



**INTERNATIONAL TRACTORS LIMITED,
DI - 42 HDM 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)

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T- 1442/1969/2020

**INTERNATIONAL TRACTORS LIMITED, DI – 42 HDM TRACTOR
- Commercial (Technical Extension)****1. SCOPE OF TEST**

The "Sonalika DI- 42 HDM" tractor had undergone "Initial Commercial Test" at this Institute vide test report No. T- 1251/1778/2019 was released in June, 2019. The performance results in Chapter-17 of said test report were evaluated on the basis of IS: 12207-2014.

Subsequently, the fourth revision of IS: 12207-2019 was established on dated 25th July, 2019. Therefore, the performance results of the said tractor has to be evaluated as per IS: 12207-2019. It was observed that, some of the parameters are not meeting the evaluative requirements applicable for "Qualifying Minimum Performance Criteria" as per clause-4 Table-1 of the said Indian Standard for acceptance of tractor for the purpose of subsidies / NABARD financing. The parameters which were not meeting the evaluative requirements has been modified & permanently incorporated in the production of said tractor model by the manufacturer.

Beside this, the applicant has submitted vide letter no. R&D/F-18/90/DI-42 HDM dated: 02.11.2019 for **Technical Extension** of "Sonalika DI- 42 HDM" tractor tested vide report No. T- 1251/1778/2019 (June, 2019). The manufacturer has submitted the said tractor model for inspection / test and same has been tested / evaluated. The performance results are reproduced as per IS: 12207-2019 under **Chapter-5** of this report.

The applicant has informed that the last cut off chassis and engine number of tractor model "International Tractors Limited, DI- 42 HDM" generated on production line as under:-

S. No.	Parameters Modified	Chassis Number	Engine Number
1.	Technical specifications of PTO shaft	AYZSH920156S3	3102FLU04C915766F1 9
2.	Labelling plate		
3.	Re-declaration of Maximum lifting capacity throughout the range of lift, at hitch points, (kN)		

The above tabulated features were added on the earlier test sample tested vide test report No. T- 1251/1778 /2019 (June, 2019) in the firm premises itself. Subsequent to the examination of case in the light of Clause 3.2.5 (a) & 6.1 of Indian Standard 12207: 2019, the following tests were considered to be carried out:

- Specification checking
- Nominal speed test
- PTO performance test
- Power lift & hydraulic pump performance test

Manufacturer : M/s. International Tractors Limited,
Vill.- Chak Gujran, P.O.- Piplanwala,
Jalandhar Road, Hoshiarpur-146 022
(Punjab) India

Test requested by (Applicant) : The manufacturer

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-1251/1778/2019 was released in June, 2019 should be referred.

2.1.1 Tractor:

Make : International Tractors Limited
Model : DI- 42 HDM
Type : Four wheeled, Rear wheel driven, Unit construction, General purpose, Agricultural tractor
Month & Year of manufacture : 03 20
Chassis Serial number : AYZSH920156S3
Country of Origin : India



5. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

- 5.1 The performance results have been reproduced from Initial Commercial Test report No. T- 1251/1778/2019 (June, 2019). 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	29.5 (D)	29.3	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	29.5 (D)	29.0	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10%	245 (D)	243	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	$\pm 8\%$	197 (D)	185.2	Yes
e)	Back-up torque, percent	Evaluative	12 percent, min.	12% (D) 12% (R)	20.3	Yes
f)	Maximum operating temperature ($^{\circ}$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)	103	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)	105	Yes
g)	Engine oil consumption, (g/kWh) (*)	Evaluative	Not exceeding 1% of SFC at maximum power under High ambient conditions.	2.44 (R) Maximum	0.48	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 (As per CMVR)	3.25 (Maximum)	0.22	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)	19.07	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	13.53 (D) 13.84 (R)	14.21	Yes
c)	Maximum drawbar power without ballast 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.	23.6 (D) 23.4 (R)	24.1	Yes
d)	Maximum transmission oil temperature (°C)	Evaluative	To be declared by the manufacturer.	130	77	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%	16.0 (D)	16.97	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	12.0 (D) 6.90 (R)	13.11	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	45	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 standard ballast, (m):						
	1) Cold brake	Evaluative	10 m	10 (R)	7.13	Yes
	2) Hot brake	Evaluative	10 m	10 (R)	7.49	Yes
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	218 to 223	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	422	Yes

1	2	3	4	5	6	7	
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5.1.5 Noise measurement : (*)							
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	88 dB (A) for >1.5 tonne GVW and 85 db (A) for <1.5 tonne GVW (as per CMVR)		85	Yes	
b)	Maximum noise at operator's ear level dB(A)	Evaluative	96 (as per CMVR)		96	Yes	
5.1.6 Amplitude of mechanical vibrations at: (*)							
	1) Left foot rest	Non Evaluative	100 microns (max)		300	No	
	2) Right foot rest				220	No	
	3) Seat (with driver seated)				100	Yes	
	4) Steering wheel				210	No	
5.1.7 Air cleaner oil pull over test : (*)							
	Maximum air cleaner oil pull over test	Evaluative	0.25% (Max)		0.11	Yes	
5.1.8 Haulage requirements : (*)							
a)	Gross mass of the trailers, (tones):						
	1) Two wheel	Non Evaluative	To be specified by manufacturer	5.5 (D)	5.5	Yes	
	2) Four wheel	Non Evaluative	-do-	6.0 (D)	6.0	Yes	
b)	Distance travelled / liter of fuel consumption, (km/l):						
	1) Two wheel	Non Evaluative	To be specified by manufacturer	4.0 to 7.0 (D)	6.31 to 6.36	Yes	
	2) Four wheel	Non Evaluative	-do-	4.0 to 7.0 (D)	6.78 to 7.01	Yes	
c)	Fuel consumption (ml/km/tonne):						
	1) Two wheel	Non Evaluative	To be specified by manufacturer	20 to 60 (D)	28.6 to 28.8	Yes	
	2) Four wheel	Non Evaluative	-do-	20 to 60 (D)	23.8 to 24.6	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 test tested vide report no.T-1251/1778 /2019 released in June, 2019	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)		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: 12343 (As amended from time to time)		Does not Meet the requirement	No
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		12.01 kmph (Meets the requirement)	Yes
	2) Audible warning signal on tractor	Evaluative	As soon as the travelling 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 months & next two digits in box No.2 for YY will represent the year of manufacturing.	International Tractors Limited	Yes	
	2) Model	Evaluative			DI - 42 HDM	Yes
	3) Month & Year of manufacture	Evaluative			03/20	Yes
	4) Engine number	Evaluative			3102FLU04C91 5766F19	Yes
	5) Chassis number	Evaluative			AYZSH920156S3	Yes
	6) Declaration of PTO power, (kW)	Evaluative			29.5	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	102.4	102.017 to 102.023	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.50	0.077 to 0.085	Yes
(c)	Piston diameter at skirt, (mm)	Non Evaluative	-do-	101.70	101.937 to 101.940	Yes
(d)	Ring end gap (mm):					
	- Top comp. ring	Evaluative	--do--	2.0	0.48 to 0.63	Yes
	- 2 nd comp. ring			2.0	0.90 to 0.93	Yes
	- Oil ring.			2.0	0.63 to 0.80	Yes
(e)	Ring groove clearance (mm):					
	- Top comp. ring	Evaluative	-do-	--Tapered ring--		Not applicable
	- 2 nd comp. ring		-do-	0.20	0.056 to 0.067	Yes
	- Oil ring.		-do-	0.20	0.041 to 0.052	Yes
(f)	Clearance of main bearings (mm):					
	- Diametrical clearance	Evaluative	-do-	0.40	0.138 to 0.298	Yes
	- Crankshaft end float	Evaluative		0.70	0.17	Yes
(g)	Clearance of big or small end bearings, (mm):					
	- Diametrical	Evaluative	-do-	0.50	0.102 to 0.281	Yes
	- Axial	Evaluative	-do-	1.00	0.30 to 0.35	Yes
(h)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	1.00	0.11 to 0.46	Yes
(i)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	1.00	0.09 to 0.19	Yes
5.1.13	Literature (Submission to test agency) (*)					
(a)	Operator manual	Evaluative	The printed literature in booklet form should be provided as per IS 8132 & should submit along with the test sample	Provided	Provided	Yes
(b)	Parts Catalogue	Evaluative		Provided	Provided	Yes
(c)	Workshop / Service manual	Evaluative		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 OECD code or equivalent International standard	ROPS not fitted		Not applicable



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1	2	3	4	5	6	7
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

Remark (*):- Data has been taken from Initial Commercial test report of "Sonalika, DI-42 HDM" tractor model tested vide report No. T-1251/1778/2019 (June, 2019)

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

5.3 Salient Observations:

5.3.1 Laboratory tests:

5.3.1.1 PTO Performance test:

- i) The maximum PTO power was recorded as **29.3 kW** against the declaration of **29.5 kW**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
- ii) The rated PTO power was recorded as **29.0 kW** against the declaration of **29.5 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 **243 g/kWh** against the declaration of **245 g/kWh**, which is within the tolerance limit of IS: 12207-2019.
- iv) The maximum equivalent crankshaft torque was recorded as **185.2 Nm** against the declaration of **197.0 Nm**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
- v) The backup torque was observed as **20.3 %**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit.

**5.3.1.2 Hydraulic performance test:**


- i) The maximum lifting capacity throughout the range of lift at hitch points and standard frame was recorded as **16.97 kN & 13.11 kN** respectively against the declaration of **16.0 kN 12.0 kN** respectively & which meets the evaluative requirement of IS: 12207-2019 with regard to tolerance limit.
- ii) The moment about rear axle on standard frame throughout the range of lift was computed as **19.53 kN-m**, which is considered on higher side compared to the moment about front axle i.e. **14.98 kN-m**. It is therefore, recommended that the lifting capacity of the hydraulic system may be reduced suitably or standard ballast mass at front axle may be provided to avoid front lifting of the tractor.

5.3.2 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	03 Months (March, 2020 to May, 2020)	Yes	--None--

TESTING AUTHORITY:


RAJNEESH PATEL
AGRICULTURAL ENGINEER


C.V. CHIMOTE
TEST ENGINEER


J.J.R. NARWARE
DIRECTOR

The report compiled by Smt. **Poonam Khurasia**, Senior Technical Assistant.

7. APPLICANT COMMENT'S

Para No.	Our Reference	Applicant's comments
		--Nil--



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INTERNATIONAL TRACTORS LIMITED, DI - 42 HDM TRACTOR
- Commercial (Technical Extension)**ANNEXURE - I****TRACTOR RUN HOURS DURING TEST**

		HOURS
A.	LABORATORY AND TRACK TESTS:	
1.	Running-in	--
2.	Nominal speed test	0.43
3.	PTO performance test	3.61
4.	Power lift and hydraulic pump performance test	1.25
B.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	2.50
TOTAL:		7.79