



**INTERNATIONAL TRACTORS,
SONALIKA INTERNATIONAL DI-22 4WD GARDENTRAC 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



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INTERNATIONAL TRACTORS, SONALIKA INTERNATIONAL DI – 22 4WD
TRACTOR - Commercial (Initial)

Manufacturer : M/s. International Tractors Limited,
Vill. Chak Gujran, P.O. Piplanwala,
Jalandhar Road,
Hoshiarpur(Pb). India – 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
Model : Sonalika International DI – 22 4WD
Variant, if any : None

Optional feature provided during ICT

Optional feature	Additional test carried out
i) Different tyre size (Front and Rear) One step up from	Physical Inspection and Nominal Speed test
Front : 5.00-12, 6 PR to 6.00-12, 6 PR (Traction Tyre)	
Rear : 8.00-18, 6 PR to 8.30-20, 6 PR (Traction Tyre)	

Type : Four wheeled, rear wheel driven, general purpose standard agricultural Tractor.
Year of manufacture : 2015
Chassis number : BYJSU471069G22
Country of Origin : India

1.2 **Engine:**
Make : International Tractors Limited (apa)
Model : 3073 GT
Type : Four stroke, naturally aspirated, water cooled, indirect injection, diesel engine.
Serial number : 3073GT43E000023FIS

Engine speed (Manufacturer's recommended production setting)(rpm):
- Maximum speed at no load : 3200 to 3300
- Low idle speed : 950 to 1050
- Speed at maximum torque : 2100 to 2500

Rated speed, (rpm):
- For PTO use : 3050
- For drawbar use : 3050

Year of Manufacture : 2015
Country of Origin : India



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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: 12207-2014 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
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 >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	12.82 (D)	12.2	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	12.82 (D)	11.4	No
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	372 (D)	374	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	54 (D)	45.4	No
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10 percent, min (D)		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)	110	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.	118 (D)	105	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	1% of SFC 3.74 (R)	1.58	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	0.40	Yes



1	2	3	4	5	6	7
17.1.2 Drawbar performance :						
a)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	5.35 (D) 5.48 (R)	7.53	Yes
b)	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.	10.26 (D) 9.15 (R)	10.9	Yes
c)	Max. transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	130 (D)	77	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%]	4.0 (D)	6.37	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	3.0 (D) 2.87 (R)	4.88	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)	05	Yes
17.1.4 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)	3.17	Yes
	2) Hot brake	Evaluative	10	10 (R)	3.62	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (R)	310 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 (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	96 (R)	2	Yes



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1	2	3	4	5	6	7
17.1.6	Amplitude of mechanical vibrations at :					
1)	Left foot rest	Non Evaluative	100 microns (max)	100 (R)	270	No
2)	Right foot rest			100 (R)	150	No
3)	Seat (with driver seated)			100 (R)	170	No
4)	Steering wheel			100 (R)	130	No
17.1.7	Haulage requirements :					
a)	Gross mass of the trailers, (tones):					
1)	Two wheel	Non Evaluative	--	3.0 (D)	3.0	Yes
2)	Four wheel		--	NA	NA	NA
b)	Distance travelled / litre of fuel consumption, (km/l):					
1)	Two wheel	Non Evaluative	--	5.0 to 6.0 (D)	4.75 to 5.66	Yes
2)	Four wheel		--	NA	NA	NA
c)	Fuel consumption (ml/km/tonne):					
1)	Two wheel	Non Evaluative	--	55 to 58 (D)	58.33 to 70.12	No
2)	Four wheel		--	NA	NA	NA
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 ingresses 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-				
17.1.9	Safety features :					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulleys, silencer, hydraulic pipes (As per IS 12239 (Part2)	--	Meet the requirement	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)	--	Meet the requirements	Yes
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	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	No



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	--	Sonalika International	Yes	
	2) Model	Evaluative		--	DI-22 4WD	Yes	
	3) Year of manufacture	Evaluative		--	2015	Yes	
	4) Engine serial number	Evaluative		--	3073GT43E000023F15	Yes	
	5) Chassis number	Evaluative		--	BYJSU471069G22	Yes	
	6) Declaration of PTO power, kW	Evaluative		--	12.82	Yes	

17.1.11 Discard limit for:						
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	73.96	73.69	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.30	0.796 to 0.805	No
(c)	Ring end gap (mm):					
	- Top comp. ring.	Evaluative	-do-	1.50 mm	0.25 to 0.35	Yes
	- 2 nd comp. ring.		0.35		Yes	
	- 3 rd comp. ring.		0.35 to 0.45		Yes	
	- Oil ring.		0.30 to 0.35		Yes	
(d)	Ring groove clearance (mm):					
	- Top comp. ring.	Evaluative	-do-	NA	Taper rings	--
	- 2 nd comp. ring.		0.20	0.070 to 0.081	Yes	
	- 3 rd comp. ring.		0.20	0.054 to 0.062	Yes	
	- Oil ring.		0.20	0.055 to 0.067	Yes	
(e)	Clearance of main bearings (mm):					
	- Diametrical clearance	Evaluative	-do-	0.15	0.063 to 0.114	Yes
	- Crankshaft end float	Evaluative	-do-	0.50	0.25	Yes
(f)	Clearance of big end bearings, (mm):					
	- Diametrical	Evaluative	-do-	0.15	0.037 to 0.075	Yes
	- Axial	Evaluative	-do-	0.5	0.3	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	NA	NA	NA
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.15	0.032 to 0.057	Yes



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1	2	3	4	5	6	7
17.1.12 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

17.1.13 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

17.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2014:				
S. No.	Characteristic	Requirements as per IS: 12207-2014	As observed	Whether meets the requirements (Yes/No.)
1	Air cleaner oil pull over, max. Oil pull over (%)	0.25% (max.)	0.22	Yes
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



17.3	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)]	Does not conform
iv)	Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in March, 2007)]	Does not conform
v)	Agricultural tractors - Operator's seat technical requirement (First revision) [IS 12343:1998 (Reaffirmed in March, 2009)]	Conforms
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)]	Does not Conform
ix)	Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) (IS: 8133 – 1983 (Reaffirmed in March, 2009)]	Conforms
x)	Agricultural Tractor & 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 maximum equivalent crankshaft torque was measured as 45.4 Nm against the declaration 54 Nm which does not meet the requirement of IS: 12207-2014 with regard to tolerance. This should be looked into for necessary corrective action.

17.4.1.2 Drawbar performance:

- i) During ten hours drawbar test, creeping of LHS & RHS rear tyre over the rims was observed as 10 mm and 15 mm respectively. This should be looked into for necessary corrective action.

**17.4.1.3 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.

17.4.1.4 Specifications of Power Take-off Shaft:

The parameter of 'W' of PTO specification does not meet the requirements so necessary improvement may be incorporated.

17.4.1.5 Specifications of Three point linkage:

The lateral distance from lower hitch point to center line of tractor & distance from end of power take-off to centre of lower hitch point (lower links in horizontal position), of three point linkages does not meet the requirements so necessary improvement may be incorporated.

17.4.1.6 Specifications of linkage drawbar:

The parameter 'A' & 'Dø' does not meet the requirements so necessary improvement may be incorporated.

17.4.1.7 Clearance between piston and cylinder liner at skirt observed as 0.796 to 0.805 against the discard limit of 0.30 mm, which is on higher side and does not meet the requirement of relevant IS.

The efficiency of the engine depends upon the effective sealing between the piston and liners. Leakage will reduce compression pressure and power will be lost. Hence improvement in engine parts is essential.

17.4.2 Field performance test:**17.4.2.1 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 (Pudding).

17.5 Make and model

The manufacturer provided the model name as "Sonalika International DI-22 4WD" for indirect injection engine. It means DI does not stand for 'Direct Injection' and according to applicant it stands for Diesel Insaver. This should require clarifying in printed literature and specification for proper conjunction of users.

17.6 Maintenance / Service Problems:

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

17.7 Recommendation with regard to safety on tractor:

The following requirements, inter-alia, may be considered for incorporation on the tractor:

- i) Provision for track adjustment for working under sloppy condition.
- ii) Working clearance around 2WD and 4WD engaging lever has not been provided as per the requirement.
- iv) Provision for mounting a canopy above the driver's seat.
- v) Minimum cautionary notice as per clause 11.2 of above referred standard
- vi) Spark arrester has not been provided in the exhaust system.
- vii) Provision of PTO master shield.
- viii) Safety switch in starting switch

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- 17.8 Adequacy of Literature supplied with machine:
- 17.8.1 The following literature was supplied with the tractor after completion of all test
- a) Service Manual for Sonalika international DI-22 Garden tractor.
 - b) Parts Catalogue for Sonalika international DI-22 Garden tractor.
 - c) Operator's manual for Sonalika international DI-22 Garden tractor.
- 17.8.2 The technical details of Pto power in kW and hp unit, drawbar power, hydraulic power, haulage recommendation, ballasting details for different operation, tyre size and tyre inflation pressure, weight of tractor etc. should be provided in the operator's manual. The literature should be brought out in national as well as other regional languages of India for guidance of users.

18. 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	09 months (March, 2015 to December, 2015)	Yes	--

TESTING AUTHORITY:

P.C. MESHARAM
SENIOR AGRICULTURAL ENGINEER

C.R. LOHI
DIRECTOR

Test Report compiled by: **Sh. Shwetabh Singh**, Senior Technical Assistant

19. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
		Draft test report was made available to applicant, applicants comments incorporated in the test report. No other specific comments given by applicant.



ANNEXURE- I

TRACTOR RUN HOURS DURING TEST

A. LABORATORY AND TRACK TESTS:		HOURS
1.	Running-in	---
2.	PTO TPL and safety comfort	0.3
3.	PTO performance test	11.33
4.	Power lift and hydraulic pump performance test	4.42
5.	Drawbar performance test	12.42
6.	Turning ability	0.20
7.	Location of centre of gravity	
8.	Operator's field of vision	
9.	Brake test	0.75
10.	Noise measurement	1.5
11.	Air Cleaner oil pullover test	3.5
12.	Mechanical vibration test	1.0
13.	Nominal speed test	0.85
B. FIELD TEST:		
1.	Disc plough	10.25
2.	Rotavation	10.76
3.	Puddling (including five hours water proof test)	15.0
C. HAULAGE TEST:		7.39
D. Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test		3.59
TOTAL:		83.26

ANNEXURE- II

BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST

S. No	Item	Disc Plough	Rotavator
1.	Make	Sonalika	Sonalika
2.	Type	Reversible, mounted	Mounted
3.	No. of Disc/blades	2-bottom	20
4.	Type of Disc/blades	-	L-shape
5.	Size of bottoms/blades, (mm)	265	130X150X5
6.	Spacing of bottoms/flanges, (mm)	* 235	170
7.	Lower hitch point span, (mm)	375	355
8.	Mast height, (mm)	795	890, 875
9.	Overall dimensions, (mm):		
	- Length	1320	1150
	- Width	550	575
	- Height	810	915
10.	Gross mass, (kg)	145	195

**ANNEXURE-III****BRIEF SPECIFICATION OF HALF CAGE WHEEL**

S. No.	Items	Specification
1	Type	Half cage wheel
2	Outer dia. (mm)	728
3	Width (mm)	310
4	No. & Type of Lugs	08, straight lugs made of MS angle section welded to angle iron
5	Size of angle section, (mm)	35X35X5
6	Length of lug, (mm)	190
7	Spacing of lug, (mm)	274
8	Weight of each cage wheel (kg)	25