

(यह परीक्षण रिपोर्ट 30/11/2024 तक वैध है। / THIS TEST REPORT IS VALID UPTO : 30/11/2024)



SWARAJ, 963 FE ST 4x4 TRACTOR



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, Cooperation & Farmer's Welfare)
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T- 1599/2130/2021	SWARAJ,963 FE ST 4x4 TRACTOR-COMMERCIAL (Initial)
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Manufacturer	: M/s. Mahindra & Mahindra Ltd., Farm Equipment Sector, Swaraj Division Phase-IV, Industrial Area, S.A.S. Nagar, Mohali, Punjab- 160 055
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	: 28
- Transmission	: 32
Method of Selection	: Due to Covid-19 Pandemic, it was not possible to conduct the random selection. Nor was possible for applicant to facilitate the random selection. As a last resort, applicant requested to allow the direct submission of test sample, which was allowed.

1. SPECIFICATIONS

1.1 Tractor:	
Make	: Swaraj
Model	: 963 FE ST 4x4
Brand name, if any	: Swaraj
Variants, if any	: None
Type	: Four wheeled, four wheel driven (4WD), Unit construction, General purpose, Agricultural Tractor.
Month & Year of manufacture	: 12 & 2020
Chassis number	: MBNBP55AELCP08995
Country of Origin	: India
1.2 Engine:	
Make	: M/s Swaraj Engines limited
Model	: SK360NH
Type	: Four stroke, naturally aspirated, liquid cooled, direct injection, diesel engine.
Serial number	: 60.4003/SBP35252
Engine speed (Manufacturer's recommended production setting), (rpm):	
- Maximum speed at no load,	: 2230 to 2330
- Low idle speed	: 580 to 700
- Speed at maximum torque	: 1000 to 1420
Rated speed, (rpm):	
- For PTO use	: 2100
- For drawbar use	: 2100
1.3 Cylinder & Cylinder Head:	
Number	: Three
Disposition	: Vertical, inline
Bore/stroke, (mm)	: 110/122
Capacity as specified by the applicant, (cc)	: 3478 (apa)
Compression ratio	: 18.3(±0.5) : 1

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16. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

16.1 On the basis of tests conducted the performance results have been summarized as evaluative (mandatory) / Non-evaluation (Non-mandatory) parameter applicable for qualifying Minimum Performance criteria as per Clause-4 (Table-1) of **Indian standard: 12207-2019** for acceptance of the 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
16.1.1	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	38.5 (D)	37.3	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	38.5 (D)	37.3	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+10 percent Max.	272 (D)	280	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8 percent	243 (N)	215	Yes
e)	Back-up torque, percent	Evaluative	12 percent	12 (D) 12 (R)	26.9	Yes
f)	Maximum operating temperature, ($^{\circ}$C)					
	1) Engine oil	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.	130 (D)	100	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.	115(D)	94	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.89 (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 metre (R)	0.26	Yes

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1	2	3	4	5	6	7	
16.1.2	Drawbar performance :						
a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 70 percent of static mass with ballast	24.54 (D) 23.61 (R)	31.66	Yes	
b)	Max. drawbar pull with unballast, as the case may be corresponding to 15 percent wheel slip or 7 percent track slip, (kN)	Evaluative	Minimum 70 percent of static mass of tractor without ballast or with standard ballast, as the case may be	20.70(D) 19.77 (R) Minimum	25.75	Yes	
c)	Maximum drawbar power with unballast as the 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.	30.8 (D) 29.8 (R) Minimum	31.5	Yes	
d)	Max. transmission oil temperature (°C)	Evaluative	The declared value should not exceed the maximum value specified by oil company	120(D)	108	Yes	
16.1.3	Power lift and hydraulic pump performance :						
a)	Maximum lifting capacity throughout the range of lift, (kN):						
	1)	At hitch points	Evaluative	[Tolerance of ± 10%]	21.57(D)	19.85	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.	17.65 (D) 8.78 (R) Minimum	19.70	Yes
b)	Maximum drop in the height of the point of application of the force after each 5 min. interval for a total duration of 30 min/ mm	Non Evaluative	The observed value should not exceed 50 mm.	50 (D)	10	Yes	
16.1.4	Brake performance at 25 kmph:						
a)	Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with unballasted* , (m):						
	1)	Cold brake	Evaluative	10	10 (R)	6.98	Yes
	2)	Hot brake	Evaluative	10	10 (R)	7.25	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² . (N)	Evaluative	600	600 (R)	127 to 145	Yes	

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1	2	3	4	5	6	7
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 (R)	Yes	Yes
* The manufacturer has not recommended ballasting for road test, therefore the brake test was conducted under unballasted condition only.						
16.1.5	Noise measurement :					
a)	Maximum ambient noise emitted by the tractor at bystanders position, dB(A)	Evaluative	88 dB(A) for >1.5 tonne GVW and 85 dB(A) for <1.5 tonne GVW (as per CMVR)	88 (R)	84	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96 (R)	93	Yes
16.1.6	Amplitude of mechanical vibrations at :					
1)	Left foot rest	Non Evaluative	100 microns (max)	100 (D)	164	No
2)	Right foot rest				152	No
3)	Seat (with driver seated)				58	Yes
4)	Steering Wheel				466	No
16.1.7	Air cleaner oil pull over :					
	Maximum air cleaner oil pull over (%)	Evaluative	0.25 % (max.)	N.A	Dry type air cleaner is fitted	Not applicable
16.1.8	Haulage requirements :					
a)	Gross mass of the trailers, (tones):					
	- Two wheel	Non	--	6.0 (D)	6.0	Yes
	- Four wheel	Evaluative	--	8.0 (D)	8.0	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
	- Two wheel	Non	--	4 to 5 (D)	3.23 to 3.36	No
	- Four wheel	Evaluative	--	4 to 5 (D)	3.11 to 3.21	No
c)	Fuel consumption (ml/km/tonne):					
	- Two wheel	Non	--	25 to 30 (D)	49.56 to 51.58	No
	- Four wheel	Evaluative	--	45 to 50 (D)	38.99 to 40.20	No
16.1.9	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 (R)	No ingress of mud and / or 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)	Transmission oil	-do-				

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1	2	3	4	5	6	7
16.1.10	Safety features:					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes (As per IS 12239 part 2)	--	Meet the requirements	Yes
b)	Lighting arrangement	Evaluative	As per CMVR	--	Meet the requirements	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 requirements	No
d)	Technical requirements for PTO shaft	Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--	Meet the requirements	Yes
e)	Dimension of three point linkage	Non-Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	--	Does not meet the requirements	No
f)	Specification of linkage drawbars	Evaluative	Should meet the requirements of IS 12953 (as amended from time to time)	--	Meet the requirements	Yes
g)	Specification of Swinging drawbars	Evaluative	Should meet the requirements of IS 12362 (Part 3)		Not Provided	Not applicable
h)	1) Maximum travelling speed at rated engine speed in reverse gears, Kmph	Evaluative	Should not exceed 20 Kmph	-	25.14 kmph	--
	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 shall 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.	--	Audible warning signal is activated when reverse gear travel speed in HR gear reaches to 13.99 kmph.	Yes

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1	2	3	4	5	6	7	
16.1.11	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.	Swaraj	Yes	
	2)	Model	Evaluative		963 FE ST 4x4	Yes	
	3)	Month & Year of manufacture	Evaluative		12/20	Yes	
	4)	Engine number	Evaluative		60.4003/SBP35252	Yes	
	5)	Chassis number	Evaluative		MBNBP55AELCP0 8995	Yes	
	6)	Declaration of PTO power,kW	Evaluative		38.5	Yes	
	7)	Specific fuel consumption ,g/kWh	Evaluative		272	Yes	
16.1.12	Discard limit for:						
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by Manufacturer	110.225	110.026 to 110.048	Yes	
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.500	0.124 to 0.142	Yes	
©	Piston diameter at skirt, mm	Non Evaluative		Not specified	109.916	Yes	
(d)	Ring end gap (mm):						
	-	Top comp. ring.	Evaluative	-do-	1.75	0.55	Yes
	-	2 nd comp. ring.		-do-	1.75	0.50 to 0.55	Yes
	-	Oil ring.		-do-	1.75	0.50	Yes
(e)	Ring groove clearance (mm):						
	-	Top comp. ring.	Evaluative	-do-	--	Tapered	--
	-	2 nd comp. ring.	-do-	-do-	0.25	0.056 to 0.064	Yes
	-	Oil ring.	-do-	-do-	0.25	0.044 to 0.048	Yes
(f)	Clearance of main bearings, (mm):						
	-	Diametrical	Evaluative	-do-	0.30	0.096 to 0.113	Yes
	-	Crank shaft end float	Evaluative	-do-	0.50	0.24	Yes
(g)	Clearance of big end bearings, (mm):						
	-	Diametrical	Evaluative	-do-	0.30	0.082 to 0.118	Yes
	-	Axial	Evaluative	-do-	0.60	0.25	Yes
(h)	Clearance between king pin and bush,(mm)	Non Evaluative	-do-	Not applicable	Not applicable	Not applicable	
(i)	Clearance between center pin and bush,(mm)	Non Evaluative	-do-	Not applicable	Not applicable	Not applicable	

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1	2	3	4	5	6	7
16.1.13	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	As per relevant IS- 8132	Provided	Yes
(b)	Parts Catalogue	Evaluative			Provided	Yes
(c)	Workshop/ Service manual	Evaluative			Provided	Yes
16.1.14	Fitment of Roll Over Protective Structure (ROPS): for tractors having more than 1150 mm rear track width	Evaluative	ROPS should meet the requirement of IS:11821 or OECD code or equivalent International Standard	Not provided	Not fitted	Not applicable
16.1.15	Standard accessories	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with tractor	Provided	Provided	Yes
16.1.16	Accessories (Optional)	Non Evaluative	Ballast weights if fitted should meet the requirement of CMVR.	Provided	Provided	Yes
16.2	CATEGORY OF BREAKDOWNS / DEFECTS (As per clause 5.0 of IS:12207-2019):					
S. No.	Category of Breakdown	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	As observed	Whether meets the requirement (Yes/No.)	
1.	Critical breakdown	Evaluative	There is no 'critical breakdown' during the course of testing.	None	Yes	
2.	Major breakdowns	Evaluative	There are not more than 02 major breakdowns and neither of them is of repetitive nature.	None	Yes	
3.	Minor breakdowns	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	

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16.3 Conformity with following IS:

- | | | | |
|-------|--|---|-------------------------|
| i) | Guide lines for declaration of power and specific fuel consumption and labelling of agricultural tractors (First revision) [IS10273: 1987 (Reaffirmed 2019)] | : | Conforms |
| ii) | Agricultural tractors - Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS:4931-1995 (Reaffirmed 2019)] | : | Conforms |
| iii) | Agricultural wheeled tractors - Three-point linkage: Part 2 Category 1N (Narrow Hitch) [IS 4468 (Part-2):1993/ ISO 730-2:1979 (Reaffirmed 2017)] | : | Does not conform |
| iv) | Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed October, 2017)] | : | Conforms |
| v) | Agricultural tractors - Operator's seat technical requirement [IS 12343 –1998 (First revision) (Reaffirmed 2019)] | : | Does not conform |
| vi) | Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision): [IS 12239 (PT-1) – 2018] | : | Does not conform |
| vii) | Tractors and machinery for agriculture and forestry – Technical means for ensuring safety Part 2: Tractors (first revision) (IS 12239 (PT-2) 1999) (Reaffirmed 2019)] | : | Does not conform |
| viii) | Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) IS: 8133-1983 (Reaffirmed 2019)] | : | Does not conform |
| ix) | Tractors and machinery for agriculture and forestry, powered lawn and garden equipment - Symbols for operator controls and other displays Part 2 Symbols for agricultural tractors and machinery [IS:6283 (Part-1)- 2006 and IS: 6283 (Part-2)-2007 (Reaffirmed 2019)] | : | Conforms |
| x) | Agricultural Tractors and Machinery - Lighting device for travel on public roads (IS:14683-1999) (Reaffirmed 2019)] | : | Conforms |

16.4 Salient Observations:

16.4.1 Laboratory tests:

16.4.1.1 PTO performance:

- i) The maximum PTO power was recorded as **37.3 kW** against the declaration of **38.5 kW**, which meets the evaluative requirement of IS: 12207-2019 with regard to tolerance limit.
- ii) The specific fuel consumption corresponding to maximum power was measured as **280 g/kWh** against the declaration of **272 g/kWh**, which meets the evaluative requirement of IS: 12207-2019 with regard to tolerance limit.
- iii) The maximum equivalent crankshaft torque was recorded as **215 Nm** against the declaration of **243 Nm**, which meets the non-evaluative requirement of IS: 12207-2019 with regard to tolerance limit.
- iv) The backup torque was observed **26.9 %**, which meets the evaluative requirement of IS: 12207-2019 with regard to tolerance.

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16.4.1.2 Drawbar performance test:

During ten hours drawbar performance test, creeping of LHS rear tyre over the rims was recorded as **10 mm**. This should be looked into for necessary corrective action.

16.4.1.3 Hydraulic performance test:

The moment about rear axle with standard frame was calculated as **31.52 kN-m**. Whereas, the moment about front axle was calculated as **24.55 kN-m** under unballasted condition. The moment about rear axle is on higher side as compared to the moment about front axle. It is, therefore, recommended that the lifting capacity of the hydraulic system may be reduced suitably or standard ballast recommendation may be reviewed to avoid the front lifting of the tractor.

16.4.1.4 Mechanical Vibration:

The amplitude of mechanical vibration on various assemblies marked as (*) in **Chapter - 8** of this test report is on higher side. This calls for dampening down of vibrations especially on steering control wheel to improve the operational comfort and service life of components.

16.4.1.5 Three point linkage:

Lateral distance from lower hitch point to centre line of tractor does not meet the requirement and some of the parameters conform to Cat. I and some of them conform to Cat.IV. Keeping in view the spirit of standardization, necessary improvement may be incorporated.

16.4.1.6 Linkage drawbar:

Some of the parameters of the drawbar linkage conform to Cat.-I and some of them conform to Cat.-IV. Keeping in view of the spirit of standardization, the necessary improvements may be incorporated.

16.4.1.7 Operator's Seat

The Longitudinal distance from centre of differential lock pedal to Seat Index Point does not meet the requirement of the IS: 12343 -1998 (Re-affirmed in 2014). This should be looked into for necessary corrective action.

16.4.1.8 Operator's work place:

Operator's work place meets the requirements of IS:12239(Part-1)-2018, **except the following:**

- i) Provision of vertical retainness at inner side of clutch and brake pedal.
- ii) Provision of spark arresting device in the exhaust system.
- iii) Height of 1st step from the ground.
- iv) Height of subsequent step from the ground.

16.4.1.9 Audible warning signal for reverse gear:

Audible warning signal for reverse gear was noticed to get activated at 13.99 km/h only vis-à-vis a requirement of 20 km/h. The applicant has, therefore, a liberty to make it upto 20 km/h if so desired.

16.4.1.10 PTO master shield:

PTO master shield has not been provided on tractor as per the requirements of IS: 4931-1995 (Reaffirmed in 2004). This should be looked into for necessary corrective action.

16.4.1.11 Discard limits:

The discard limit for crown wheel & pinion has been specified as "gears are not discarded on the basis of backlash". This should be looked into for necessary corrective action.

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16.4.2 Field performance test:

16.4.2.1 Haulage performance:

- i) The specific fuel consumption (ml/km/ton) in case of two and four wheel trailer was recorded as **49.56 to 51.58** & **38.99 to 40.20** ml/km/ton against the declaration of **25 to 30** & **45 to 50** ml/km/ton respectively. The observed value was on higher side and does not meet the non - evaluative requirement of IS: 12207-2019 with regard to tolerance. This should be looked into for necessary corrective action.
- ii) The distance travel per litre of fuel consumption in case of two and four wheel trailer was observed as **3.23 to 3.36** km/l & **3.11 to 3.21** km/l against the declaration of **4 to 5** km/l. The observed value is on lower side and does not meet the non-evaluative requirement of IS: 12207-2019 with regard to tolerance. This should be looked into for necessary corrective action.

16.4.2.2 Wetland cultivation (Puddling operation):

No ingress of water and/or mud was observed during puddling operation of the tractor. Hence, it meets the requirements of IS: 11082-1984 (Technical requirements of agricultural tractors for wetland operations). The tractor is found suitable for wetland cultivation (Puddling operation).

16.5 Maintenance / Service Problems:

No noticeable maintenance/ service problem was observed during the test.

16.6 Recommendation with regard to safety on tractor:

The following requirements, inter alia, may be considered for incorporation on the tractor:

- i) Provision of spark arresting device in exhaust system.
- ii) Provision of working clearance around hand control namely position control lever and draft control lever, Parking brake & PTO engaging lever, tipping trailer and sector plate, Liftomatic button and seat should be provided as per IS:12239(part-2)-1999 (Reaffirmed in 2019).
- iii) Longitudinal distance from centre of differential lock pedal to Seat Index Point does not meet the requirement. It should be provided as per IS: 12343-1998, (Reaffirmed in 2014).
- iv) Vertical retainers at inner side of clutch and brake pedal should be provided as per relevant standard.
- v) PTO shaft master shield should be provided to avoid the accident.

16.7 Adequacy of Literature supplied with machine:


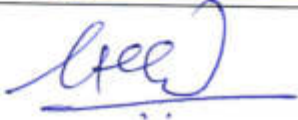

16.7.1 The following literature was supplied with the tractor for reference during the test:

- i) Tractor Operator's Manual of Swaraj 963 FE ST 4x4 tractor.
- ii) Parts Catalogue of Swaraj 963 FE ST 4x4 tractor.
- iii) Service Manual of Swaraj 963 FE ST 4x4 tractor.

16.7.2 The printed literature supplied with the test sample is in English. However, these literatures should be brought out in other vernacular languages of India for guidance of users.

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TESTING AUTHORITY:

C.V. CHIMOTE TEST ENGINEER	
Y.K.RAO SENIOR AGRICULTURAL ENGINEER	
P. K. PANDEY DIRECTOR	

Test report is compiled by: Shwetabh Singh, Agricultural Engineer.

17. APPLICANT'S COMMENT

Para No.	Our Reference	Applicant's comments
17.1	16.4.1.2, 16.4.1.3, 16.4.1.4, 16.4.1.5, 16.4.1.6 & 16.6	These requirements are being revisited for necessary corrective action at our end.
17.2	16.4.1.7, 16.4.1.8, 16.4.1.9, 16.4.1.10, 16.4.1.11 & 16.4.2	Study and trials are under progress for necessary corrective action.
17.3	16.7.2	Literatures in all regional languages are under process for end users.

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ANNEXURE- I

BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST

S.No.	Parameters	Disc Plough	Rotavator	Puddler
1	Make	Vasundhara Krishi Yantra	TAFE	ACE
2	Type	Mounted	Mounted	Mounted
3	No. of Discs / Blades	Three	48	12 (6 in each gang)
4	Type of Discs / Blades	Plain concave	Hatchet	Notched concave
5	Size of Discs / Blades (mm)	660	275 x 80 x 7	500
6	Spacing of Discs /Flanges, (mm)	510	260	180
7	Lower hitch point span, (mm)	850	820	835
8	Mast height, (mm)	490	605	510
9	Overall Dimensions (mm):			
	Length	1900	960	1020
	Width	1090	2265	2070
	Height	1150	1095	1050
10	Gross Mass, (Kg)	280	505	300

ANNEXURE-II

BRIEF SPECIFICATION OF HALF CAGE WHEEL

S. No.	Parameters	Specification
1	Type	Half cage wheel
2	Outer dia. (mm)	1200
3	Width (mm)	360
4	No. & Type of Lugs	14, straight lugs made of MS angle section welded to angle iron frame
5	Size of angle section, (mm)	50 x 50 x 5
6	Length of lug, (mm)	360
7	Spacing of lug, (mm)	260
8	Weight of each cage wheel (kg)	100

T- 1599/2130/2021	SWARAJ,963 FE ST 4x4 TRACTOR-COMMERCIAL (Initial)
	(THIS TEST REPORT IS VALID UPTO:30/11/2024)

ANNEXURE – III

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	PTO performance test	10.0
3.	Power lift and hydraulic pump performance test	3.5
4.	Drawbar performance test	22.5
5.	Turning ability	0.2
6.	Location of centre of gravity	0.1
7.	Operator's field of vision	--
8.	Brake test	1.0
9.	Noise measurement	1.8
10.	Mechanical vibration test	0.8
11.	Nominal speed test	0.8
B.	FIELD TEST:	
1.	Disc ploughing	10.5
2.	Rotavation	11.0
3.	Puddling (including water proof test)	10.6
C.	HAULAGE TEST:	5.0
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	15.0
	TOTAL:	92.8