



**INDOFARM AGRICOM 1070 SELF PROPELLED,  
COMBINE HARVESTER (TRACK TYPE)**



भारत सरकार  
कृषि मंत्रालय  
(कृषि एवं सहकारिता विभाग)

GOVERNMENT OF INDIA  
MINISTRY OF AGRICULTURE  
(DEPARTMENT OF AGRICULTURE & CO-OPERATION)

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ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५

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## 3. SPECIFICATIONS

- 3.1 Combine Harvester**
- Make : Indo Farm Equipment Ltd  
 Model : Agricom -1070  
 Serial Number/Chassis No. : CAG BB0011  
 Type : Self propelled track type  
 Year of manufacture : 2011
- 3.2 Prime mover (Engine)**
- Make : Tata  
 Model : 497 SP 27  
 Type : Four stroke, Naturally Aspirated, liquid cooled, direct injection, diesel engine.  
 Serial number : GQZ 826971  
**Engine speed (Manufacturer's recommended production setting), (rpm):**  
 - Maximum speed at no load, : 3100 ± 100  
 - Low idle speed : 800 ± 100  
 - Speed at maximum torque : 1500  
 - Rated speed : 2800  
 - Rated speed for field operation : 2800  
 Location : Behind the Grain tank  
 Mounting : On M.S. frame with anti vibration mountings
- 3.2.1 Cylinder & Cylinder Head:**
- Number : Four  
 Disposition : Vertical, inline  
 Bore/stroke, (mm) : 97/100  
 Capacity as specified by the applicant, (cc) : 2956  
 Compression ratio : 19.0 (± 1) : 1  
 Type of cylinder head : Monoblock  
 Type of cylinder liners : Dry  
 Type of combustion chamber : Direct injection, Re-entrant, toroidal  
 Arrangement of valves : Overhead  
**Valve clearance (cold):**  
 - Inlet valve, (mm) : 0.2  
 - Exhaust valve, (mm) : 0.3
- 3.2.2 Fuel System:**
- Type of fuel feed system : Force feed
- 3.2.2.1 Fuel tank:**
- Capacity, ( l ) : 82.0  
 Location : On LHS of combine  
 Provision for draining of sediments / water : Drain plug provided  
 Material of fuel tank : M. S. Sheet
- 3.2.2.2 Fuel feed pump:**
- Make : BOSCH, India



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**18. SUMMARY OF OBSERVATIONS. COMMENTS AND RECOMMENDATIONS****18.1 Engine performance Test :**

Engine Brake Power, (KW)	Crankshaft Torque, (Nm)	Engine Speed (rpm)	Hourly Fuel Consumption kg/h, (l/h)	Specific Fuel Consumption (kg/kwh)	Specific Energy (kwh/l)
I) Maximum Power- 2 hours test:					
43.4	146.0	2840	13.21	0.252	3.32
II) Power at rated engine speed test (2800 RPM)					
43.2	147.3	2800	12.94	0.251	3.33
41.4	141.2	2800	12.74	0.256	3.27*
III) Maximum torque :					
27.0	171.9	1500	7.57	0.229	3.65
24.6	156.5	1499	7.00	0.232	3.61*
IV) Five hour rating test					
a) Engine loaded to 90% of maximum power :					
38.0	125.0	2905	11.67	0.257	3.26*
b) Maximum power :					
41.2	139.0	2833	12.64	0.256	3.26*

\*Under high ambient condition

**Remarks:**

- I) The maximum power output of the engine was observed as 43.6 kW at 2849 rpm of engine at full throttle.
- II) The specific fuel consumption corresponding to maximum power at full throttle setting measured as 0.252 kg /kwh
- III) The back-up torque of the engine was measured as 17.7 % under natural ambient condition at full throttle.
- IV) The maximum smoke density was recorded as 0.23 m<sup>-1</sup> (Bosh No.).
- V) The maximum temperature of engine oil, coolant (water) and exhaust gas were observed as 97,92 and 620 respectively.
- VI) The lubricating oil & coolant consumption during five hours rating test were measured as 0.48 g/kwh & 0.33 % of total coolant capacity respectively.

**18.2 Turning Ability:**

The radius of turning cycle of LHS and RHS was observed satisfactory.

**18.3 Visibility:**

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

**18.4 Braking Performance:**

No specific brake mechanism is provided. The combine stop by bringing the control levers of LHS and RHS driving roller/track to the neutral position.

**18.5 Mechanical Vibration:**

The amplitude of mechanical vibration of components are given in the chapter 8 of this report. The observation reading marked (\*) for various assemblies on higher side and suitable arrangement should be provided to dampen the vibration for the operator's comfort.



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**18.6 Noise Measurement:**

- I) The ambient noise emitted by the machine was measured as 87 db (A).
- II) The noise at drivers ear level was measured as 92 db (A) which is within limit when compared to warning levels of 98 db (A).

**18.7 Field Test:****Summary of field test:**

The result of the field test for the paddy harvesting is summarized below.

Sl. No.	Observation	Range of observation	Average of observation
1.	Speed of operations, kmph	1.93 to 3.45	-
2.	Area covered (ha/h)	0.212 to 0.299	-
3.	Fuel consumption: -(l/h -(l/ha))	7.53 to 8.17 26.92 to 37.91	-
4.	Crop throughput (tonne/ha)	6.20 to 16.00	-
5.	Grain breakage in main grain outlet (%)	0.14 to 1.15	0.401
6.	Header losses (%)	0.072 to 0.475	0.24
7.	Total non-collectable losses (%)	0.099 to 0.709	0.363
8.	Total collectable losses (%0	0.38 to 3.92	2.134
9.	Total processing losses (%)	0.95 to 4.38	2.66
10.	Threshing efficiency (%)	95.98 to 99.46	97.8
11.	Cleaning efficiency (%)	93.07 to 98.20	96.4

**18.7.1 Paddy Harvesting**

- I) The grain breakage range from 0.14 to 1.15 % which is considered to be normal.
- II) The total non-collectable losses ranged from 0.099 to 0.709 % which is considered to be normal.
- III) The total processing losses ranged from 0.95 to 4.38 % which is considered to be on higher side against max. limit of 2.5 % specified by BIS.
- IV) The threshing efficiency ranged from 95.98 to 99.46 % which does not meet the requirements
- V) The cleaning efficiency ranged from 93.07 to 99.20 % which does not meet the requirements

Necessary improvements are required to be incorporated to reduce the total processing losses and to improve cleaning and threshing by the applicant.

**18.7.2 Harvesting of any other crops:**

The performance of combine to harvest the paddy crop was evaluated as the recommended by the applicant.



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**INDOFARM AGRICOM 1070 SELF PROPELLED COMBINE HARVESTER (TRACK TYPE) -Comm.(ICT)****18.7.3 Ease of operation and safety provision:**

- i) The control provider around the accelerator is within easy reach. But not labeled with symbols as per Indian standard. Therefore it is recommended that the symbol as per the requirement of IS-6283-1998 may be provided.
- ii) The stone trap needs to be provided before the threshing unit
- iii) Spark arresting device is not provided in the engine exhaust system which is considered essential.
- iv) Slip clutch/ safety devices in knife drive, crop auger and threshing drum drive are considered essential from safety point of view which needs to be provided.
- v) The provision for adjusting the reel speed is not provided, which needs to be provided
- vi) The grain tank is should be provided with suitable device to know the grain fill.
- vii) Mechanical lock for reel in raised position needs to be provided to ensure safety while working on cutter bar.

**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 bearing were observed within the permissible limit.
- ii) The transmission gears and components wear found in normal working condition.
- iii) The timing gears, clutch lining, release bearing were found in normal working condition.
- iv) The condition of the component of 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 component of starter motor and alternator were found in normal working condition.
- vii) The rate of wear of peg teeth bar of threshing cylinder & cylinder concave were observed to be normal.

**18.7.5 Hardness and chemical composition:**

- i) The hardness of knife blade in reminder zone is not within the permissible limit of IS: 6025-1999.

**18.8 Maintenance / service problems:**

No noticeable maintenance / service problem was observed during the course of test at this institute however the following provisions needs to be provided in the machine

- i) Provision of threshing drum speed variation to cater for varying crop conditions

**18.9 Safety provisions**

- i) The slip clutch should be provided in all the drives to prevent the damage to the drive belts and fire hazard in case of choking of combine harvester during the crop harvesting.
- ii) The tail lights , hazard indicator lights and reflectors should be provided on combine harvesters to prevent any accident during crossing of village roads in night during the harvesting operation.
- iii) Grain unloading light should be provided for safe and ease parking of grain collecting vehicle.
- iv) The provision for mechanical lock of cutting platform in raised position should be provided for safety during maintenance work.



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**INDOFARM AGRICOM 1070 SELF PROPELLED COMBINE HARVESTER (TRACK TYPE) -Comm.(ICT)****18.10 Identification plate of combine:**

The identification plate is provided on the combine harvester as specified in IS :10273-1999.

**18.11 Literature supplied with the machine:**

The following literature supplied in English were supplied with the machine for reference during testing and these were found adequate, however, it needs to be modified in Hindi and other regional language for the guidance of the users in accordance with IS :8132-1983.

1. Operator manual Agricom 1070 Harvester Combine.
2. Operator's Service book Tata 497 SP Industrial Engine
3. Spare Part's Catalogue Agricom 1070

**18.12 Citizen Charter:**

Duration of Test	Test duration under citizen charter	Whether the report released within time frame given in citizen charter	Remark
May 2012 to December 2012 – 8 Months	09 Months	Yes	--

**TESTING AUTHORITY:**

  
R.K.NEMA  
AGRICULTURAL ENGINEER

  
H.L.YADAV  
SENIOR AGRICULTURAL ENGINEER

  
C.R.LOHI  
DIRECTOR

Test Report compiled by: **Shri. Pratyush Satya**, Senior Technical Assistant.



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19. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
19.1	18.5	As mechanical vibrations are on higher side, our R&D is working on the same to reduce them to the desired level.
19.2	18.7.1 ( iv)	Our R&D is working on the same and will be achieved in regular production.
19.3	18.7.3 (i), (iii)	<ul style="list-style-type: none"> <li>- Labelling of controls &amp; Gauges will be provided in regular production.</li> <li>- Spark arrester in engine's exhaust will be provided in production machines.</li> </ul>
19.4	18.9 (i), (ii)	<ul style="list-style-type: none"> <li>- Our R&amp;D is working on the same and will be provided in due course of time.</li> <li>- Will be provided on grain discharge auger side in regular production machines.</li> </ul>

Combine Run Hours during Test

Appendix-I

A	Laboratory Tests:	Hours
1.	Running-in	1.5
2.	Engine Performance test	13.34
3.	Radius of turning space & turning circle	0.50
4.	Location of center of Gravity	0.50
5.	Visibility test	0.20
6.	Brake performance Test	0.33
7.	Noise measurement	0.66
8.	Mechanical vibration Test	0.67
9	Header Lifting Test	2.83
B	Field Test:	
1	Paddy Harvesting	53.7
2	Miscellaneous test and other run hours including ideal run, transportation, trails and preparation for test	4.67
<b>TOTAL</b>		<b>78.90</b>



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Appendix-II

OBSERVATION SHEET FOR FIELD TESTING (PADDY HARVESTING)

Test No.	Date of test	Variety of crop	Height of plants (cm)	Length of ear head (cm)	No. of grains per ear head	Plant Population		Straw grain ratio	Moisture (%)		Atmospheric conditions at the time of test		
						No of plant/m <sup>2</sup>	No of tillers/m <sup>2</sup>		Grain	Straw	R.H (%)	Pressure, (Kpa)	
1	26.04.12	Culsar - 39	65 to 85	18 to 24	170 to 195	25 to 26	675 to 702	1.779 : 1	20.7	71.0	67	96.7	
2	27.04.12	Culsar - 39	89 to 98	23 to 26	182 to 190	21 to 23	402 to 440	0.975 : 1	19.0	75.0	43	96.7	
3	28.04.12	Culsar - 39	80 to 87	18 to 23	81 to 112	26 to 28	302 to 338	1.674 : 1	17.0	78.0	56	96.7	
4	29.04.12	Culsar - 39	95 to 110	19 to 26	135 to 170	25 to 27	436 to 457	1.812 : 1	18.0	75.0	43	96.7	
5	30.04.12	Chalpanaie -45	81 to 94	19 to 24	65 to 100	23 to 25	453 to 480	1.613 : 1	21.5	73.0	43	96.7	
6	01.04.12	Chalpanaie -45	84 to 99	18 to 23	78 to 96	24 to 26	490 to 510	1.522 : 1	20.0	75.0	57	96.8	
7	02.05.12	Chalpanaie -45	87 to 94	19 to 28	81 to 96	23 to 25	444 to 475	1.096 : 1	19.9	72.0	43	96.8	

Appendix-III

FIELD TEST DATA ANALYSIS (PADDY HARVESTING)

Test No.	Date of test	Duration of test (hr.)	Speed of operation (kmph)	Width of cut (m)	Rate of work		Through put		Fuel consumption		Pre-harvest loss (kg/ha)	Crop straw:Grain ratio (SKH/GKH)	Crop through put (t/h)	Grain breakage in main outlet (%) (a)
					Area covered (ha/hr.)	Grain output (kg/h)	Clean Grain (kg/h) GKH	Straw (kg/h) SKH	(l/h)	(l/ha)				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	26.04.12	3.37	1.963	1.43	0.2807	2479.38	2493.82	4437.56	7.953	28.329	26.57	1.78	6.93	0.42
2	27.04.12	3.17	3.453	1.75	0.2779	8086.17	8108.01	7893.33	7.525	27.127	7.43	0.97	16.00	0.24
3	28.04.12	8.40	1.925	1.726	0.2751	2312.82	2319.70	3882.11	8.065	29.315	18.54	1.67	6.20	1.15
4	29.04.12	6.83	2.772	1.706	0.2124	3184.19	3187.40	5776.60	8.053	37.913	41.03	1.81	8.96	0.14
5	30.04.12	8.20	2.487	1.778	0.2619	2682.21	2701.39	4357.17	7.805	29.801	20.25	1.62	7.06	0.23
6	01.04.12	9.41	2.597	1.776	0.2489	5262.24	5272.72	8024.37	8.172	32.833	16.89	1.52	13.30	0.25
7	02.05.12	9.33	2.927	1.727	0.2994	3827.08	3953.26	4333.65	8.060	26.921	31.85	1.09	8.29	0.38
Avg														0.40

Appendix-IV

FIELD TEST DATA ANALYSIS (PADDY HARVESTING)

Test No.	Total collectible losses Unit/ha shed from main outlet (%) (B)	Loss due to combine, percent by mass												Total processing losses (A+B+a+b)	Threshing efficiency (%)	Cleaning efficiency (%)
		Non collectible losses (%) (c)														
		Straw outlet (Rate)						Sieve(Shoe)								
		Threshed (1)	Unthreshed (2)	Broken (3)	Total (1+2+3)	Threshed (1)	Unthreshed (2)	Broken (3)	Total (1+2+3)	Header loss (c)	Total (B)	(a+b+c)				
16	17	18	19	20	21	22	23	24	25	26	27	28	29			
1	0.38	0.016	0.142	0.000	0.156	0.001	0.000	0.0014	0.417	0.574	0.957	99.48	94.9			
2	0.61	0.063	0.005	0.000	0.068	0.017	0.000	0.032	0.166	0.266	0.850	99.36	97.36			
3	1.11	0.019	0.002	0.000	0.021	0.013	0.000	0.051	0.222	0.294	2.332	98.87	95.73			
4	3.69	0.002	0.006	0.000	0.008	0.009	0.000	0.019	0.072	0.099	3.857	98.28	98.2			
5	3.92	0.130	0.047	0.000	0.177	0.025	0.000	0.057	0.475	0.709	4.384	95.98	97.9			
6	2.28	0.014	0.017	0.000	0.031	0.009	0.000	0.013	0.130	0.174	2.574	97.68	93.07			
7	2.95	0.056	0.074	0.000	0.130	0.024	0.000	0.094	0.201	0.425	3.554	96.94	97.60			
Avg	2.134								0.240	0.383	2.658	97.80	96.39			



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**DETAILS OF GREASING & OILING POINTS**

Appendix-V

S. No.	Location	No. of Grease Nipples
1)	Grease Nipples : to be greased after each working day	
i)	Cutter bar drive	2
ii)	Reel drive shaft	3
iii)	Feeding unit drive shaft	2
iv)	Threshing drum bearing	2
v)	Tensioner pulley	4
vi)	Main drive pulley	1
vii)	Blower Bearing	2
viii)	Cutter bar drive shaft	3
Total:		19
2)	Oiling Points	
i)	Reel	12
ii)	Undershot conveyer	2
iii)	Cutter bar blade joint & ball joint	2
Total:		15



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**SYMBOLS AND ABBRIVIATION**

Appendix-VI

**SYMBOLS:****I. SYMBOLS ASSIGNED TO BASIC SI UNIT**

S.N.	PHYSICAL QUANTITY	NAME OF SI UNIT	SYMBOL
1	Length	Meter	m
		Millimeter	mm
2	Mass	Kilogram	kg
		Gram	g
		Tonne	t
3	Time	Second	s

**II. SYMBOLS ASSIGNED TO SOME DERIVED UNIT**

S.N.	PHYSICAL QUANTITY	NAME OF SI UNIT	SYMBOL
1.	Area	Square centimeter	cm <sup>2</sup>
		Square meter	m <sup>2</sup>
		Hectare	ha
2	Speed / velocity	Meter per second	m/s
		Kilometer per hour	kmph
3	Pressure	Newton per square millimeter	N/mm <sup>2</sup>
4	Time	Minute	min
		Hour	h
5	Volume	Cubic centimeter	cm <sup>3</sup>
		Milliliter	ml
		Litre	l

**ABBREVIATIONS:**

As per applicant	:	apa	Clause	:	Cl
Degree	:	deg	Figure	:	Fig
Indian standard	:	IS	Kilowatt	:	kW
Number	:	No.	Not available	:	N.A.
Not Recorded	:	N. R.	Percent	:	%
Reference	:	Ref.	Revolutions per minute	:	rpm