



**INTERNATIONAL TRACTORS LIMITED,  
SONALIKA INTERNATIONAL DI-42 RX TRACTOR**



**भारत सरकार**

**GOVERNMENT OF INDIA**

कृषि मंत्रालय (कृषि एवं सहकारिता विभाग, मशीनीकरण एवं प्रौद्योगिकी 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- 897/1412/2013

INTERNATIONAL TRACTORS LIMITED, SONALIKA INTERNATIONAL  
DI-42 RX TRACTOR- Commercial (Batch)

Manufacturer : M/s. International Tractors Limited,  
Vill. Chak Gujran, P.O. Piplanwala,  
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 test sample was selected randomly out of  
five tractors from the production line by the  
representative of testing authority.

**1. SPECIFICATIONS**

1.1 **Tractor:**  
Make : International Tractors Limited  
Model : Sonalika International DI-42 RX  
Variant, if any : None  
Type : Four wheeled, Rear wheel driven, general  
purpose agricultural Tractor.

Year of manufacture : 2012  
Chassis number : BZYSV329298S3  
Country of Origin : India

1.2 **Engine:**  
Make : Sonalika International  
Model : 3100ELI  
Type : Four stroke, naturally aspirated, water cooled,  
direct injection, diesel engine.

Serial number : 3100ELI33A329011F3

**Engine speed (Manufacturer's recommended production setting)(rpm):**  
- Maximum speed at no load : 2150 to 2250  
- Low idle speed : 600 to 650  
- Speed at maximum torque : 1100 to 1300

**Rated speed, (rpm):**  
- For PTO use : 2000  
- For drawbar use : 2000

1.3 **Cylinder & Cylinder Head:**  
Number : 2000  
Disposition : Three  
Bore/stroke, (mm) : Vertical, in-line  
Capacity as specified by the applicant, (cc) : 100 / 118  
Compression ratio, (apa) : 2780  
Type of cylinder head : 18.2 :1  
Type of cylinder liners : Individual, inline  
Type of combustion chamber : Wet replaceable  
Arrangement of valves : Wet replaceable  
Valve clearance (cold / Hot) : Re-entrant cavity on piston crown  
- Inlet valve, (mm) : Overhead, Inline  
- Exhaust valve, (mm) : 0.30±0.05 / 0.30±0.05  
: 0.40±0.05 / 0.40±0.05



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1.4 **Fuel System:**  
Type of fuel feed system : Gravity & force feed

1.4.1 **Fuel tank:**  
Capacity, (l) : 54.100  
Location : Above clutch housing  
Provision for draining of sediments/  
water : Drain plug provided.  
Material of fuel tank : M.S Sheet

1.4.2 **Water separator :**  
Make : Hilux  
Type : Inverted funnel centrifugal separation.  
Location : On LHS of engine in between fuel tank & fuel  
filter.

1.4.3 **Fuel feed pump:**  
Make : Bosch, India  
Type : Plunger  
Model/Group combination No. : 9440030011  
Provision of sediment bowl : Provided (Metallic)  
Method of drive : Through cam shaft of fuel injection pump.

1.4.4 **Fuel filters:**  
Make : Bosch, India  
Model/Group combination No. : F002 H20 109  
Number : Two  
**Type of elements:**  
- Primary : Cloth  
- Secondary : Paper  
Capacity of final stage filter, ( l ) : 0.450

1.4.5 **Fuel Injection pump:**  
Make : Bosch, India  
Model/Group combination No. : F002 AOZ 635, PES3A90D320RS3500  
Type : Inline, Plunger  
Serial number : 21238230  
Method of drive : Through timing gears

1.4.6 **Fuel injectors:**  
Make : Bosch, India  
Holder Number : F 002 C70 552  
Nozzle Number : DSLA 148 P 1549  
Type : Multiholes (Five holes)  
Manufacturer's production pressure  
setting, (MPa) : 25.0 ± 0.8  
Injection timing : 13 ± 1 degree before BTDC  
Firing order : 1 – 3 – 2

1.4.7 **Governor:**  
Make : Bosch, India  
Model/Group combination No. : RSV 325... 1000A 5C 1531R  
Type : Mechanical, centrifugal, variable speed  
Rated engine speed, (rpm) : 2000  
Governed range of engine speed (rpm) : 600 to 2250





12.2.8 Haulage Test	Two wheel trailer	Four wheel trailer	Two wheel trailer	Four wheel trailer
-Gross mass of trailer, (tonnes)	: 4.0	5.5	4.0	5.5
- Average speed, (kmph)	: 30.72	29.00 to 30.04	27.35 to 27.92	27.64 to 28.04
- Distance traveled per litre of fuel consumed, (km)	: 5.63	5.20 to 5.21	5.01 to 5.05	4.87 to 4.92
Average fuel consumption (cc/km/tonne)	: 44.39	34.91 to 34.98	49.49 to 49.87	36.95 to 37.37

12.3 Salient Observations:  
12.3.1 Laboratory test:

	Previous sample	Present sample
i)	The backup torque was 33.4 %	The backup torque is 26.06%
ii)	The specific fuel consumption corresponding to maximum power was measured as 267 g/kWh.	The specific fuel consumption corresponding to maximum power was recorded as 250 g/kWh against the declaration of 265g/kWh.
iii)	The power drop under high ambient condition in compare to the natural ambient condition was recorded as 2.2 %.	The power drop under high ambient condition in compare to the natural ambient condition was recorded as 6.35 %.
iv)	The coolant (Water) consumption was observed to be 2.86 % of total coolant capacity, which was on higher side.	The coolant (Water) consumption was observed as 0.495 % of total coolant capacity.
v)	Maximum temperature of transmission oil was observed as 80°C against the declaration of 130 °C	Maximum temperature of transmission oil was observed as 78° C against the declaration of 130 °C
vi)	During drawbar performance the tyre creeping over rim of LHS & RHS tyre were observed Nill & 10 mm respectively.	During drawbar performance the tyre creeping over rim of LHS & RHS tyre were observed 20 & 35 mm respectively, which is on higher side.
vii)	Maximum lifting capacity at standard frame measured as 9.30 kN against the value of 9.22 kN specified by manufacturer.	Maximum lifting capacity at standard frame was recoded as 13.42 kN against the value of 9.22 kN specified by manufacturer.
viii)	Total drop in height of lift during maintenance of lift load test was recorded as 70 mm which is is within the specified limit of 150 mm.	Total drop in height of lift during maintenance of lift load test was recorded as 74 mm which is within the specified limit of 150 mm.
ix)	The noise at operator's ear level was 94 dB (A)	The noise at operator's ear level is 93 dB (A).
x)	The amplitude of mechanical vibration on various assemblies marked as (*) was on higher side especially at the steering control wheel and operator's seat. This calls for dampening down of vibration to improve the operational comfort and service life of the components.	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. This calls for dampening down of vibrations to improve the operational comfort and service life of components.
12.4 Adequacy of literature:		
i)	No literature was supplied with the test tractor for reference during the test. The spare parts catalogue was not provided.	Operator's manual repair manual and spare parts catalogue is supplied with the test tractor for reference during the test.



13. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

13.1 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
<b>13.1.1 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 >35hp. -7.5/+10% for PTO power ≤ 35 hp	27.5 (D)	27.5	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	27.5 (D)	27.5	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	265 (D)	250	No
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	125(D)	165.7	No
e)	Back-up torque, percent	Non Evaluative	7 percent, min.	NA	26.01	Yes
<b>f) Maximum operating temperature, (°C)</b>						
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)	108	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.	110 (D)	102	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.50 (R)	0.411	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)	0.2	Yes





1	2	3	4	5	6	7
<b>13.1.2 Drawbar performance :</b>						
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	16.83 (D) 16.76 (R) Minimum	21.49	Yes
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	13.00 (D) 12.88 (R) Minimum	16.24	Yes
c)	Maximum drawbar power without ballast, (kW).	Evaluative	Min. 80% of PTO power as referred in 12.1.1 (a) of PTO performance	22.0 (D) 22.0 (R) Minimum	24.0	Yes
d)	Max. transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	130 (D)	78	Yes
<b>13.1.3 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%]	10.82 (D)	14.59	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	9.22 (D) 6.51 (R) Minimum	13.42	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]	150 (D)	74	Yes
<b>13.1.4 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)	8.33	Yes
2)	Hot brake	Evaluative	10	10 (R)	8.35	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)	206 to 272	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
<b>13.1.5 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	98 (R)	93	Yes
<b>13.1.6 Amplitude of mechanical vibrations at :</b>						
			100 microns (max)			
1)	Left foot rest	Non Evaluative	100 microns (max)	100 (R)	160	No
2)	Right foot rest			100 (R)	70	Yes
3)	Seat (with driver seated)			100 (R)	90	Yes
4)	Steering wheel			100 (R)	130	No
<b>13.1.7 Haulage requirements :</b>						
a)	Gross mass of the trailers, (tonnes):					
1)	Two wheel	Non Evaluative	--	4.0 (D)	4.0	Yes
2)	Four wheel	Evaluative	--	5.5 (D)	5.5	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
1)	Two wheel	Non Evaluative	--	5.00 to 6.00 (D)	5.01 to 5.05	Yes
2)	Four wheel			5.00 to 6.00 (D)	4.87 to 4.92	Yes
c)	Fuel consumption (ml/km/tonne):					
1)	Two wheel	Non Evaluative	--	30 to 40 (D)	49.49 to 49.87	No
2)	Four wheel			30 to 40 (D)	36.95 to 37.37	No
<b>13.1.9 Safety features :</b>						
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
<b>13.1.10 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	--	International Tractors Ltd.	Yes
2)	Model	Evaluative		--	Sonalika International DI-42 RX	Yes
3)	Year of manufacture	Evaluative		--	2013	Yes
4)	Engine serial number	Evaluative		--	3100ELI33A329011 F3	Yes
5)	Chassis number	Evaluative		--	BZYSV329298S3	Yes
6)	Declaration of PTO power, (kW)	Evaluative		--	27.5	Yes





13.1.11 Discard limit for:						
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	100.3	100.05 to 100.07	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.45	0.146 to 0.158	Yes
(c) Ring end gap (mm):						
	- Top comp. ring.	Evaluative	-do-	2.00	0.40 to 0.55	Yes
	- 2 <sup>nd</sup> comp. ring.		-do-	2.00	0.95 to 1.0	Yes
	- Oil ring.		-do-	2.00	0.70 to 0.75	Yes
(d) Ring groove clearance (mm):						
	- Top comp. ring.	Evaluative	-do-	0.150	Taper rings	-
	- 2 <sup>nd</sup> comp. ring.		-do-	0.140	0.045 to 0.047	Yes
	- Oil ring.		-do-	0.130	0.047 to 0.048	Yes
(e) Clearance of main bearings (mm):						
	- Diametrical clearance	Evaluative	-do-	0.20	0.063 to 0.104	Yes
	- Crankshaft end float	Evaluative	-do-	0.60	0.20	Yes
(f) Clearance of big end bearings, (mm):						
	- Diametrical	Evaluative	-do-	0.35	0.098 to 0.108	Yes
	- Axial	Evaluative	-do-	1.00	0.30	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	1.00	0.115 to 0.125	Yes
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	1.00	0.134 to 0.145	Yes

13.1.12 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



13.2 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	2	3	4	5
1	Air cleaner oil pull over, max. Oil pull over (%)	0.25% (max.)	N.A	-
2.	Seating requirements	Should meet the requirements of IS: 12343-1998	Does not meet the requirement	NO
3.	Fitment of ROPS	With a provision for fitment of ROPS. If ROPS fitted it should meet the requirement of IS: 11821-1992	ROPS not fitted	-
4.	Technical requirements for PTO shaft	Should meet the requirements of IS: 4931 -1995	Meets the requirement	Yes
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	Not applicable
7.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Provided	Yes

- 13.3 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 conform**
  - 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)] : **Does not Conform**
  - 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] : **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 in March, 2009)] : **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 Conform**
- x) Agricultural Tractor & Machinery Lighting device for travel on public roads [(IS: 14683-1999 (Reaffirmed in March, 2009))] : **Conforms**

**13.4 Salient Observations:**

**13.4.1 Laboratory tests:**

**13.4.1.1 PTO Performance:**

- i) The specific fuel consumption corresponding to maximum power was measured as **250 g/kWh** against the declaration of **265 g/kWh**, which does not meets the tolerance limit of IS: 12207-2008. This should look into for necessary corrective action.
- ii) The maximum equivalent crankshaft torque was recorded as 165.7 Nm against the declaration of 125 Nm, which does not meet the requirement of IS: 12207-2008 in respect of tolerance. This should look into for necessary corrective action.

**13.4.1.2 Drawbar performance**

During drawbar performance test, rear tyre creeping was observed as 20 & 35 mm for LHS and RHS tyres respectively which is on higher side and calls for necessary corrective action.

**13.4.1.3 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 & foot rests (RHS and LHS). This calls for dampening down of vibrations to improve the operational comfort and service life of components.

**13.4.1.4 Three point linkage:**

- i) 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.

**13.4.1.5 Linkage drawbar:**

- i) 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.

**13.4.2 Haulage performance:**

The specific fuel consumption (ml/km/tonne) with two wheel and four wheel trailer was observed as 49.49 to 49.87 and 36.95 to 37.37 ml/km/tonne against the declaration of 30 to 40 ml/km/tonne, which does not meets the requirements of IS: 12207-2008. This should look into for necessary corrective action.



- 13.5 Maintenance / Service Problems:**  
No noticeable maintenance or service problem was observed during the test.
- 13.6 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.
  - v) Provision of PTO shaft master shield.
  - vi) Differential lock may be provided.
- 13.7 Adequacy of Literature supplied with machine:**  
The following literature has been supplied with the tractor
  - i) Operator's manual.
  - ii) Service manual.
  - iii) Spare part's catalogue (For Sonalika International DI-35 RX, DI-39 RX, DI-42 RX, DI-745III RX, DI-47 RX, DI-45 RX Turbo, DI-52 RX, DI-55 RX Turbo, DI-60 RXMM, DI-60 RXMM Super, DI-60 RX Turbo, DI-750III RX 4-CYL, DI-60 RX 4-CYL tractors).
- 13.7.1** The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.

**14. Citizen charter**

Duration of Test	Test duration under citizen charter	Whether the report released within time frame given citizen charter	Remark, if any
10 Months	8 Months (April, 2013 to November, 2013)	Yes	None

**TESTING AUTHORITY:**

  
**H.LYADAV**  
SENIOR AGRICULTURAL ENGINEER

  
**C.R.LOHI**  
DIRECTOR

Test Report compiled by: **Shri. Pratyush Satya**, Senior Technical Assistant.