



SONALIKA INTERNATIONAL DI-26 GARDNTRAC 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

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T-996/1520/2015

**SONALIKA INTERNATIONAL, DI-26 GARDENTRAC TRACTOR
Commercial (Initial)**

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

SPECIFICATIONS

1.1 Tractor:		
Make	:	Sonalika International
Model	:	DI-26 Gardentrac
Variant, if any	:	None
Type	:	Four wheeled, Four wheel driven, General Purpose Agricultural Tractor.
Year of manufacture	:	2015
Chassis number	:	BMKSU467695026D
Country of Origin	:	India
1.2 Engine:		
Make	:	Mitsubishi Diesel Engine
Model	:	MVS3L2
Type	:	Four strokes, Naturally aspirated, water cooled, Indirect Injection, diesel engine.
Serial number	:	MVS3L2 -A5237
Engine speed (Manufacturer's recommended production setting)(rpm):		
- Maximum speed at no load	:	2945-2995
- Low idle speed	:	970 to 1030
- Speed at maximum torque	:	1400 to 2200
Rated speed, (rpm):		
- For PTO use	:	2700
- For drawbar use	:	2700
1.3 Cylinder & Cylinder Head:		
Number	:	Three
Disposition	:	Vertical, in-line
Bore/stroke, (mm)	:	78/92 (apa)
Capacity as specified by the applicant, (cc)	:	1318 (apa)
Compression ratio, (apa)	:	22 (\pm 0.5) :1
Type of cylinder head	:	Mono block
Type of cylinder liners	:	Wet replaceable
Type of combustion chamber	:	Swirl chamber, indirect injection
Arrangement of valves	:	Overhead, Inline
Valve clearance :		
		Cold Hot
- Inlet valve, (mm)	:	0.25 0.25
- Exhaust valve, (mm)	:	0.25 0.25



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: 12207-2008	Values declared by the applicant/ requirement	As observed	Whether meets the require- ments (Yes/No.)
1	2	3	4	5	6	7
16.1.1	PTO Performance :					
a)	- Max. 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	13.4	12.5	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	13.4	12.5	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	327.35	346	No
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	56	53.2	No
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10 percent, min (R) 7 percent, min (D)	20.9	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.	110	116	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	109	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	3.3 (D) 3.46 (R)	0.72	Yes
h)	Smoke level	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	3.25 per meter (R)	0.29	Yes



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1	2	3	4	5	6	7	
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	No drawbar ballast was recommended	NA	--	
b)	Max. drawbar pull with Standard ballasted corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast/ with standard ballast	6.50 (D)	8.84	Yes	
				5.80 (R)			
c)	Maximum drawbar power without ballast, (kW) (Standard ballast)	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.	10.7(D)	11.9	Yes	
				10.0 (R)			
d)	Maximum transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	110	83	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%]	5.0 (D)	8.22	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	4.0 (D)	7.06	Yes
2.94 (R)							
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 minute, (mm)	Non Evaluative	The observed value should not exceed 50 mm	50 (D)	04	Yes	
16.1.4 Brake performance at 17.20 kmph:							
a)	Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with Un ballasted tractor (as no road ballast recommended by the manufacturer), (m):						
	1)	Cold brake	Evaluative	10	10	3.95	Yes
	2)	Hot brake	Evaluative	10	10	4.05	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	600	400 to 420	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	Yes	Yes
16.1.5	Noise measurement :					
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	88	81	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96	89	Yes
16.1.6	Amplitude of mechanical vibrations at :					
1)	Right foot rest	Non Evaluative	100 microns (max.)	100 micron (max)	90	Yes
	left foot rest				150	No
2)	Seat (with driver seated)				390	No
3)	Steering control wheel				250	No
16.1.7	Haulage requirements :					
a)	Gross mass of the trailers, (tones):					
1)	Two wheel	Non Evaluative	--	3.0	3.0	Yes
2)	Four wheel		--	NA	NA	--
b)	Distance travelled / litre of fuel consumption, (km/l):					
1)	Two wheel	Non Evaluative	--	5.0-6.0	4.22 to 5.07	No
2)	Four wheel		--	NA	NA	--
c)	Fuel consumption (ml/km/tonne):					
1)	Two wheel	Non Evaluative	--	55.0-58.0	65.68 to 78.98	No
2)	Four wheel		--	NA	NA	--



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16.1.8	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	No ingress of water was observed during water proof test	Yes
	1) Clutch assembly	-do-				
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
	4) Engine Oil	-do-				
5) Transmissi on Oil	-do-					
16.1.9	Safety features :					
a)	Guards against moving and hot parts	Evaluative	As per CMVR	...	Provided	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)	--	NA	---
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	Yes
	Swinging drawbar				Not Provided	Not applicable

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	--	SONALIKA INTERNATIONAL	Yes
2)	Model	Evaluative		--	DI-26 GARDENTRAC	Yes
3)	Year of manufacture	Evaluative		--	2015	Yes
4)	Chassis number	Evaluative		--	BMKSU467695026D	Yes
5)	Engine number	Evaluative		--	MVS3L2- A5237	Yes
6)	Declaration of PTO power, (kW)	Evaluative		--	13.4	Yes



1	2	3	4	5	6	7
16.1.11	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be declared by the manufacturer	78.20	78.01 to 78.04	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative	-do-	0.30	0.110 to 0.113	Yes
(c)	Ring end gap (mm):					
	- Top comp. ring.	Evaluative	-do-	1.5	0.40 to 0.55	Yes
	- 2 nd comp. ring.		-do-	1.5	0.40 to 0.50	Yes
	- Oil ring.		-do-	1.5	0.35 to 0.40	Yes
(d)	Ring groove clearance (mm):					
	- Top comp. ring.	Evaluative	-do-	0.30	Tapered face	--
	- 2 nd comp. ring.		-do-	0.30	0.098 to 0.102	Yes
	- Oil ring.		-do-	0.20	0.053 to 0.054	Yes
(e)	Clearance of main bearings (mm):					
	- Diametrical clearance	Evaluative	-do-	0.10	0.016 to 0.059	Yes
	- Crankshaft end float	Evaluative	-do-	0.50	0.10	Yes
	Clearance of big end bearings, (mm):					
	- Diametrical	Evaluative	To be declared by the manufacturer	0.15	0.037 to 0.064	Yes
	- Axial	Evaluative	-do-	0.50	0.15	Yes
(h)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	NA	NA	--
(i)	Clearance between center pin and bush, (mm)	Non Evaluative	-do-	Not declared	0.086 to 0.108	---
16.1.12	Literature					
(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



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16.1.12 CATEGORY OF BREAKDOWNS / DEFECTS :						
Sl. 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	

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	Remarks
1	2	3	4	5
1	Air cleaner oil pull over, max. oil pull over (%)	0.25% (max.)	Dry type	..
2.	Seating requirements	Should meet the requirements of IS: 12343-1998	Does not conform	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	--
4.	Technical requirements for PTO shaft & its Master shield	Should meet the requirements of IS: 4931 -1995	Does not conform	No
5.	Dimensions of three point linkage	Should meet the requirements of IS: 4468 (Part-I)-1997	Does not conform	No
6.	Specifications of linkage drawbar.	Should meet the requirements of IS: 12953-1990	Does not conform	No
7.	Specifications of swinging drawbar	Should meet the requirements of IS:12362 Part 3-1994.	Not provided	--
8.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Provided	Yes

16.3 Conformity with following Indian Standard:

- 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)/ISO 730-1:1994] : **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 : **Does not conform**
technical requirement [IS 12343 –1998 (First revision) (Reaffirmed in March, 2009)].
- vi) Guide for safety & comfort of operator of : **Does not conform**
agricultural tractors: Part 1 General requirements (first revision): [IS 12239 (PT-1)-1996 (Reaffirmed in March, 2009)/ISO 4254-1:1989].
- vii) Tractors and machinery for agriculture and : **Does not conform**
forestry – Technical means for ensuring safety Part 2: Tractors (first revision) IS 12239 (PT-2)-1999 (Reaffirmed in March, 2009)].
- viii) Tractors and machinery for agriculture and : **Conforms**
forestry, powered lawn and garden equipment – Symbols for operator controls and other displays [IS: 6283 (Part-1 & Part-2) –2006 & 2007(Reaffirmed in March, 2009)/ ISO 3767-2:1991]].
- ix) Guide lines for location and operation of : **Does not conform**
operator controls on agricultural tractors and machinery (first revision) (IS: 8133 – 1983) (Reaffirmed in March, 2009)].
- x) Agricultural Tractor & Machinery Lighting : **Conforms**
device for travel on public roads (IS: 14683-1999) (Reaffirmed in March, 2009)]

16.4 Salient Observations:

16.4.1 Laboratory tests:

16.4.1.1 PTO Performance:

- i) The specific fuel consumption corresponding to maximum power was measured as **346 g/kWh** against the declaration of 327.35 **g/kWh**, which does not meet the tolerance limit of IS: 12207-2014. This should be looked into.
- ii) The observed crankshaft was 53.2 against the declared value of 56.0 which doesn't meet the tolerance limit as per relevant IS.
- iii) The backup torque is 20.9%.

16.4.1.5 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 accelerator lever, clutch & brake pedals. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

16.4.2 Three point linkage:

- i) Dia of hitch pin hole of lower and upper hitch point , Lateral distance from lower hitch point to centre line of tractor , 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.

16.4.3 Operator's Seat: Meet the requirements of IS: 12343-1998, except following:-

- i) Inclination of driver's seat towards rear direction is less.
- ii) Provision for the mass adjustment is not provided.
- iii) Vertical distance of clutch pedal, brake pedal and longitudinal distance of steering control wheel from the SIP not meet the requirements of relevant standard. These all need to improve the quality and for necessary corrective action.

**16.4.2.2 Haulage test performance**

Distance travelled per liter of fuel consumption (km/l) and specific fuel consumption ((ml/km/tonne) during haulage test was does not meets against the declaration. This should be looked into.

16.5 Maintenance / Service Problems:

No noticeable service or maintenance problem observed during the tests.

16.6. Components / assembly inspection & wear assessment :-

- i) Backlash between crown wheel and Pinion was observed 0.42 mm against the declared discard limit of 0.18 mm. this should be looked into for the stringent quality improvement.
- ii) Pitting and chipping of brake lining material was observed on one side of the LHS brake disc.
- iii) The discard limit for the spring index is not mentioned in the technical specifications.
- iv) The discard limit for the clutch linings is not mentioned in the technical specifications.

16.7 Make and model

The manufacturer provided the model name as "Sonalika International DI-26 Gardentrac" for indirect injection engine. It means DI does not stands 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.

16.8 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 for under sloppy condition.
- ii) Working clearance around the operating levers has been not 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

16.9 Adequacy of Literature supplied with machine:

16.9.1 Following literature were supplied after issuing the draft test reports of this tractor, in reference to our comments

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

16.9.2 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.



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	10 Months (March 2015 to December 2015)	Yes	--

TESTING AUTHORITY:

P.C. MESHAM
SENIOR AGRICULTURAL ENGINEER

C. R. LOHI
DIRECTOR

Test report compiled by Sh. Nitesh Kumar Verma, Senior Technical Assistant

18. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
18.1	1.20.5	We will take care to it in production of this model
18.2	16.4.1.1	R & D people will discuss this problem with the vender to improve the limit.
18.3	16.4.2 (i)	The matter is under the discussion with design dept. people to improve & meet the requirement.
18.4	16.4.3 (i),(ii)(iii)(iv)	We will look into the matter and corrective action will be taken
18.5	16.7 (i),(ii)(iii)(iv)(v)(vi)(vii)(viii)	The R & D will take care of it.

ANNEXURE- IBRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST

S.No	Item	Reversible M.B. Plough	Rotavator
1.	Make	Sonalika	Kranti
2.	Type	Mounted reversible	Mounted
3.	No. of bottoms/blades	02	30
4.	Type of mould board /blades	General Purpose	L shape
5.	Size of bottoms/blades, (mm)	265	86 x 42 x 8
6.	Spacing of bottoms/flanges, (mm)	235	175
7.	Lower hitch point span, (mm)	375	455
8.	Mast height, (mm)	795	455
9.	Overall Dimensions (mm)		
	- Length	1320	1350
	- Width	550	670
	- Height	810	855
10.	Gross mass, (kg)	145	190