व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT

संख्या / No. : IMP-702/1695/2014
माह / Month: December, 2014

TRACTOR DRIVEN PNEUMATIC PLANTER
"NEW HOLLAND PL-604"

सत्यमेव जयते

भारत सरकार
कृषि मंत्रालय
कृषि एवं सहकारिता विभाग)

GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE
(DEPARTMENT OF AGRICULTURE & COOPEARATION)

उत्तरी क्षेत्र कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान
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5.6	**Cl.12 Workmanship and Finish**			
i.	Cl. 12.1	The welding shall be satisfactory in all respect and should not be brittle or porous	The welding is satisfactory in all respect.	Conforms
ii.	Cl.12.2	The components shall be free from rust and shall have protective coating to prevent surface deterioration in transit and storage	The components are free from rust and have protective coating to prevent surface deterioration in transit and storage	Conforms
iii.	Cl.12.3	The components should be free from pits, burrs and other defects that may be detrimental for their use	The components are free from pits, burrs and other defects that may be detrimental for their use	Conforms
iv.	Cl. 14.1	Each drill shall be marked with the following particulars:- a) Indication of the source of Manufacturer b) Model,Code and serial number c) Type and size d) type of seed (suitability) e) mass	Only a) b) c) information are provided.	**Does not conform**

6 Laboratory test

6.1 Material analysis:

The material analysis of the critical components was done in respect of its hardness and chemical analysis of soil engaging elements such as furrow opener of sowing and fertilizer mechanism. The hardness and chemical analysis observation are given in Table 1 & 2.

The hardness of furrow opener of sowing and fertilizer mechanism were determined. The results of hardness test are tabulated in Table-I.

TABLE-1 : Furrow opener of sowing and fertilizer mechanism Hardness (HRC)

Sr No.	Discription	As per IS-1500-1983	Hardness as observed, HRC	Remarks
1.	Furrow opener of sowing unit	35 to43	49	**Does not conform**
2.	Furrow opner of fertilizer unit	35 to43	57	**Does not conform**

TABLE-2 : Chemical composition of furrow opener of sowing mechanism

Sl. No.	Material	As observed (% by weight)
1.	Carbon (C)	0.0
2.	Silicon(Si)	3.52
3.	Manganese (Mn)	0.55
4.	Phosphorous (P)	0.007
5.	Sulphur (S)	0.0

TABLE-2 : Chemical composition of furrow opener of fertilizer mechanism

Sl. No.	Material	As observed (% by weight)
1.	Carbon (C)	0.0
2.	Silicon(Si)	4.18
3.	Manganese (Mn)	0.95
4.	Phosphorous (P)	0.006
5.	Sulphur (S)	0.0

A. Seed specifications:

Variety	Bulk density - gm/cc	No. of seeds per Kg. Sample	Moisture content, %	Broken (%)
African tall	0.798	375 to 400	8.0 to 8.5	NIL

B. Fertilizer specifications

Type	Bulk density, g/cc
DAP	1.23

6.3 Wear of soil engaging component:

The test sample was operated for 23.19 hours. Wear of soil engaging components furrow openers Sowing and fertilizer mechanism are given in table -1

S.No.	Mass of furrow opener of sowing unit, g		Mass of furrow opener of fertilizer unit, g		Wear on a mass basis (%)	
	Before test	After test	Before test	After test	furrow opener of sowing unit	furrow opener of fertilizer unit
1	2505.0	2442.0	2950.0	2852.0	2.51	3.32
2	2510.0	2430.1	2947.0	2863.7	3.18	2.83
3	2508.5	2419.2	2950.0	2852.6	3.56	2.93
4	2503.0	2409.0	2955.0	2911.1	3.76	1.49

7. RUNNING-IN

The Pneumatic planter was run-in for 2.0 h. During that period all of the necessory adjustment are done, prior of the field test.

8. FIELD TEST

The field test of pneumatic planter PL 604 was conducted with New Holland 6010 tractor 540 rpm (corresponding to 2200 rpm of engine)

The test was conducted for Maize sowing for 25.19 hours. The maize seed variety was DKC 9121 & fertilizer used was DAP.

Summary of field test results:

Sr. No.	Parameters	Ranage of measurement
1.	Tracor used	New Hollond 6010
2.	Forward speed, kmph	4.10 to 4.26
3.	Avg. Working width, m	2.369 to 2.434
4.	Fuel consumption l/h l/ha	 5.854 to 6.169 7.168 to 8.808
5.	Wheel slipage, %	2.58 to 8.11
6.	Actual field capacity, ha/h	0.668 to 0.829
7	Field efficiency, %	64.85 to 83.83
8.	Avg. depth of seed sowing, cm	4.55 to 5.35
9	Avg. depth of fertilizer sowing, cm	3.65 to 6.75
10.	Seed rate, Kg/ha	16.3 to 23.58
11.	Fertilizer rate, Kg/ha	254.39 to 462.45
12.	Avg. vertical spacing between seed and fertilizer, mm	3.7 to 13.5
13.	Avg. horizontal spacing between seed and fertilizer, mm	61.25 to 122.5
14.	Avg. Plant spacing, mm (Percentage of coeff. of variation, %)	174.5 to 260.9 (4.59 to 11.43)
15.	Avg. row spacing, mm (Percentage of coeff. of variation, %)	604.0 to 616.5 (0.52 to 4.96)
16.	Avg. Draft, Kgf (Avg linear drawbar power at avg speed, kW)	360 (4.24)
17.	PTO power utilized Kw (Ps)	1.70 to 3.66 (2.31 to 4.98) Avg. 2.81 (3.82)

8.1 Rate of Work

i. The forword speed was observed as 4.10 to 4.26 kmph.
ii. The average width of sowing was observed as 2.369 to 2.434 m.
iii. The area covered was 0.668 to 0.829 ha/h.
iv. The fuel consumption varied from 5.854 to 6.169 l/h and 7.168 to 8.808 l/ha respectively.
v. Actual field capacity was observed as 0.668 to 0.829, ha/h.
vi. Field efficiency was observed as 64.85 to 83.83%.

8.2 **Quality of work**

i. Seed and fertilizer rate was found 16.3 to 23.58 kg/ha and 254.39 to 462.45 kg/ha. respectively.

ii. Avg. depth of seed and fertilizer sowing was observed 4.55 to 5.35 cm and 3.65 to 6.75 cm respectively

iii. Avg. vertical and horizontal spacing between seed and fertilizer were observed as 3.7 to 13.5 and 61.25 to 122.5 mm

iv. Avg. plant and row spacing observed were as 174.5 to 260.9 mm and 604.0 to 616.5 mm respectively.

v. Percentage of coeff. of variation in a row spacing and plant spacing were observed as 0.52 to 4.96 and 4.59 to 11.43 respectively.

vi. Avg. Draft was observed as 360 kgf and avg. drawbar power utilized during operation was observed as 4.24 Kw (5.76 Ps). PTO power utilized was ranged from 1.70 to 3.66 (2.31 to 4.98) Kw (Ps).

8.3 **Labour requirement**

Two labourer are required to operate the drill. One skilled labourer to make adjustments / calibration of the seed drill and operate the tractor and other unskilled labourer to load the seed and fertilizer boxes and cleaning of furrow openers as and when required

8.4 **Wear of soil engaging component:**

The wear of furrow opener of sowing mechanism and fertilizer mechanism on a mass basis were varied from 2.51 to 3.76 % and 1.49 to 3.32 % which is consindered as normal.

9. EASE OF OPERATION AND ADJUSTMENT

Operation and adjustment of Pneumatic planter was observed to be satisfactory. However, the driver has to get down from the tractor to do the adjustments on the machine. Automatic mechanically operated marker arrangement are provided which make easier during operation and save labour to operate marker at each turning.

10. BREAKDOWN AND REPAIRS

No breakdown was observed during the test.

11. COMMENTS AND RECOMMENDATIONS

i) The dimensions of seed metering mechanism does not conform to the requirement of IS: 6813-Feb. 2006. Suitable improvement should be done.

ii) The Area recorder is not provided in machine. This may be provided as per requirement of IS : 6813-Feb. 2006.

iii) Dimension of three point linkage does not conform to the requirments of IS 4468 (Part I): 1997. Suitable improvement should be done.

iv) Dimension of power input shaft and propeller shaft hub do not conform to the requirments of IS 4931:1995. Suitable improvement should be done.

v) Marking on the machine and calibaration plate should be provided as recommended in Indian Standard

12. **Special feature**

i) An automatic operated marker is provided.

ii) Pneumatic planter will have large amount of varibility in a sowing of different sizes of a seed with a various choice in a plant spacing.

iii) Two pneumatic ground wheels are provided to overcome the problem of wheel slippage in turn to avoid variation in fertilizer and seed rate.

iv) A over-run type clutch provided at power input shaft end and one shear bolt is provided at another for safety of a PTO propeller shaft.

v) A shear pin provided for a safety of sowing mechanism.

13. **Literature**

Following literature has been provided by the applicant for reference during the test.

i. Instruction manual (Multi language – Italian, English, Oveh, French & Spanish)
ii. Parts catalogue

The literachure provided are found adequate, where as it may be updated as per IS 8132:1999. It should also be brought up in Indian Regional Languages for users.

TESTING AUTHORITY

G.R. AMBALKAR **Agricultural Engineer**	
R.K. NEMA **Senior Agricultural Engineer**	
HIMAT SINGH **Director** –	

Test report compiled by: Sh. S.A. Hinge, Sr. Tech. Assistant

14. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's Comment
	11(iii), (iv) & 13	The valuable comments & suggestion for improvements are well taken. Under our policy of continuous product improvement these aspects are further being looked into & will take appropriate action to eliminate these deviations soon where ever necessary.

ANNEXURE-1

BRIEF SPECIFICATIONS OF THE TRACTOR USED DURING FIELD TEST

1	Make, model and type	New Holland 6010 Four Wheel, general purpose Agricultural tractor.
2	Number of cylinders	Three, Vertical Inline
3	Maximum PTO power, kW (Ps)	39.0(53.0) As per Test Report No. T-939/1457,Oct. 2014 of C.F.M.T.&T.I. , Budni
4	Power at standard power take-off Speed, 540±10rpm, kW (Ps)	39.0(53.0)
5	Rated engine speed, rpm	2300
6	No load engine speed during field test,	2200
7	Drawbar power, kW (Ps)	33.0 (44.9)
8	Drawbar pull, kN :	
	- Without ballast	18.0
	- With ballast	25.0
9	Type of wheel equipment	Pneumatic
10	Number & size of tyre :	
	Front	Two, 7.50-16, 8 PR
	Rear	Two, 16.9-28, 12 PR
11	Standard track width, mm :	
	- Front	1440
	- Rear	1536
12	Wheel base, mm	2070
13	Ballast condition	Used as un ballasted.
14	Total Operational Mass, kg :	
	- Front	945
	- Rear	1570
	- Total	2515