014 (February, 2014) and T-1072/1597/2017 (February, 2017) should be referred.

2.1.1 Tractor:

Make	:	International Tractors Limited
Model	:	Sonalika International DI-35 SM
Brand name	:	Sonalika
Type	:	Four wheeled, rear wheel driven, Unit construction, General purpose, Agricultural tractor
Month & Year of manufacture	:	05 19
Chassis Serial number	:	FZJSS847609SM
Country of Origin	:	India

2.1.2 Engine:

Make	:	International Tractors Limited
Model	:	3100FL
Type	:	Four stroke Liquid cooled, naturally aspirated, direct injection, diesel engine
Serial number	:	3100FL93D843849F3

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

- Maximum speed at no load	:	2150 to 2250
- Low idle speed	:	650 to 750
- Speed at maximum torque	:	1100 to 1300

Rated speed, (rpm):

- For PTO use	:	2000
- For drawbar use	:	2300

2.1.3 Cylinder & Cylinder Head:

Number	:	Three
Disposition	:	Vertical, inline
Bore / stroke, (mm)	:	100/118
Capacity as specified by the applicant, (cc)	:	2780

2.1.4 Fuel System:

Type of fuel feed system	:	Gravity and forced feed
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2.1.4.1 Fuel feed pump:

Make	:	Bosch, India (apa)
Type	:	Plunger
Model/Group combination No.	:	FP/KSG22AD10, F002A50040

2.1.4.2 Fuel Injection pump:

Make	:	Bosch India
Model/Group combination No.	:	F002 A0Z 636, PES3A90D320RS3500
Type	:	Inline, Plunger
Serial number	:	91710731

2.1.4.3 Fuel injectors:

Make	:	Bosch, India
Model/Group combination No.:	:	F002 C70 552
Holder number	:	F002 C70 552
Nozzle no.	:	DSLA 148P 1549
Type	:	Multi hole (Five holes)
Injection timing	:	12° ± 2 degree before TDC

5. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

- 5.1 The performance results have been reproduced from Initial Commercial Test report No. T-910/1425/2014 (February, 2014) and Commercial supplementary test report No. T-1072/1597/2017 (February, 2017) and / On the basis of test conducted the performance results have been summarized as evaluative (mandatory) and non – evaluative (not mandatory) parameters applicable for qualifying Minimum Performance Criteria as per clause-4 Table-1 of Indian Standard 12207: 2019 for acceptance of tractor for the purpose of subsidies/NABARD financing are summarized as under.

Sl. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	Values declared by the applicant (D)/ Requirement (R)	As observed	Whether meets the requirements (Yes/No)
1	2	3	4	5	6	7
5.1.1	PTO Performance:					
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: $\pm 5\%$ for PTO power and or Engine power >26 kW. $\pm 10\%$ for PTO power and or engine ≤ 26 kW	26.0 (D)	25.5	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	26.0 (D)	25.1	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10%	265(D)	245	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	$\pm 8\%$	153 (D)	158.4	Yes
e)	Back-up torque, percent %	Evaluative	12 percent, min.	12% (D) 12% (R)	32.0	Yes
f)	Maximum operating temperature, ($^{\circ}$ C)					
	1) Engine oil	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)	104	Yes
	2) Coolant	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)	108	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.46 Maximum (R)	1.32	Yes
h)	Smoke level, m ¹	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hatridge value.	3.25 Maximum (R)	0.11	Yes



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1	2	3	4	5	6	7
5.1.2 : Drawbar performance :						
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip or 7 percent track slip, (kN)	Non Evaluative	Minimum 70% of static mass with ballast	17.37 (D) 17.37 (R) Minimum	19.23	Yes
b)	Max. drawbar pull with unballast corresponding to 15 percent wheel slip or 7 percent track slip, (kN)	Evaluative	Minimum 70% of static mass of tractor without ballast or with standard ballast, as the case may be	12.68 (D) 12.84 (R) Minimum	14.11	Yes
c)	Maximum drawbar power with unballast, as in case may be, (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.	20.8 (D) 20.4 (R) Minimum	21.0	Yes
d)	Maximum transmission oil temperature (°C)	Evaluative	To be declared by the manufacturer.	130 (D)	88	Yes
5.1.3 Power lift and hydraulic pump performance:						
a)	Maximum lifting capacity throughout the range of lift, (kN):					
1)	At hitch points	Evaluative	Tolerance of ± 10%	14.0 (D)	14.03	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	7.84 (D) 6.00 (R) (Minimum)	10.91	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) 50(R) Maximum	30	Yes
5.1.4 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 m	10 (R)	7.72	Yes
2)	Hot brake	Evaluative	10 m	10 (R)	8.07	Yes

1	2	3	4	5	6	7
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600 N	600 (R) Maximum	248 to 252	Yes
c)	Whether parking brake is effective at a force of 600 N at foot pedal (s) or 400 N at hand lever, N	Evaluative	Yes / No	Yes	Yes	Yes
5.1.5	Noise measurement (*):					
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	88 dB (A) for >1.5 tonne GWV and 85 dB (A) for <1.5 tonne GWV (as per CMVR)		81	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	96 (as per CMVR)		92	Yes
5.1.6	Amplitude of mechanical vibrations at(*):					
1	Left foot rest)	Non Evaluative	100 microns (max)		100	Yes
2	Right foot rest)				90	Yes
3	Seal (with driver seated)				120	No
4	Steering wheel)				210	No
5.1.7	Air cleaner oil pull over test :					
	Maximum air cleaner oil pull over, (%)	Evaluative	0.25% (Max)		0.16	Yes
5.1.8	Haulage requirements(*):					
a)	Gross mass of the trailers, (tones):					
	Two wheel	Non Evaluative	To be specified by manufacturer		5.5 (D)	Yes
	Four wheel	Evaluative			6.0 (D)	Yes
b)	Distance travelled / liter of fuel consumption, (km/l):					
	Two wheel	Non Evaluative	-do-	4.5 to 6.0 (D)	5.51	Yes
	Four wheel	Evaluative	-do-	4.5 to 6.0 (D)	5.13 to 5.29	Yes
c)	Fuel consumption (ml/km/tonne):					
	Two wheel	Non Evaluative	-do-	28 to 38 (D)	32.97	Yes
	Four wheel	Evaluative	-do-	28 to 38 (D)	31.48 to 32.49	Yes
5.1.9	Wetland cultivation (Puddling Operation) (*):					
	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 during ICT of base model tested vice test report no. T-910/1425/2014 (February 2014)	Yes
	1) Clutch assembly	-do-				
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
	4) Engine oil	-do-				
	5) Transmission oil	-do-				



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1	2	3	4	5	6	7
5.1.10	Safety features :					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulleys, silencer, hydraulic pipes (As per IS: 12239 (Part-2) As per CMVR	Meets the requirement		Yes
b)	Lighting arrangement	Evaluative	As per CMVR	Meets the requirement		Yes
c)	Seating requirements (Tractors having more than 1150 mm rear track width)	Non Evaluative	Should meet the requirements of IS: 12243 (As amended from time to time)	Meets the requirement		Yes
d)	Technical requirements for PTO shaft	Evaluative	Should meet the requirements of IS: 4931 (As amended from time to time)	Meets the requirement		Yes
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 requirement		No
f)	Specifications of linkage drawbar	Evaluative	Should meet the requirements of IS 12953 (As amended from time to time)	Meets the requirement		Yes
g)	Swinging drawbar (wherever fitted)	Evaluative	Should meet the requirements of IS 12362 (Part 3) (As amended from time to time)	Not provided		Not applicable
h)	1) Maximum traveling speed at rated engine speed in reverse gear, kmph	Evaluative	Should not exceed 20 kmph	11.70 kmph (Meets the requirement)		Yes
	2) Audible warning signal on tractor	Evaluative	As soon as the traveling speed in reverse gear reaches to 20 kmph an audible warning signal on tractor be activated. The safety aspects about the operation of shuttle technology shall be brought in operation and manufacturer /dealer shall ensure the training on this aspect to operator before the delivery of tractor.	Not Provided		Not applicable
5.1.11	Labelling of tractors (Provision of labelling plate):					
	1) Make	Evaluative	Should conform to the requirements of CMVR along with maximum PTO power in kW and year of manufacture in numerical form [MM YY Digit 01-12 in box No.1 for MM will represent the month & next two digits in box No.2 for YY will represent the year of manufacturing.	International Tractors Limited		Yes
	2) Model	Evaluative		Sonalika International DI-35 SM		Yes
	3) Month & Year of manufacture	Evaluative		05 / 19		Yes
	4) Engine number	Evaluative		3100FL93D843849F3		Yes
	5) Chassis number	Evaluative		FZJSS847609SM		Yes
	6) Declaration of PTO power, (kW)	Evaluative		26.0		Yes

1	2	3	4	5	6	7
5.1.12	Discard limit for, (mm) (*):					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer and supported by the printed literature	100.30	100.04	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.450	0.148 to 0.149	Yes
(c)	Piston diameter at skirt, (mm)	Non Evaluative	-do-	99.20	99.891 to 99.892	Yes
(d)	Ring end gap (mm):					
	- Top comp. ring.	Evaluative	-do--	2.00	0.50 to 0.60	Yes
	- 2 nd comp. ring.			2.00	0.80 to 0.90	Yes
	- Oil ring.			2.00	0.60 to 0.80	Yes
(e)	Ring groove clearance (mm):					
	- Top comp. ring.	Evaluative	-do-	-Tapered-		Not applicable
	- 2 nd comp. ring.		0.150	0.053 to 0.058	Yes	
	- Oil ring.		0.130	0.043 to 0.047	Yes	
(f)	Clearance of main bearings (mm):					
	- Diametrical clearance	Evaluative	-do-	0.40	0.097 to 0.108	Yes
	- Crankshaft end float	Evaluative	-do-	0.60	0.23	Yes
(g)	Clearance of big or small end bearings, (mm):					
	- Diametrical	Evaluative	-do-	0.50	0.053 to 0.054	Yes
	- Axial	Evaluative	-do-	1.00	0.45	Yes
(h)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	1.00	0.08 to 0.10	Yes
(i)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	1.00	0.12 to 0.13	Yes
5.1.13	Literature (Submission to test agency) (*):					
(a)	Operator manual	Evaluative	The printed literature	Provided	Provided	Yes
(b)	Parts Catalogue	Evaluative	In booklet form	Provided	Provided	Yes
(c)	Workshop / Service manual	Evaluative	should be provided as per IS 8132 & should submit along with the test sample	Provided	Provided	Yes
5.1.14	Fitment of Roll Over Protective Structures (ROPS): for tractor having more than 1150 mm rear track width	Evaluative	ROPS should meet the requirement of IS 11821 or OPEC code or equivalent International standard	Not fitted		Not applicable
5.1.15	Standard Accessories	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with the tractor.	Provided		Yes
5.1.16	Accessories (optional)	Non Evaluative	Ballast weights, if fitted, should meet the requirement of CMVR	Provided		Yes



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5.2 CATEGORY OF BREAKDOWNS / DEFECTS (As per Clause 5.0 of IS:12207-2019):					
S. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	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

Remark(*) :- Data taken from base model International Tractors Limited, Sonalika International DI-35 SM vide report no. T- 910/1425/2014 was released in February 2014 and Commercial supplementary test report No. T-1072/1597/2017 was released in February, 2017

5.3 Salient Observations:

5.3.1 Laboratory tests:

5.3.1.1 PTO Performance Test:

- i) The maximum PTO power was recorded as **25.5 kW** against the declaration of **26.0 kW**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
- ii) The rated PTO power was recorded as **25.1 kW** against the declaration of **26.0 kW**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
- iii) The specific fuel consumption corresponding to maximum power was recorded as **245 g/kWh** against the declaration of **265 g/kWh**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
- iv) The maximum equivalent crankshaft torque was recorded as **158.4 N-m** against the declaration of **153.0 N-m**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
- v) The backup torque is **32.0 %**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
- vi) The drop in maximum PTO Power of **7.1%** was recorded between natural and high ambient condition, which is on higher side. Therefore, this should be looked into for necessary corrective action.

5.3.1.2 Drawbar performance test:

- i) Maximum drawbar pull with unballast and with ballast corresponding to 15 percent wheel slip has been recorded as **14.11 kN** & **19.23 kN** respectively against the declaration of **12.68 kN** & **17.37 kN** respectively and which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
- ii) Maximum drawbar power with unballast has been recorded as **21.0 kW** against the declaration **20.8k kW** and which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
- iii) During ten hour drawbar performance test, creeping of LHS & RHS rear tyre over the rims was recorded as **20 mm** & **30 mm** respectively. This should be looked into for necessary corrective action.



5.3.1.3 Power lift & hydraulic pump performance test

- i) Maximum lifting capacity throughout the range of lift at hitch points and with standard frame has been recorded as **14.03 kN & 10.91 kN** respectively against the declaration of **14.0 kN & 7.84 kN** and which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
- ii) The moment about rear axle with standard frame was computed as **16.26 kN-m**, whereas, the moment about front axle was computed as **14.49 kN-m** under unballasted condition. The moment about rear axle with standard frame is on higher side as compared to the moment about front axle. Therefore, it is recommended that the lifting capacity of the hydraulic system may be reduced suitably or ballast mass recommendation may be reviewed to avoid the front lifting of the tractor.

5.4 Salient Observations:

This tractor model meets the evaluative requirements of IS: 12207-2019.

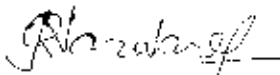
6. CITIZEN CHARTER

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	05 Months (February, 2020 to June, 2020)	Yes	--None--

TESTING AUTHORITY:


RAJNEESH PATEL
 AGRICULTURAL ENGINEER


C.V. CHIMOTE
 TEST ENGINEER


J.J.R. NARWARE
 DIRECTOR

7. APPLICANT COMMENTS

--Nil--



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ANNEXURE - I

TRACTOR RUN HOURS DURING TEST

A. LABORATORY AND TRACK TESTS:		HOURS
1.	Running-in	0.77
2.	Nominal speed test	12.20
3.	PTO performance test	15.90
4.	Drawbar performance test	3.50
5.	Power lift and hydraulic pump performance test	5.50
B.	Miscellaneous test and other run hours, including idle run transportation, trial and preparation for test.	
Total		40.87