

Lib

LIBRARY REFERENCE COPY



**INTERNATIONAL TRACTORS,
SONALIKA INTERNATIONAL DI-35 RX CM PLUS 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

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO : 9001 - 2008 Certified Institute)

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

E-mail fmti-mp@nic.in

Website : <http://cfmtti.dacnet.nic.in>

Telephone : 07564 - 234729

Fax : 07564 - 234743

Manufacturer	: M/s. International Tractors Limited, Vill. Chak Gujran, P.O. Piplanwala, Jalandhar Road, Hoshiarpur – 146 022 (Pb). India
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 - 35 RX CM Plus
Variant, if any	: Sonalika International DI - 35 DS CM Plus
Type	: Four wheeled, rear wheel driven, general purpose agricultural Tractor.
Year of manufacture	: 2014
Chassis number	: KYASE452717S3
Country of Origin	: India
1.2 Engine:	
Make	: International Tractors Limited
Model	: 3100 FL
Type	: Four stroke, naturally aspirated, water cooled, direct injection, diesel engine.
Serial number	: 3100 FL 431449331F3
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	: 2000
Year of Manufacture	2014
Country of Origin	India
1.3 Cylinder & Cylinder Head:	
Number	: Three
Disposition	: Vertical, in-line
Bore/stroke, (mm)	: 100 / 118
Capacity as specified by the applicant, (cc)	: 2780
Compression ratio, (apa)	: 18.2 :1(± 0.2)
Type of cylinder head	: Individual, inline
Type of cylinder liners	: Wet replaceable
Type of combustion chamber	: Re-entrant cavity on piston crown

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

15. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

S. No.	Adjustment/ Defects/ breakdowns and Repairs	Tractor run hours
-	-None-	-

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: 12207-2014	Values declared by the applicant (D)/ Requirement (R)	As observed	Whether meets the requirements (Yes/No.)
1	2	3	4	5	6	7
16.1.1	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 >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	24.6 (D)	25.3	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	24.6 (D)	24.9	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	265 (D)	256	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	157 (D)	146.4	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10 percent, min (D)	27.53	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)	115	Yes



T- 991/1515/2015

**INTERNATIONAL TRACTORS, SONALIKA INTERNATIONAL
DI – 35 RX CM PLUS TRACTOR - Commercial (Initial)**

1	2	3	4	5	6	7
	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)	109	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	1% of SFC	0.639	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	0.07	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	17.47 (D) 16.92(R)	20.93	Yes
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	13.25 (D) 12.62(R)	14.87	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.	19.68 (D) 20.2(R)	23.0	Yes
d)	Max. transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	130 (D)	80	Yes
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%]	10.78 (D)	12.92	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	5.93 (D) 5.96 (R)	12.44	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)	22	Yes



1	2	3	4	5	6	7	
15.1.4	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	10 (R)	9.65	Yes	
	2) Hot brake	Evaluative	10	10 (R)	9.65	Yes	
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 ms^{-2} (N)		Evaluative	600	600 (R)	470 to 489	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
15.1.5	Noise measurement :						
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)	87	Yes
15.1.6	Amplitude of mechanical vibrations at :						
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R)	150	No	
	2) Right foot rest			100 (R)	150	No	
	3) Seat (with driver seated)			100 (R)	100	Yes	
	4) Steering wheel			100 (R)	180	No	
15.1.7	Haulage requirements :						
a)	Gross mass of the trailers, (tones):						
	1) Two wheel	Non Evaluative	--	5.5 (D)	5.5	Yes	
	2) Four wheel	Evaluative	--	6.5 (D)	6.0	Yes	
b)	Distance travelled / litre of fuel consumption, (km/l):						
	1) Two wheel	Non Evaluative	--	4.5 to 6.0 (D)	5.99 to 6.78	No	
	2) Four wheel	Evaluative	--	4.5 to 6.0 (D)	6.36	No	
c)	Fuel consumption (ml/km/tonne):						
	1) Two wheel	Non Evaluative	--	28 to 38 (D)	26.81 to 30.33	Yes	
	2) Four wheel	Evaluative	--	28 to 38 (D)	26.19	Yes	
15.1.8	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)	No ingress of mud and /or water was observed	Yes
	1) Clutch assembly	-do-					
	2) Brake housings	-do-					
	3) Front axle hubs	-do-					



1	2	3	4	5	6
16.1.9 Safety features :					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulleys, silencer, hydraulic pipes (As per IS 12239 (Part2))	--	Meet the requirement
b)	Lighting arrangement	Evaluative	As per CMVR	--	Provided
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
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
e)	Dimensions of three point linkage	Non Evaluative	Should meet the requirements of IS: 4468 (Part-I) (As amended from time to time)	--	Meet the requirement
f)	Specifications of linkage	Non Evaluative	Should meet the requirements of IS 12953 and IS 12362 (Part 3) (As amended from time to time)	--	Meet the requirement

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	--	International Tractors
2)	Model	Evaluative		--	Sonalika International DI - 35 RX CM PLUS
3)	Year of manufacture	Evaluative		--	2014
4)	Engine serial number	Evaluative		--	3100FL 43I 449331 F3
5)	Chassis number	Evaluative		--	KYASE452717S3
6)	Declaration of PTO power, kW (hp)	Evaluative		--	24.6 (33)

16.1.11 Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	102.346	100.04
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.45	0.110 to 0.125

(c)	Ring end gap (mm):				
	- Top comp. ring.	Evaluative	-do-	2.00	0.55
	- 2 nd comp. ring.		-do-	2.00	0.95
- Oil ring.	-do-		2.00	0.75	
(d)	Ring groove clearance (mm):				
	- Top comp. ring.	Evaluative	-do-	NA	Taper rings
	- 2 nd comp. ring.		-do-	0.20	0.047 to 0.048
- Oil ring.	-do-		0.20	0.037 to 0.038	



1	2	3	4	5	6	7
(e)	Clearance of main bearings (mm):					
-	Diametrical clearance	Evaluative	-do-	0.35	0.046 to 0.098	Yes
-	Crankshaft end float	Evaluative	-do-	0.70	0.15	Yes

(f)	Clearance of big end bearings, (mm):					
-	Diametrical	Evaluative	-do-	0.35	0.088 to 0.101	Yes
-	Axial	Evaluative	-do-	1.00	0.35	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	1.00	0.150 to 0.159	Yes
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	1.00	0.150 to 0.170	Yes

16.1.12 Literature (Submission to test agency)

(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

16.1.13 CATEGORY OF BREAKDOWNS / DEFECTS :

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



1	2	3	4	5
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	Whether meet the requirement (Yes/No.)
1	Air cleaner oil pull over, max. Oil pull over (%)	0.25% (max.)	NA (Dry type)	--
2.	Fitment of ROPS	With a provision for fitment of ROPS.	Not provided	--
		If ROPS fitted it should meet the requirement of IS: 11821-1992	ROPS not fitted	--
3.	Specification of swinging drawbar	Should meet the requirements of IS: 12362 Part 3-1994.	Not provided	Not applicable
4.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Provided	Yes

16.3 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)] : **Does not conform**
- 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)] : **Conforms**
- 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)] : **Does not Conform**
- 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**
- 16.4 Salient Observations:**
- 16.4.1 Laboratory tests:**
- 16.4.1.1 PTO Performance:**
- The backup torque was observed as 27.53%.
 - The maximum power under normal ambient condition and under high ambient condition was measured as 25.3 kW and 24.34 kW respectively against the declaration of 24.6 kW. Power drop from normal ambient condition to high ambient condition is 3.8% so this should be looked into for necessary corrective action.
- 16.4.1.2 Drawbar performance:**
- During ten hours drawbar test, creeping of LHS & RHS rear tyre over the rims was observed as 25 mm & 53 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 are on higher side. This calls for dampening down of vibrations to improve the operational comfort and service life of components.
- 16.4.1.4 Three point linkage:**
- Some of the parameters are meeting to cat. I and some of cat. II. This should be looked into for necessary corrective action.
- 16.4.2 Field performance test:**
- 16.4.2.1 Wetland cultivation (pudding operation) :**
- No ingress of mud/or water was noticed during puddling operation of the tractor. Hence, It meets the requirements of IS: 11082-1984 (Technical requirements of agricultural tractors for wetland operation). The tractor is suitable for wetland operation (Puddling).
- 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:
- Provision for safety against accidental start of the engine.
 - Provision of spark arresting device in exhaust system.
 - Provision of differential lock.
 - Master shield for PTO shaft has not been provided..
 - Fuel shut-off knob doesn't maintaining "STOP" position.
- 16.7 Adequacy of Literature supplied with machine:**
- 16.7.1** The following literature was supplied with the tractor for reference during the test.
- Operator manual
 - Parts Catalogue
 - Workshop/ Service manual
- 16.7.2** The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.



T- 991/1515/2015

INTERNATIONAL TRACTORS, SONALIKA INTERNATIONAL
DI – 35 RX CM PLUS TRACTOR - Commercial (Initial)

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	11 months (November 2014 to October 2015)	No	Due to waiting for field test

TESTING AUTHORITY:**H.L. YADAV**
SENIOR AGRICULTURAL ENGINEER**C.R. LOHI**
DIRECTORTest Report compiled by: **Er. Rajneesh Patel**, Senior Technical Assistant.

18. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
18.1	1.14.1 (Dimension BØ), 16.1.16 (1), (2) & (3)	We will look into this and make sure in production.
18.2	1.20.1, 1.20.4, 16.3 (v) & (viii)	These are minor non conformance and will not affect the tractor performance; however we will look into for corrective actions.
18.3	1.20.2, 1.20.3 & 1.20.5, 16.1.9 (c) & (d), 16.3 (iii), (vi) & (ix)	We will look into for implementation of these safety features.
18.4	16.7.1	We are submitting the required literature.

**ANNEXURE-I****TRACTOR RUN HOURS DURING TEST**

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	---
2.	PTO performance test	11.17
3.	Power lift and hydraulic pump performance test	3.16
4.	Drawbar performance test	14.7
5.	Turning ability	0.4
6.	Location of centre of gravity	
7.	Operator's field of vision	0.2
8.	Brake test	2.0
9.	Noise measurement	1.58
10.	Air Cleaner oil pullover test	--
11.	Mechanical vibration test	1.0
12.	Nominal speed test	0.38
B.	FIELD TEST:	
1.	Disc plough	10.34
2.	Rotavation	10.35
3.	Puddling (including five hours water proof test)	15.58
C.	HAULAGE TEST:	5.79
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	5.98
TOTAL:		82.63

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

S. No	Item	Disc Plough	Rotavator
1.	Make	John Deere	Sonalika
2.	Type	Mounted	Mounted
3.	No. of Disc/blades	2	36, in 6 flanges
4.	Type of Disc/blades	Plain Concave	Hatchet
5.	Size of bottoms/blades, (mm)	640	245 x 50 x 04
6.	Spacing of bottoms/flanges, (mm)	260	255
7.	Lower hitch point span, (mm)	850	720
8.	Mast height, (mm)	500	500
9.	Overall dimensions, (mm):		
	- Length	1570	1770
	- Width	1050	930
	- Height	1040	1020
10.	Gross mass, (kg)	355	380

**BRIEF SPECIFICATION OF FULL CAGE WHEEL**

S. No.	Items	Specification
1	Type	Full cage wheel
2	Outer dia. (mm)	1250
3	Width (mm)	1010
4	No. & Type of Lugs	32, straight lugs made of MS angle section welded to angle iron frame
5	Size of angle section, (mm)	40 x 40 x 6
6	Length of lug, (mm)	500
7	Spacing of lug, (mm)	180
8	Weight of each cage wheel (kg)	120