



**SWARAJ 960 FE TRACTOR**



सत्यमेव जयते

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, CO-OPERATION AND FARMERS WELFARE)**

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५

**CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE**

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

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<b>Manufacturer</b>	: M/s. Mahindra & Mahindra Limited Farm Equipment Sector Swaraj Division, Phase-IV, Industrial Area, S.A.S. Nagar (Mohali) Near Chandigarh-160055
<b>Test requested by (applicant)</b>	: M/s. Mahindra & Mahindra Limited Farm Equipment Sector Swaraj Division, Phase-IV, Industrial Area, S.A.S. Nagar (Mohali) Near Chandigarh-160055
Place of running-in	: At Applicant's works
Duration of said running-in, (h):	
- Engine	: 28
- Transmission	: 32
<b>Method of Selection</b>	: The tractor was submitted directly by the applicant for test. Hence, method of selection is not known.

### 1. SPECIFICATIONS

<b>1.1 Tractor:</b>	
Make	: Swaraj
Model	: 960 FE
Type	: Four wheeled, Rear wheel driven (2WD), general purpose, Agricultural tractor.
Variant(s) if any	: <b>None</b>
Year of manufacture	: <b>WX (i.e. it means 2014)</b>
Chassis number	: WXCK67930100001
Country of origin	: India
<b>1.2 Engine:</b>	
Make	: M/s Swaraj Engines Ltd.
Model	: RB33XP
Type	: Four strokes, Liquid cooled, Direct injection, Diesel engine.
Serial number	: 47.3053 / STG12161V
<b>1.2.1 Engine speed(Manufacturer's recommended production setting), (rpm):</b>	
- Maximum speed at no load	: 2120 to 2180
- Low idle speed	: 600 to 700
- Speed at maximum torque	: 1000 to 1400
<b>Rated speed, (rpm):</b>	
- For PTO use	: 2000
- For drawbar use	: 2000
<b>1.3 Cylinder &amp; Cylinder Head:</b>	
Number	: Three
Disposition	: Vertical, Inline
Bore/stroke, (mm)	: 110/122 (apa)
Capacity as specified by the applicant, (cc)	: 3480
Compression ratio	: 19.2(±0.5) : 1



**12. FIELD TEST**

- 12.1 The field tests comprising of disc ploughing, rotavation and puddling were conducted for 11.48, 10.99 and 10.18 hours respectively.  
All the field tests were conducted at the full accelerator settings, when the no load speed of the engine was 2115 -2180 rpm.
- 12.2 The brief specifications of the implements used during field tests are given in Annexure-I&II.
- 12.3 The summary of field test observation with disc plough & rotavator is given in Table - 3.

**Table - 3****SUMMARY OF FIELD PERFORMANCE TEST**

S. No.	Parameter/operation	Disc Ploughing	Rotavation	Puddling
1	2	3	4	5
i)	Type of soil (refer IS: 7926-1975)	Heavy	Heavy	Heavy
ii)	Av. soil moisture, (%) / Av. depth of standing water (cm)	19 to 21	17 to 19	12
iii)	Bulk density of soil, (g/cc)	2.09 to 2.11	1.62 to 2.06	--
iv)	Cone index, (kg/sq.cm) / Puddling index, (%)	10.04 to 11.74	6.81 to 8.51	82 to 85
v)	Gear used	L1	L1	L-1
vi)	Av. speed of operation, (kmph)	2.77 to 2.84	3.35 to 3.41	2.69 to 2.96
vii)	Av. wheel slip, (%) / Av. Travel reduction, (%)	15 to 16	-0.92 to -1.34	17.2 to 25.6
viii)	Av. depth of cut, (cm) / Av. Depth of puddles, (cm)	21 to 23	8 to 9	22 to 25
ix)	Av. working width, (cm)	76 to 79	169 to 170	--
x)	Area covered, (ha/h)	0.166 to 0.179	0.467 to 0.497	--
xi)	<b>Fuel consumption:</b>			
	- (l/h)	3.85 to 4.18	5.01 to 5.96	4.0
	- (l/ha)	21.50 to 25.18	10.72 to 11.99	--
xii)	Av. draft of implement, (kN)	7.18 to 7.86	--	--

**Remarks:** The average lub oil and coolant consumptions during the entire field tests were observed is 3.98 and 4.59 ml/h respectively.

**12.4 Wet land cultivation (Puddling):**

- 12.4.1 The un-ballasted tractor was equipped with half cage Wheel for conducting the puddling operation.
- 12.4.2 After completion of puddling test and water proof test, the tractor was partially dismantled to check effectiveness of sealing provided against ingress of water and / or mud in various assemblies / components as per requirement of IS : 11082 – 1984 (Technical requirement of Agricultural tractor for wet land cultivation). The observations recorded were as under.

Sl. No.	Location	Whether ingress of mud and/or water observed	Remarks
1.	Front axle assemblies	No	None
2.	Centre pin	No	
3.	Clutch assembly	No	
4.	Engine sump	No	
5.	Brake assembly, transmission, hydraulic, & steering	No	
6.	Starter motor	No	
7.	Alternator	No	



## 13. HAULAGE TEST

Date of test	:	21.10.15,26.10.15,27.10.15 and 28.10.15	
Type of trailer	:	<b>Two wheel (Single axle)</b>	<b>Four wheel (Double axle)</b>
Gross mass of trailer (tonne)	:	5.0	7.0
Height of trailer hitch above ground level, (mm)	:	645	650
Gear used during the test for negotiating slopes up to 8%	:	H4	H4
Average travel speed,(kmph)	:	27.57	27.03 to 27.21
<b>Average fuel consumption:</b>			
- (l/h)	:	5.20 to 5.23	5.98 to 6.01
- (ml/km/tonne)	:	37.71 to 37.95	31.60
Average distance traveled per litre of fuel consumption, (km)	:	5.26 to 5.30	4.52
<b>General observations:</b>			
Effectiveness of brakes	:	Effective	Effective
Maneuverability of tractor-trailer combination	:	Satisfactory	Satisfactory

## 14. COMPONENTS/ASSEMBLY INSPECTION

The engine and other assemblies were dismantled after **90.55 hours** of tractor operation at this Institute.

## 14.1 Engine:

## 14.1.1 Cylinder bore:

Cylinder No.	Cylinder bore dia, (mm)						Maximum permissible wear limit, (mm)
	Top position		Middle position		Bottom position		
	Thrust side	Non-thrust side	Thrust side	Non-thrust side	Thrust side	Non-thrust Side	
1.	110.01	110.01	110.02	110.01	110.01	110.01	110.225
2.	110.02	110.02	110.02	110.01	110.02	110.02	
3.	110.03	110.02	110.02	110.02	110.02	110.01	

## 14.1.2 Piston:

Piston No.	Piston dia, (mm)					Clearance between piston and cylinder liner at the skirt of the piston, (mm)	
	Top(above top compression ring)		At skirt			As observed	Maximum permissible limit
	Thrust side	Non-thrust side	Thrust side	Non-thrust side	Max. permissible wear limit,		
1.	109.297	109.295	109.847	**	.	0.163	0.60
2.	109.299	109.292	109.848	**	-	0.162	
3.	109.300	109.295	109.845	**	-	0.175	

\*\* Not measurable due to piston design features.





**14.1.3 Ring end gap:**

Rings	Ring end gap, (mm)									Max. Permissible limit, (mm)
	Cylinder No.1			Cylinder No.2			Cylinder No. 3			
	Top	Middle	Bottom	Top	Middle	Bottom	Top	Middle	Bottom	
1 <sup>st</sup> comp. ring	0.60	0.60	0.60	0.60	0.60	0.60	0.55	0.55	0.55	1.75
2 <sup>nd</sup> comp ring	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.75
Oil ring	0.40	0.40	0.40	0.45	0.45	0.45	0.40	0.40	0.40	1.75

**14.1.4 Ring side clearance:**

Rings	Ring side clearance, (mm)			Max. Permissible clearance Limit, (mm)
	Piston-I	Piston-II	Piston-III	
1 <sup>st</sup> Compression ring	Tapered Ring			
2 <sup>nd</sup> Compression ring	0.082	0.083	0.079	0.25
Oil ring	0.067	0.068	0.070	0.25

**14.1.5 Main bearings:**

Bearing No.	Diametrical Clearance, (mm)	Crankshaft end float, (mm)	Max. permissible clearance limit, (mm)	
			Diametrical clearance	Crankshaft end float
1.	0.171 to 0.182	0.16	0.30	0.50
2.	0.157 to 0.166			
3.	0.169 to 0.180			
4.	0.166 to 0.178			

**14.1.6 Big end bearings:**

Bearing No.	Clearance, (mm)		Max. permissible clearance limit, (mm)	
	Diametrical	Axial	Diametrical	Axial
1.	0.120 to 0.128	0.25	0.30	0.60
2.	0.113 to 0.124	0.25		
3.	0.114 to 0.127	0.30		

**14.1.7 Valve, guides and timing gears:**

Any marked sign of overheating of valves : **None**  
 Pitting of seat/faces of valves : **None**  
 Any visual damage to the teeth of timing gears : **None**

**Spring Rate, (N/mm):**

-Intake valve : 15.9 to 16.4  
 -Exhaust valve : 15.7 to 15.9

Against the discard limit of 9.8 N/mm

**Clearance between valve guide and valve stem, (mm):**

Intake valve : 0.060 to 0.070  
 Exhaust valve : 0.057 to 0.064

Against the discard limit of 0.10 mm

**14.2 Clutch:**

Any marked wear on clutch friction plates : **None**  
 Condition of clutch release bearing : **Normal**  
 Condition of release levers & springs : **Normal**  
 Condition of pilot bearing : **Normal**  
 Presence of oil in clutch housing : **None**

Any marks on fly wheel/ pressure plate : **None**



- Overall thickness of clutch plate, (mm): :  
Transmission: 10.48 to 10.78

- Height of lining over rivet head, (mm):  
Transmission: 2.73 to 3.46

Wear up to rivet head and up to rivet head fouling

#### 14.3 Transmission gears:

Any visual damage, pitting & chipping of any transmission gear teeth. : None

Backlash between crown wheel and pinion, (mm) : 0.28

Gears are not discarded on the basis of backlash

#### 14.4 Brakes :

Description	Initial specified thickness of brake lining, (mm)	Measured overall thickness of brake disc after test, (mm)	Measured depth of oil groove, (mm)	Discard limit for depth of oil groove in brake lining (mm)
Left	4.75 ± 0.05	4.718 to 4.785	1.02 to 1.22	Wear till groove base
Right	4.75 ± 0.05	4.700 to 4.830	1.02 to 1.19	

#### 14.5 Front axle:

Condition of front axle seals and bearings : Normal

Any visual damage, pitting & chipping of front axle : None

Condition of centre pin & bushes : Normal

Clearance between centre pin and bushes, (mm) : 0.061 to 0.137

Against the discard limit of 0.80 mm

Clearance between king pin and bushes, (mm) : 0.087 to 0.136

Against the discard limit of 0.60 mm

#### 14.6 Steering system:

Visual condition of the components of complete steering assembly : Normal

#### 14.7 Starter motor & Alternator:

Presence of soil/oil in housing : None

Condition of bearings and other components : Normal

### 15. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

S. No.	Adjustments/Defects/Breakdowns and repairs	Tractor run hours
1.	- None-	



## 16. COMMENTS &amp; RECOMMENDATIONS

16.1 Evaluative (mandatory) / Non-evaluation (Non-mandatory) parameter applicable for qualifying Minimum Performance criteria as per Clause-4 (Table-1) of IS: 12207-2014 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: 12207:2014	Values declared by the applicant/ (D) Requirement (R)	As observed	Whether meets the require- ments (Yes/No.)
1	2	3	4	5	6	7
<b>16.1.1 PTO Performance :</b>						
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: -5 / +10% for PTO power >26 kW. -7.5/+10% for PTO power ≤ 26 kW or -5 / +10% for Engine power >26 kW. -7.5/+10% for Engine power ≤ 26 kW	35.5(D)	34.2	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	35.5(D)	34.2	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	270 (D)	278	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	210(D)	207.4	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10% (D)	27.2	Yes
<b>f) Maximum operating temperature, (°C)</b>						
	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.	130 (D)	107	Yes
	2) Coolant (water)	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)	93	Yes
g)	3) Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.7(D)/ 2.78(R)	0.42	Yes
h)	4) Smoke level	Evaluative	Maximum light absorption coefficient of 3.25 per metre or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	3.25 per metre (R)	0.30	Yes



1	2	3	4	5	6	7
<b>16.1.2</b>	<b>Drawbar performance :</b>					
a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	24.0(D) Minimum 21.23(R)	27.87	Yes
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast or with standard ballast as the case may be.	16.0 (D) Minimum 14.76(R)	20.0	Yes
c)	Maximum drawbar power without ballast, (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.	27.5 (D) Minimum 27.4 (R)	30.0	Yes
d)	Maximum transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	110 (D)	81	Yes
<b>16.1.3</b>	<b>Power lift and hydraulic pump performance :</b>					
a)	Maximum lifting capacity throughout the range of lift, (kN):					
1)	At hitch points	Non Evaluative	To be declared by manufacturer [Tolerance of minus 10%]	16.67 (D)	16.45	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 and it should be 16 kg/engine hp where the tractor is not provided with a PTO shaft	11.77 (D) Minimum 8.05 (R)	12.96	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	Observed value should not exceed 50 mm.	50 (D)	45	Yes
<b>16.1.4</b>	<b>Brake performance at 25 kmph:</b>					
a)	Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with road ballast, (m):					
1)	Cold brake	Evaluative	10	10 (R)	8.21	Yes
2)	Hot brake	Evaluative	10	10 (R)	8.86	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s <sup>2</sup> (N)	Evaluative	600	600 (R)	237 to 336	Yes



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
<b>16.1.5</b>	<b>Noise measurement :</b>					
a)	Maximum ambient noise emitted by the tractor, dB(A)	Evaluative	As per CMVR	88 (R)	83	Yes
b)	Maximum noise at operator's ear level, dB(A)	Evaluative	As per CMVR	96 (R)	94	Yes
<b>16.1.6</b>	<b>Amplitude of mechanical vibrations at :</b>					
1)	Left foot rest	Non Evaluative	100 microns (max)	100 (R)	190	No
2)	Right foot rest				240	No
3)	Seat (with driver seated)				150	No
4)	Steering Wheel				250	No
<b>16.1.7</b>	<b>Haulage requirements :</b>					
a)	Gross mass of the trailers, (tones):					
1)	Two wheel	Non Evaluative	--	5.0 (D)	5.0	Yes
2)	Four wheel		--	7.0 (D)	7.0	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
1)	Two wheel	Non Evaluative	--	5 to 6 (D)	5.26 to 5.30	Yes
2)	Four wheel	Non Evaluative	--	5 to 6 (D)	4.52	No
c)	Fuel consumption (ml/km/tonne):					
1)	Two wheel	Non Evaluative	--	30 to 40 (D)	37.71 to 37.95	Yes
2)	Four wheel	Non Evaluative	--	25 to 35 (D)	31.60	Yes
<b>16.1.8</b>	<b>Wetland cultivation :</b>					
	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	No ingress of mud and / or water was observed	Yes
1)	Clutch assembly	Evaluative				
2)	Brake housings	Evaluative				
3)	Front axle hubs	Evaluative				
4)	Engine oil	Evaluative				
5)	Transmission oil	Evaluative				
<b>16.1.9</b>	<b>Safety features :</b>					
a)	Guards against moving and hot parts	Evaluative	Belt drives, -pulley, silencer, hydraulic pipes (As per IS 12239 (part 2)	Requirements as per table no. 4	Conforms	Yes
b)	Lighting arrangement (Tractor having more than 1150 mm rear track width)	Evaluative	As per CMVR	--do--	Conforms	Yes



1	2	3	4	5	6	7
c)	Seating requirement (Tractors having more than 1150 mm rear track width)	Non-Evaluative	Should meet the requirements of IS 12343 (as amended from time to time)	--do--	Does not Conform	No
d)	Technical requirements for PTO shaft	Non-Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--do--	Conforms	Yes
e)	Dimension of three point linkage	Non-Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	--do--	Does not conform	No
f)	Specification of linkage drawbar	Non-Evaluative	Should meet the requirements of IS 12953 and IS 12362 (part 3) (as amended from time to time)	--do--	Conforms	Yes
	Swinging drawbars				Not Provided	Not Applicable
<b>16.1.10</b>	<b>Labelling of tractors (Provision of labelling plate):</b>					
1)	Make	Evaluative	Should conform to the requirements of CMVR	--	Swaraj	Yes
2)	Model	Evaluative		--	960 FE	Yes
3)	Year of manufacture	Evaluative		--	WX	Yes
4)	Engine number	Evaluative		--	47.3053/STG12161V	Yes
5)	Chassis number	Evaluative		--	WXCK67930100001	Yes
6)	Declaration of PTO power, (kW)	Evaluative		--	35.5	Yes
<b>16.1.11</b>	<b>Discard limit for:</b>					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer and supported by the printed literatures.	110.225	110.01 to 110.03	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.60	0.162 to 0.175	Yes
(c)	<b>Ring end gap (mm):</b>					
-	Top comp. ring.	Evaluative	-do-	1.75	0.55 to 0.60	Yes
-	2 <sup>nd</sup> comp. ring.		-do-	1.75	0.50	Yes
-	Oil ring.		-do-	1.75	0.40 to 0.45	Yes
(d)	<b>Ring groove clearance (mm):</b>					
-	Top comp. ring.	Evaluative	-do-	--	Tapered Ring	--
-	2 <sup>nd</sup> comp. ring.		-do-	0.25	0.079 to 0.083	Yes
-	Oil ring.		-do-	0.25	0.067 to 0.070	Yes
(e)	<b>Clearance of main bearings (mm):</b>					
-	Diametrical clearance	Evaluative	-do-	0.30	0.157 to 0.182	Yes
-	Crankshaft end float	Evaluative		0.50	0.16	Yes
(f)	<b>Clearance of big end bearings, (mm):</b>					
-	Diametrical	Evaluative	-do-	0.30	0.113 to 0.128	Yes
-	Axial	Evaluative	-do-	0.60	0.25 to 0.30	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.60	0.087 to 0.136	Yes
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.80	0.061to 0.137	Yes





T-1002/1526/2016

**SWARAJ 960 FE TRACTOR – Commercial (Initial)**

16.1.12 Literature (Submission to test agency)						
(a)	Operator manual	Evaluative	Provided/Not Provided	As relevant Code 8132)	per IS (IS	Provided Yes
(b)	Parts Catalogue	Evaluative	Provided/Not Provided	As relevant Code 8132)	per IS (IS	Provided Yes
(c)	Workshop/Service manual	Evaluative	Provided/Not Provided	As relevant Code 8132)	per IS (IS	Provided Yes

**16.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2014:**

S. No.	Characteristic	Requirements as per IS: 12207-2014	As observed	Whether meets the requirements (Yes/No.)
1	2	3	4	5
1.	Fitment of ROPS	With a provision for fitment of ROPS. If ROPS fitted it should meet the requirement of IS: 11821-1992(As amended from time to time) or equivalent international standards.	Not provided  ROPS not fitted	Not applicable  Not applicable
2.	Accessories	Trailer hitch, front tow hook, may be provided.	Not provided (Front tow hook)	No

**16.3 CATEGORY OF BREAKDOWNS / DEFECTS :**

S. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	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

**16.4 Conformity with following IS:**

- i) Guidelines for declaration of power and specific fuel consumption and labeling of agricultural tractors (First revision) [IS 10273:1987 (Reaffirmed in March, 2009)] : **Conforms**
- ii) Agricultural tractors – Rear mounted power take-off - Types 1, 2 and 3 (third revision)[IS: 4931-1995 (Reaffirmed in March, 2009)] : **Conforms**
- iii) Agricultural wheeled tractors - Rear mounted three-point linkage: Part 1 Categories 1, 2, 3 & 4 (fourth revision) [IS 4468(Part-I):1997 (Reaffirmed in March, 2007)] : **Does not conform**

- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 : Conforms  
(Reaffirmed in March, 2007)]
- v) Agricultural tractors - Operator's seat technical requirement : **Does not conform**  
(First revision) [IS 12343:1998 (first revision) (Reaffirmed in March, 2009)]
- vi) Guide for safety & comfort of operator of agricultural tractors: : **Does not conform**  
Part 1 General requirements (first revision) :[IS 12239 (PT-1)-1996 (Reaffirmed in March, 2007)]/ISO 4254-1:1989
- vii) Tractors and machinery for agriculture and forestry – : **Does not conform**  
Technical means for ensuring safety Part 2: Tractors (first revision) [(IS : 12239 (PT-2)-1999 (Reaffirmed in March, 2009)]
- viii) Tractors and machinery for agriculture and forestry, powered : **Does not conform**  
lawn and garden equipment – Symbols for operator controls and other displays [IS: 6283 (Part-1)-2006 (Reaffirmed in March, 2009) and IS:6283 (Part-2)-2007 (Reaffirmed in March, 2009)]
- ix) Guide lines for location and operation of operator controls on : **Does not conform**  
agricultural tractors and machinery (first revision) (IS: 8133 – 1983 (Reaffirmed in March, 2009))
- x) Agricultural Tractor & Machinery Lighting device for travel on : Conforms  
public roads [(IS: 14683-1999 (Reaffirmed in March, 2009))]

**16.5 Salient Observations:**

**16.5.1 Laboratory tests:**

**16.5.1.1 Mechanical Vibration:**

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

**16.5.1.2 Operator's seat:**

The following points of operator's seat do not meet the requirement of IS: 12343:1998 (re-affirmed in March, 2009).

Vertical distance from SIP to the centre of clutch pedal.

**16.5.1.3 Symbols for operator controls and displays:**

Grease lubricant type and frequency, oil lubricant type and frequency, PTO and Hand brake are not identifiable with the symbols as per IS:6283 (Part-1 &2) -2006&2007(re-affirmed in March, 2009). This should be pay attention for improvement as per IS.

**16.5.1.4 Three point linkage:**

Some of the parameters of three point linkages are does not meets the requirements of IS: 4468(Part-I):1997 (Reaffirmed in March, 2007)] .This should be looked into.

**16.5.5 General:**

The year of manufacture on labelling plate is given in the coded form. This should be provided in the numerical form as per IS: 10273 for better understanding of users.

**16.5.2 Wet land cultivation (Puddling operation):**

No ingress of mud and / or water was noticed during puddling operation of the tractor and meet the requirements of IS: 11082-1984 (Technical requirements of agricultural tractors for wetland operation). Therefore, the tractor is recommended as suitable for wetland operation (Puddling).





- 16.5.3 Haulage test:**  
Average distance traveled per litre of fuel consumption, (km) for four wheel trailer was observed as 4.52 km/l against the declaration of 5.0 to 6.0 km/l, which does not meet the requirements of IS: 12207-2014. This should look into for necessary corrective action.
- 16.6 Maintenance / Service Problems:**  
No noticeable maintenance/service problem was observed during the test.
- 16.7 Recommendation with regard to safety on tractor:**  
The following requirements, inter alia, may be considered for incorporation on the tractor:  
i) Provision for spark arresting device in exhaust system.  
ii) Cautionary notice as per para 11.2 of IS:12239 (Part-2)-1999  
iii) Front tow hook not provided.
- 16.8 Adequacy of Literature supplied with machine:**  
The following literature has been supplied with the tractor  
i) Operator's manual  
ii) Spare part's catalogue  
iii) Service manual
- 16.8.1** The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.

**17. Citizen charter**

Duration of Test	Test duration under citizen charter	Whether the report released within time frame given citizen charter	Remark, if any
10 Months (March,2015 to January,2015)	10 Months	Yes	None

**TESTING AUTHORITY:**

  
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