



## FORCE MOTORS LIMITED, BALWAN 450 S-DLX TRACTOR



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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T-856/1474/2015

**BALWAN 450 S-DLX TRACTOR- Commercial (Variant)**

**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 & Air cleaner oil	Servo pride 20W40 (same as base model)	As recommended
2.	Gearbox housing, Differential housing & steering housing	Servo Gear Super HD- 90 (same as base model)	Oil originally filled in the tractor was not changed
3.	Hydraulic system	Servo pride 20W40 (same as base model)	Oil originally filled in the tractor was not changed
4.	Brake	Servo pride 20W40 (same as base model)	Oil originally filled in the tractor was not changed
5.	Rear axle & rear final drive	Servo Gear Super – 90 (same as base model)	--do--
6.	Grease	Servo grease MP – 2 (same as base model)	MP Grease

**3. ESSENTIAL TESTS**

**3.1. SPECIFICATIONS**

	<u>Base Model</u>	<u>Variant Model</u>
<b>3.1.1 Tractor:</b>		
Make	: M/s Force Motors Ltd.	M/s Force Motors Ltd.
Model	: 450	BALWAN 450 S-DLX
Brand name	: NA	NA
Type	: Four wheeled, rear two wheels driven unit construction, general purpose Agricultural Tractor.	
Year of manufacture	: 2008	2014
Chassis Serial number	: T07018741D07	T070 22517 C 14
Country of Origin	: India	India
<b>3.1.2 Engine:</b>		
Make	: M/s. Force motors Ltd.	M/s. Force motors Ltd.
Model	: TD 1950 F	TD1950 F(41)
Type	: Water cooled, four stroke, DI naturally aspirated diesel engine.	
Serial number	: D10019247	D 10027373
<b>Engine speed (Manufacturer's recommended production setting)(rpm):</b>		
- Maximum speed at no load	: 2700 to 2750	2700 to 2800
- Low idle speed	: 700 to 750	700 to 750
- Speed at maximum torque	: 1500 to 1750	1300 to 1500
<b>Rated speed, (rpm):</b>		
- For PTO use	: 2500	2500



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	d)	IS: 12953	Conform	Conform	No Change
	e)	IS:12343	Does not conform	Does not conform	No Change
	f)	IS:12239 (Pt-I)	Conform	Does not conform	No Change
	g)	IS:12239 (Pt-II)	Does not conform	Does not conform	No Change
	h)	IS:8133 -1993	Conform	Conform	No Change
	i)	IS: 6283 - 1998	Does not conform	Does not conform	No Change
	j)	IS:14683	Conform	Conform	No Change
21.	xxi)	<b>Final Reduction:</b>	Same configuration in base & variant models		No change
22.	xxii)	Type of fuel Injection pump:	Inline Plunger	Inline Plunger	No Change
23.	<b>Change related to statutory/ regulatory requirements (As per Table 4):</b>				
	a)	Engine operating principle (spark/ compression ignition, two/four stroke)	Compression Ignition, 4 stroke, DI engine	Compression Ignition, 4 stroke DI engine	No change
	b)	Number & arrangement of cylinders	Three , vertical inline	Three, vertical inline	No change
	c)	PTO power (kW)	27	26	<b>Change</b>
	d)	Engine displacement (cc)	1947	1947	No Change
	e)	Rated engine speed (rpm)	2500	2500	No Change

## 6. 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: 2014 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: 12207-2014	Values declared by the applicant/ requirement		As observed		Whether Variant model meets the requirements (Yes/No.)
				Base model	Variant Model	Base model	Variant model	
1	2	3	4	5 a	5 b	6 a	6 b	7
6.1.1	<b>PTO Performance :</b>							
a)	- Max. Power under 2 hrs. test, (kW ) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: a)-5/+10% for PTO power >26 kW. b)-7.5/+10% for PTO power ≤ 26 kw	27 (D)	26 (D)	28	27.4	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	27.0 (D)	26.0 (D)	27.8	27.4	Yes

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c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+5%	265 (D)	265 (D)	261	274	Yes
d)	Maximum equivalent crankshaft torque(Nm)	Non Evaluative	± 8%	118 (D)	118 (D)	119.8	115.6	Yes
e)	Back-up torque, percent	Non Evaluative	10%, min.	10%, min.	10%, min.	9.2	10.5	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)	130 (D)	130	130	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.	110 (D)	110 (D)	97	95	Yes
				<b>Base model</b>	<b>Variant Model</b>	<b>Base model</b>	<b>Variant model</b>	
g)	Engine oil consumption g/kwh	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.60 (R)	2.6 (R)	0.48	2.01	Yes
h)	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 meter	3.25 Per meter	-	0.81 Per meter	Yes
<b>6.1.2 Power lift and hydraulic pump performance</b>								
<b>a. Maximum lifting capacity throughout the range of lift, (kN):</b>								
				<b>Base model</b>	<b>Variant Model</b>	<b>Base model</b>	<b>Variant model</b>	
	1) At hitch points	Non Evaluative	[Tolerance of minus 10%]	13.7 (R)	13.7 (R)	12.4 2	14.75	Yes
	2) With the standard frame	Evaluative	The lift capacity should at least be 18 kg/PTO hp. and it should be 16 kg/engine hp where the tractor is not provided with a PTO shaft	9.4	9.4	8.31	10.33	Yes



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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 minute. (mm)	Non Evaluative	The observed value should not exceed 50 mm	Nil	50	Nil	Nil	Yes
<b>6.1.3 Labelling of tractors (Provision of labelling plate):</b>								
1)	Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	Not specified	Force Motors Ltd.	Yes		
2)	Model	Evaluative		Balwan 450	BALWAN 450 S-DLX	Yes		
3)	Year of manufacture	Evaluative		Not specified	2014	Yes		
4)	Engine serial number	Evaluative		Not specified	D 10027373	Yes		
5)	Chassis serial number	Evaluative		T-07018741 D07	T07022517 C14	Yes		
6)	Declaration of PTO power, kW	Evaluative		26.9	26	Yes		
7)	Specific fuel consumption, (g/kwh)	Evaluative		277	265			

<b>6.1.4 CATEGORY OF BREAKDOWNS / DEFECTS :</b>					
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

<b>6.1.5 Literature (Submission to test agency)</b>						
(a)	Operator manual	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
(b)	Parts Catalogue	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
(c)	Workshop/Service manual	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes

<b>6.1.6 Optional requirements as per Clause-4 (Table-2) of IS:12207-2014:</b>					
S. No.	Characteristic	Requirements as per IS: 12207-2014		As observed	Whether meets the requirements (Yes/No.)
1.	Fitment of ROPS	With a provision for fitment of ROPS.		Not provided	NA
		If ROPS fitted it should meet the requirement of IS: 11821-1992		Not provided	NA
2.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.		Provided	Yes

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6.2	<b>Salient Observations:</b>		
6.2.1	<b>PTO Performance:</b>		
	i)	The maximum PTO power in case of base and variant models were observed as 28 & 27.4 kW respectively against the declaration of 27 & 26 kW which is within the specified limit.	
6.2.2	<b>Operator's Seat:</b>		
	Operator's Seat does not meet the minimum requirements of IS: 12343-1998, (Re-affirmed in March, 2009) with regard to the vertical distance from SIP to foot rest.		
6.2.3	<b>Symbols of operator's Controls and other displays</b>		
	Controls and displays are identifiable with symbols as per IS : 6283 (Part 1&2) – 1998, <b>except the following:</b>		
	i)	1.Hand Brake	
6.2.4	<b>Conformity with IS:12239 (Part-1)-1996 (Re-affirmed in March,2007) :</b>		
	Meets the requirements of IS: 12239 (Part-1) – 1996, <b>except the following:</b>		
	i)	Provision of spark arrester has not been provided.	
	ii)	Subsequent step of footsteps	
6.2.5	<b>Conformity with IS:12239 (Part-2)-1999 (Re-affirmed in March,2009) :</b>		
	Meets the requirements of IS:12239 (Part-2)-1999, <b>except the following:</b>		
	i)	The working clearance between the hydraulic position control lever & external circuit lever is less than 70 mm.	
6.2.6	<b>Labelling of tractor: -</b>		
	Labelling plate of tractor meets the requirements.		
6.2.7	<b>Maintenance / Service Problems:</b>		
	No noticeable maintenance or service problem was observed during the test.		
6.2.8	<b>Recommendation with regard to safety on tractor:</b>		
	The following requirements, inter alia, may be considered for incorporation on the tractor:		
	i)	The working clearance around draft control lever may be provide as per requirement of IS:12239(part-2)-1999	
	ii)		
6.2.9	<b>Adequacy of Literature supplied with machine:</b>		
	The following literature was supplied with the tractor by the manufacturer for reference during the test.		
	a)	Operator's manual	
	b)	Parts Catalogue	
	c)	Workshop/Service manual	
	It is, however, recommended that following literature may be brought out as per IS: 8132-1999 (reaffirmed in March, 2009) for the guidance of users & service personnel in national as well as regional language for this model of tractor.		

The result of the test carried out on variant model " BALWAN 450 S-DLX " have been compared with those on base model " BALWAN 450 " tractor & found within the limit, as specified in Indian Standard:12207-2014



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**TESTING AUTHORITY:**A.K.SINGH  
SENIOR AGRICULTURAL ENGINEERC.R.LOHI  
DIRECTOR

Test report compiled by Er.Shwetabh Singh, Senior Technical Assistant

**7. Citizen Charter**

Duration of test	Test duration under citizen charter	Whether the report release with in time frame given citizen charter	Remark, if any
25 July 2014 to 15 December 2014	10 Month	Yes	None

**8. APPLICANT'S COMMENTS**

Para No.	Our Reference	Applicant's comments
8.1	3.1.20.1 (i)	We will ensure dimensional conformance in series production
8.2	3.1.20.4 (ii)	We have noted the point and care will be taken to establish the compliance.
8.3	3.1.20.4(i)	We understand that spark arrester is necessary only on the engine which has smoke and also high oil consumption. Since our Balwan 450 S-DLX engine meets TREM III A norms in respect of exhaust pollution. Also the oil consumption is less hence fitment of spark arrester device may not be necessary.
8.4	3.1.20.5 (i)	We have noted the point and care will be taken to establish the compliance.

**Annexure-I**

TRACTOR RUN HOURS DURING TEST		
A.	LABORATORY AND TRACK TESTS	HOURS
1.	Running -in	-
2.	PTO Performance test	15.35
3.	Nominal speed test	0.75
4.	Hydraulic performance test	1.5
B.	Miscellaneous test and other run hours, including idle run transportation, trial and preparation for the tests.	5.62
Total (hrs)		23.22