

[ONLINE TESTING]



SWARAJ 742 FE 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, CO-OPERATION AND FARMERS WELFARE)

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2. FUEL AND LUBRICANTS

2.1 Fuel : The High-speed diesel oil supplied by M/s Indian Oil Corporation Limited having density of 0.836 g/cc at 15°C was used.

2.2 Lubricants:

S. No.	Particulars	As recommended by the manufacturer	As used during the test
1.	Engine	SAE 20W40	SAE 20W40
2.	Air cleaner oil	SAE 30	Oil originally filled in the tractor was not changed
3.	Transmission, brake and hydraulic system	Servo, Transtrac 30	
4.	Steering system	Servo Transtrac 30	
5.	Grease	MP Grease	Servo grease MP

3. Essential Tests

3.1 Specifications

	<u>Previous sample</u>	<u>Present sample</u>
3.1.1 Tractor:		
Make	: Swaraj	
Model	: 742 FE	
Type	: Four wheeled, rear-wheel driven, general purpose, agricultural tractor.	
Month & Year of manufacture	: NA/2016	01/21
Chassis number	: WYCH92606100001	MBNBJ49AGMCA27 194
Country of origin	: India	
3.1.2 Engine:		
Make	: M/s. Swaraj Engines Limited	
Model	: SK342NR	
Type	: Four stroke, naturally aspirated, water cooled, direct injection, diesel engine.	
Serial number	: 42.1001/SWG13096	42.4001/SDA02356
3.1.2.1 Engine speed(Manufacturer's recommended production setting), (rpm):		
- Maximum speed at no load	: 2100 to 2200	
- Low idle speed	: 580 to 700	
- Speed at maximum torque	: 1000 to 1400	
Rated speed, (rpm):		
- For PTO use	: 2000	
- For drawbar use	: 2000	
3.1.3 Cylinder & Cylinder Head:		
Number	: Three	
Disposition	: Vertical, Inline	
Bore/stroke, (mm)	: 110/110 (apa)	
Capacity as specified by the applicant, (cc)	: 3136	
Compression ratio	: 17.8 (± 0.5) : 1	
Type of cylinder head	: Individual	

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Sl. No.	Parameters	Previous sample		Present sample
		Natural Ambient	High Ambient	Natural Ambient (Max. power Two Hours test)
i)	No load maximum speed, (rpm)	2113	2110	2162
ii)	Equivalent crankshaft torque at maximum power, (Nm)	134.6	127.7	129.0
iii)	Pressure at maximum power:			
	- Intake air, (kPa)	2.8	2.8 to 2.9	2.9 to 3.0
	- Exhaust gas, (kPa)	7.1 to 8.3	6.7 to 6.9	24.4 to 26.7

4.0 OTHER APPLICABLE TESTS

--	-- None--	--
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5.0 ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

S. No.	Adjustment/Defect/Breakdown and Repairs	Category of Breakdown	Tractor run hours
--	-- None--		--

6.0 SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

- 6.1** On the basis of test conducted the performance results have been summarized as evaluative (mandatory) and non – evaluative (not mandatory) parameters applicable for qualifying Minimum Performance Criteria as per clause-4 table-1 of Indian Standard **12207: 2019** for acceptance of tractor for the purpose of subsidies/NABARD financing for the applicable features for this tractor model.

Sl. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	Values declared by the applicant/ requirement		As observed		Whether present model meets the requirements (Yes/No.)
				Previous sample	Present sample	Previous sample	Present sample	
1.	2.	3.	4.	5 a	5 b	6 a	6 b	7.
6.1.1	PTO Performance :							
a)	Max. power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: ± 5% for PTO power or engine power >26 kW, ± 10% for PTO power or Engine power ≤ 26 kW.	28.18 (D)	28.18 (D)	28.2	27.0	Yes
b)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% Max.	265 (D)	265 (D)	261	279	Yes
6.1.2	Safety features :							
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulleys, silencer, hydraulics pipes(as per IS-12239 Part 2)			Meet the requirements		Yes

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1.	2.	3.	4.	5.	6.	7.	
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)		Do 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)	Dimensions of three point linkage	Non Evaluative	Should meet the requirements of IS: 4468 (Part-I) (As amended from time to time)		Do not meet the requirements	No	
f)	Specifications of linkage drawbar	Evaluative	Should meet the requirements of IS 12953 (As amended from time to time)		Meet the requirements	Yes	
g)	Specifications of Swinging drawbar (wherever fitted)	Evaluative	Should meet the requirements of IS 12362 (Part 3) (As amended from time to time)		Not provided	Not applicable	
h)	1) Maximum travelling speed at rated engine speed in reverse gears, kmph	Evaluative	Should not exceed 20 Kmph		11.38 kmph (Meet the requirements)	Yes	
	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.		Not applicable	--	
6.1.3	Labeling of tractors (Provision of labeling plate):						
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO in kW and year of manufacture in numerical MM YY Digit 01-12 in box No.1 for MM will represent the month and next two digit in the box No.2 for YY will represent the year of manufacturing		SWARAJ	Yes	
	2) Model	Evaluative			742 FE	Yes	
	3) Month & Year of manufacture	Evaluative			-	01/21	Yes
	4) Engine number	Evaluative			-	42.4001/SDA02356	Yes
	5) Chassis number	Evaluative			-	MBNBJ49AGMCA27194	Yes
	6) Declaration of maximum PTO power, kW	Evaluative				28.18	Yes
6.1.4	Literature (Submission to test agency)						
(a)	Operator manual	Evaluative	Provided/Not Provided		Provided	Yes	
(b)	Parts Catalogue	Evaluative	Provided/Not Provided		Provided	Yes	
(c)	Workshop/ Service manual	Evaluative	Provided/Not Provided		Provided	Yes	

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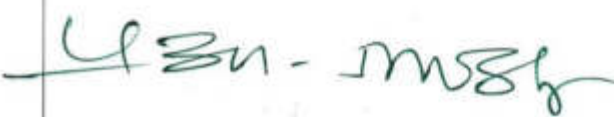
6.2 Conformity with following IS:	<u>Previous sample</u>	<u>Present sample</u>
i) Guide lines for declaration of power and specific fuel consumption and labeling of agricultural tractors (First revision) [IS10273: 1987]	: Conformed	Conforms
ii) Agricultural tractors – Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS:4931-1995]	: Conformed	Conforms
iii) Agricultural wheeled tractors - Three-point linkage: Part 2 Category 1N (Narrow Hitch) (Third Revision) [IS 4468 (Part-2):1993/ ISO 730-2:1979]	: Did not conform	Does not conform
iv) Drawbar for agricultural tractors – Link type [IS 12953:1990]	: Conformed	Conforms
v) Agricultural tractors - Operator’s seat technical requirement [IS 12343 –1998 (First revision)]	: Did not conform	Does not conform
vi) Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision): [IS 12239 (Pt-1) 1996/ISO 4254-1:1989]	: Did not conform	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)]	: Did not conform	Does not conform
viii) Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) IS: 8133-1983]	: Did not conform	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]	: Did not conform	Conforms
x) Agricultural Tractors and Machinery – Lighting device for travel on public roads (IS: 14683-1999)]	: Conformed	Conforms
6.3 Salient Observations:		
6.3.1 Laboratory tests:		
6.3.1.1 PTO Performance:		
i) The maximum power in present sample was observed as 27.0 kW against the declaration of 28.2 kW , which meets the requirement of IS: 12207-2019 with regard to tolerance limit.		
ii) The specific fuel consumption corresponding to maximum power in present sample was recorded as 279 g/kWh against the declaration of 265 g/kWh , which meets the requirement of IS: 12207-2019 with regard to tolerance limit.		
6.3.2 Recommendation with regard to safety on tractor:		
The following requirements, inter alia, may be considered for incorporation on the tractor:		
i) Width of operator’s seat should be as per relevant standard.		
ii) Fuel shut-off knob should be remained in “STOP” position without application of sustainable manual effort.		
iii) The spark arrester should be provided in the exhaust system.		
iv) PTO master shield should be provided as per relevant standard.		
v) Working clearance around various control levers should be provided as per as per relevant standard.		
6.4 Adequacy of Literature supplied with machine:		
6.4.1 The following literature was supplied with test sample for reference during the test.		
a) Operator’s manual for Swaraj 742 FE tractor model		
b) service manual for Swaraj 742 FE tractor model		
c) Spare part’s catalogue for Swaraj 742 FE tractor model		

The above manual/catalogue submitted by the applicant was not found adequate and following discrepancies found:

- i) As per supplied service manual, the steering oil capacity is mentioned common with transmission, however it have separate reservoir fitted with tractor. The same discrepancy was found in supplied spare parts catalogue.
- ii) In supplied service manual, the type of clutch is mentioned as "Single" in place of "Duel clutch".
- iii) In supplied service manual, type of gear box is mentioned as "Constant mesh" while the tractor model is fitted with "sliding mesh gears".
- iv) In supplied service manual, maximum PTO power was mentioned as 31.33 kW while the same is mentioned as 28.18 kW in technical specifications.
- v) In supplied operator's manual, engine air cleaner is specified as "Dry type" in place of "oil bath type".
- vi) In supplied operator's manual, make of fuel filters is mentioned as "Mico" however it is fitted with make "Bosch".
- vii) In supplied spare parts catalogue, type of brakes is mentioned as "Dry" in place of "oil immersed brakes".

- 6.4.2**
- i) However, these literatures should also be brought out in other vernacular languages of India for guidance of users.
 - ii) Printing quality of the images in the literature may be improved for the easy approach and understanding of the users and keeping paper quality in view printing may be done on both side of paper.

TESTING AUTHORITY:

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

The report compiled by: **NITESH KUMAR VERMA**, Agricultural Engineer

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7. Applicant's comments

Para no.	Our reference	Comments received from the applicant
7.1	3.1.20.1, 3.1.20.3 & 6.3.2	These requirements are being revisited for necessary corrective action at our end.
7.2	3.1.20.4 & 3.1.20.5	Study & trials are under progress for necessary corrective action.
7.3	6.4.1 & 6.4.2	Necessary suggested changes will be incorporated in literatures.

ANNEXURE- I

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS	HOURS
1.	Running-in	--
2.	PTO performance test	2.67
3.	Nominal speed test	0.50
B.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	0.50
TOTAL:		3.67