



**GURJEET 975 SELF PROPELLED,  
COMBINE HARVESTER**



भारत सरकार

**GOVERNMENT OF INDIA**

कृषि मंत्रालय (कृषि एवं सहकारिता विभाग, मशीनीकरण एवं प्रोद्योगिकी प्रभाग)  
Ministry of Agriculture (Deptt. of Agri. & Co-op, Mechanization & Technology Division)

**केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान**

**CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE**

**(An ISO : 9001-2008 Certified Institute)**

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1	2	3	4	5	6	7
<b>17.8 Safety requirement</b>						
i)	Guards against all moving parts	Essential		Provided		--do--
ii)	Lighting arrangement a) Head light b) Parking light c) Indication d) Reverse gear e) Brake f) Number plate	Essential as per CMVR		Provided		--do--
iii)	Grain tank cover	Essential		Provided		--do--
iv)	Spark arrester in engine's exhaust	Essential		Not provided		Does not conform
v)	Stone trap before concave	Essential		Provided		Conforms
vi)	Rear view mirror	Essential		Provided		Conforms
vii)	Slip clutch at following driver - a) Cutting platform b) Under shout conveyor drive c) Grain & tailing elevator	Essential		Not provided Not provided		Does not conform
viii)	Anti slip surfaces at operator platform & ladder & proper gripping for the control levers.	Essential		Not provided Provided		Conforms
ix)	Working clearance around the controls	Essential 70 mm, min		Provided		Conforms
x)	Labelling of control, gauge	Essential		Provided		Conforms

**17.9 Material of Construction:**

i)	Guard should conform to IS: 6024-1983	The guard (except ledger plate) shall be manufactured from malleable iron casting (Is: 2108-1977), steel casting (Is: 1030-1947) or steel forging (IS: 2004-1978)		Provided		Conforms
ii)	Knife blade As per IS: 6025-1982	It must have chemical composition as C= 0.70-0.95% Mn= 0.30-0.50%		C = 0.795 Mn = 0.231		Conforms Does not conform
iii)	Knife back Must meet the requirement of IS: 10378-1982	The knife back shall be manufactured from carbon steel having minimum carbon content of 0.35%		C=0.419		Conforms



17.10 Labelling of combine harvester (Provision of Labelling plate):		
1) Make	-- Gujeet	Yes
2) Model	-- Gurjeet 975	Yes
3) Year of manufacture	-- 03-2013	Yes
4) Engine number	-- CXEM 101530	Yes
5) Chassis number	-- GC975C71013	Yes
6) Declaration of power, kW)	--	NO

Should conform to the requirements of IS: 10273- 1987 along-with declared value of HP

**18 SUMMARY OF OBSERVATIONS, COMMENTS AND RECOMMENDATIONS**

**18.1 Engine Performance Test:**

Engine Brake power, kW (Ps)	Crankshaft torque, Nm(kgf-m)	Engine speed (rpm)	Hourly fuel consumption kg/h (l/h)	Specific fuel consumption kg/kwh (kg/hph)	Specific energy, kWh/l (hph/l)
<b>i) Maximum power - 2 hours test:</b>					
92.1(125.2)	409.2(41.8)	2250	24.468 (29.611)	0.266(0.195)	3.110(4.228)
80.8(109.9)	496.9(50.7)	1625	19.185 (23.096)	0.237(0.174)	3.497(4.754)**
77.2(105.0)	550.9(56.2)	1400	18.251(22.012)	0.237(0.174)	3.505(4.765)***
79.8(108.5)	579.8(59.2)	1375	18.574(22.365)	0.233(0.171)	3.566(4.848)****
<b>ii) Power at rated engine speed (2200 rpm)</b>					
94.3(128.2)	428.6(43.7)	2200	24.507(29.634)	0.260(0.191)	3.182(4.327)
87.0(118.2)	395.3(40.3)	2200	23.858(29.060)	0.274(0.202)	2.994(4.070)*
<b>iii) Maximum torque:</b>					
79.9(108.6)	550.8(56.2)	1450	18.878(22.773)	0.236(0.174)	3.509(4.770)
67.7(92.0)	520.7(53.1)	1300	17.207(20.959)	0.254(0.187)	3.230(4.392)*
71.4(97.1)	595.0(60.7)	1200	17.501(21.111)	0.245(0.180)	3.382(4.598)**
70.0(95.2)	583.0(59.5)	1200	17.133(20.618)	0.244(0.179)	4.086(5.555)***
72.1(98.0)	601.0(61.3)	1200	17.555(21.126)	0.243(0.171)	3.413(4.640)****
<b>V) Five hour rating test:</b>					
<b>a) Engine loaded to 90% of maximum power:</b>					
81.4(110.7)	356.6(36.4)	2283	22.441(27.330)	0.276(0.203)	2.980(4.052)
<b>b) maximum power:</b>					
89.7(122.0)	407.7(41.6)	2200	24.133(29.395)	0.269(0.198)	3.052(4.149)

\* Under high ambient condition.  
\*\* At 1800 rpm.  
\*\*\* At 1700 rpm.  
\*\*\*\* At 1600 rpm

**Remarks:**

- i) The maximum power output of the engine was observed as 92.1 kW (125.2 Ps) & 80.8(109.9)kW 77.2(105.0), 79.8 (108.5) at 2250rpm and 1625, 1400,1375 rpm of engine at full throttle and setting recommend for field operation respectively.
- ii) The specific fuel consumption corresponding to maximum power was measured as 0.266(0.195)0.237(0.174),0.237(0.174) & 0.233(0.171) Kg/kwh (kg/hph) which is considered to be slightly on the higher side at full throttle setting.
- iii) The back-up torque of the engine was measured as 30.8 which is considered to be normal.
- iv) The maximum smoke density was recorded as 4.45 (Bosch No.) which is within the permissible limit.
- v) The maximum temperature of engine oil, coolant(water) and exhaust gas were observed as 108.4, 99.0 and 492° C respectively. The engine oil temperature is considered on high side and calls for provision of oil cooler.
- vi) The lubricating oil & coolant consumption during five hours rating test were measured as 0.392g/kWh (0.288g/hph) and 0.32% of total coolant capacity respectively.

**18.2 Turning ability:**

The radius of turning circle at LHS and RHS was observed as 9.97 and 9.81 and turning space as 11.27 and 11.11 respectively without brake.  
The radius of turning circle at LHS and RHS was observed as 8.49 and 8.58 and turning space as 9.79 and 9.88 respectively with brake.

**18.3 Visibility:**

The visibility around the cutter bar from operator's seat in normal sitting position is satisfactory.

**18.4 Braking Performance:**

- i) The mean deceleration and stopping distance corresponding to 455 N pedal force was measured as 5.17 m/sec<sup>2</sup> and 5.5 m respectively and the performance is in line with the IS 12207-1987 & CMVR requirements.
- ii) The performance of parking brake was found satisfactory.

**18.5 Mechanical Vibration:**

The amplitude of mechanical vibration of components marked as (\*) in chapter 13 of this report are on higher side. This calls for providing suitable remedial measures to dampen the vibration assemblies in order to improve the operational comfort and service life of various components & sub

**18.6 Noise measurement:**

- i) The ambient noise emitted by the machine was measured as 90dB(A) which is on higher side when compared with warning and danger limits of 88 dB(A) respectively.
- ii) The noise at driver's ear level was measured as 99 dB(A) which is on higher side when compared with warning and danger levels of 98 dB(A) respectively for an exposure of 8 hours per day specified by ILO.

**18.7 Field Test:****18.7.1 Summary of field tests:**

The results of the field test are summarized below:

Sl. No.	Observation	Wheat harvesting	Paddy harvesting
1.	Forward speed (kmph)	3.34 to 3.51	1.41 to 3.31
2.	Area covered (ha/h)	0.890 to 1.01	0.319 to 0.773
3.	Fuel consumption: - (l/h) - (l/ha)	7.20 to 7.62 7.17 to 8.52	6.22 to 6.67 8.09 to 20.15
4.	Crop throughput (tonne/h)	5.38 to 11.1	6.37 to 17.21
5.	Grain breakage in main grain outlet(%)	0.002 to 0.004	0.001 to 0.182
6.	Header losses(%)	0.143 to 0.349	0.219 to 0.401
7.	Total non-collectable losses(%)	0.281 to 0.502	0.351 to 1.096
8.	Total collectable losses(%)	0.576 to 1.387	0.329 to 1.493
9.	Total processing losses(%)	0.903 to 1.670	0.870 to 2.05
10.	Threshing efficiency(%)	98.56 to 99.98	98.98 to 99.72
11.	Cleaning efficiency(%)	97.97 to 99.49	97.87 to 98.79

**18.7.1.1 Wheat Harvesting:**

- i) The grain breakage in all the varieties tested was measured as 0.002 to 0.004% which is considered normal.
- ii) The total non collectable losses ranged from 0.281 to 0.502% which is considered normal.
- iii) The total processing losses ranged from 0.903 to 1.670% which is considered normal.
- iv) The threshing efficiency ranged from 98.56 to 99.98% which is considered normal.
- v) The cleaning efficiency ranged from 97.97 to 99.49% which is considered to be normal.

**18.7.1.2 Paddy Harvesting:**

- i) The grain breakage ranged from 0.001 to 0.182% which is considered to be normal
- ii) The total non-collectable losses ranged from 0.351 to 1.096% which is considered to be normal
- iii) The total processing losses ranged from 0.870 to 2.05% which is considered to be normal.
- iv) The threshing efficiency ranged from 98.98 to 99.72% which is considered to be normal.
- v) The cleaning efficiency ranged from 97.87 to 98.79%. which is considered to be normal

**18.7.2 Harvesting of any other crops:**

The performance of combine to harvest wheat and paddy crops was evaluated as the same were recommended by the applicant.

**18.7.3 Ease of Operation and Safety Provision:**

- i) The controls provided around the operator are within easy reach but not labelled with symbols as per Indian standard. Therefore it is recommended that the symbols as per the requirement of IS-6283-1998 may be provided.
- ii) The design of stone trap need to be modified for easy cleaning.
- iii) The safety covers for drive chain sprocket/belts for cutter bar, reel, and platform auger, are considered essential & may be provided from safety point of view.
- iv) Spark arresting device is not provided in the engine exhaust system which is considered essential.



- v) Slip clutch for reel drive, cutter bar drive and threshing drum drive are also considered essential from safety point of view.
- vi) The mechanical arrangement for adjusting the reel speed though provided needs to be modified such that the same could be controlled from the operator's position.
- vii) Mechanical lock for reel in raised position needs to be provided to ensure safety while working on cutter bar.
- viii) The load on the front and rear tyres exceeds the maximum load carrying capacity of the tyre (front- 3450 Kg/tyre and rear- 2290 Kg/tyre). Suitable tyres with load matching may be considered.

**18.7.4 Assessment of Wear:**

- i) The wear of engine components i.e cylinder liners, piston, piston rings, valves, valve guides, springs, big-end bearings and main bearings were observed within the permissible limit.
- ii) The transmission gears and components were found in normal working condition.
- iii) The timing gears, clutch lining, release bearing were found in normal working condition.
- iv) The condition of the components of brake, hydraulic system and steering system was observed to be normal.
- v) The condition of the bearing, chains, sprockets and belts was observed to be normal.
- vi) The components of starter motor and alternator were found in normal working condition.
- vii) The rate of wear of rasp bar and peg teeth of threshing cylinder & concave were observed to be normal.

**18.8 Hardness and Chemical composition:**

- i) The hardness of knife blade both in the Hardened Zone & remainder zone was measured as 72 to 73 and 68 to 69 HRC respectively. The hardness of knife blade is not conforming to the requirement of IS: 6025-1999.
- ii) The percentage of carbon was recorded as 0.419 percent in knife guard which is on lower side against the requirement of 0.70 to 0.95% as per IS:6025-1999.
- iii) The percentage of Manganese was recorded as 0.801 & 0.645 percent in cutter bar blade and knife guard respectively which is on higher side against the required range of 0.30% to 0.50% as per IS 6025-1999.
- iv) It is therefore, recommended that the material used for fabrication of above components should essentially meet the requirement of Indian Standard.

**18.9 Maintenance/Service problems:**

No noticeable maintenance/service problem was observed during the course of test at this Institute, however indicator for servicing of dry filter element of air cleaner need to be provided.

**18.10 Labelling Plate of Combine Harvester:**

On labelling plate is Power is not provided, on the combine harvester which not conforming to requirements of IS: 10273-1987. This should be looked into corrective action.

**18.11 Literature supplied with the Machine:**

- 18.11.1 The following literature was supplied with the machine for reference during testing
  - i) Service manual for Ashok Leyland AL BS III engine.
  - ii) Parts catalogue of combine harvester.
  - iii) Instruction book of Ashok Leyland not provided which is essential.
  - iv) Operators manual of combine harvester not provided, which is essential.



**19.0 Citizen charter**

Duration of Test	Test duration under citizen charter	Whether the report released within time frame given in the citizen charter	Remark
March 2013 to December 2013 9 Months	10 Months	Yes	--

**TESTING AUTHORITY:**

*R.K. Nema*  
**R.K.NEMA**  
AGRICULTURAL ENGINEER

*H.L. Yadav*  
**H.L.YADAV**  
SENIOR AGRICULTURAL ENGINEER

*C.R. Lohi*  
**C.R.LOHI**  
DIRECTOR

Test report Compiled by Pratyush Satya, Senior Technical Assistant.

**20.0 Applicant's Comments**

Para no.	Reference	Comments
20.1	18.1 (ii,iv)	The declaration of specific fuel consumption & coolant temperature matter is referring to the engine manufacturer. The suitable correction action will be taken after study.
20.2	18.2, 18.4, 18.5, 18.6 (i,ii), 18.7.3, (i,ii,iii,iv,v,vi,vii), 18.8 (i,ii,iii), 18.10, 18.11.1 (iv)	Incorporated in regular production.