



सत्यमेव जयते

भारत सरकार

कृषि एवं किसान कल्याण मंत्रालय

(कृषि, सहकारिता एवं किसान कल्याण विभाग, मशीनीकरण एवं प्रौद्योगिकी प्रभाग)

GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS WELFARE

(Deptt. of Agricultural, Cooperation & Farmer's Welfare, Mechanization & Technology Division)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

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CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO 9001: 2015 Certified Institute)

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T- 1236/1763/2019	CAPTAIN 280 4WD TRACTOR COMMERCIAL TEST (VARIANT) INCOMPLETE
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Manufacturer : M/s. Captain Tractors Pvt. Ltd.,
Padavala Road, Veraval (Shapar),
Taluka : Kotda Sangani,
Distt : Rajkot - 360024 (Gujarat) INDIA

Month: April	Test Report No. T- 1236/1763/2019	Year : 2019
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CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE –BUDNI	Page 2 of 30
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T- 1236/1763/2019	CAPTAIN 280 4WD TRACTOR COMMERCIAL TEST (VARIANT) INCOMPLETE
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Type of Test : **COMMERCIAL (Variant) - Incomplete**

Test code/Procedure : IS:5994-1998 (Reaffirmed in 2014) and IS: 12207-2014.

Period of Test : May, 2018 to December, 2018

Test Report No. : **T- 1236/1763/2019**

Month/Year : April, 2019

-
- i) The results reported in this report are observed values and no corrections have been applied for atmospheric and site conditions.
 - ii) The data given in this report pertain to the particular machine submitted by the applicant for tests.
 - iii) The results presented in this report do not in any way attribute to the durability of the machine.
 - iv) This report should not be reproduced in part or full without prior permission of the Director, Central Farm Machinery Training and Testing Institute, Budni (M.P.)
 - v) **This is an INCOMPLETE VARIANT TEST REPORT and should not be used for institutional finance/ subsidy purpose.**
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SELECTED CONVERSIONS

SELECTED CONVERSIONS			ABBREVIATIONS	
Sl. No	Units	Conversion Factor		
1	Force:		apa	As per applicant
	1 kgf	9.80665 N	TDC	Top Dead Centre
		2.20462 lbf	IS	Indian Standard
2	Power:		LHS/RHS	Left Hand Side/ Right Hand Side
	1 Mechanical horsepower	1.01387 metric horsepower	Hg.	Mercury
		745.7 metric horsepower	Temp.	Temperature
	1 metric horsepower	735.5 W	N.R.	Not recorded
	1 kW	1.35962 metric horsepower	rpm	Revolutions per minute
3	Pressure:		O.D/I.D	Outer diameter/ Inner diameter
	1 psi	6.895 kPa	N.A.	Not available/ Not applicable
	1 kgf/cm ²	98.067 kPa = 735.56 mm of Hg	PTO	Power take-off
	1 bar	100 kPa = 10 N/cm ²	R.H.	Relative Humidity
	1 mm of Hg	1.3332 m-bar		

C O N T E N T S

S. No.	Particulars of test	<u>PAGE</u>
1.	Scope of test	05
2.	Fuel & Lubricants	06
3.	Essential Test	06
	3.1 Specifications	06
	3.2 Nominal speed	18
	3.3 PTO Performance	18
4.	Other applicable tests	19
	4.1 Drawbar performance test	19
	4.2 Centre of gravity of test	21
	4.3 Turning ability test	21
	4.4 Noise measurement	21
5.	Adjustments, Defects, Breakdowns & Repairs	22
6.	Comparison Between Base Model and Variant Model	22
7.	Summary of Observations, Comments & Recommendations	25
8.	Citizen Charter	28
9.	Applicant's Comments	28
	Annexure – I & II	29

T- 1236/1763/2019	CAPTAIN 280 4WD TRACTOR COMMERCIAL TEST (VARIANT) INCOMPLETE
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Manufacturer	: M/s. Captain Tractors Pvt. Ltd., Padavala Road, Veraval (Shapar), Tal . : Kotda Sanagani, Distt. : Rajkot -360024 (Gujarat)
Test requested by	: The manufacturer
Selected for test by	: Applicant
Place of running-in	: At applicant's works
Duration of said running-in, (h):	
- Engine	: 18
- Transmission	: 08
Method of Selection	: The tractor was submitted directly by the applicant for test. Hence method of selection is not known.

1. SCOPE OF TEST

The “**CAPTAIN 250 DI**” tractor had undergone Initial Commercial Test at this Institute and test report No. **T- 1081/1606/2017 (April, 2017)** was released in April, 2017. Now the applicant has submitted an application vide letter No. Nil, dated on 11.09.2017 for testing of “**CAPTAIN 280 4WD**” tractor as a variant of “**CAPTAIN 250 DI**” tractor.

The applicant having enclosed a list of following differences in the technical specifications “**CAPTAIN 250 DI** ” and “**CAPTAIN 280 4WD**” and requested to test the “**CAPTAIN 280 4WD**” tractor as a variant of “**CAPTAIN 250 DI** ” tractor:-

The major features of Base model and Variant model are listed below:

S. No.	Parameters	Base Model Test Report No. T-1081/1606/2017(April)	Variant Model
1.	Make & Model of tractor	CAPTAIN & 250 DI	CAPTAIN & 280 4WD
2.	Type of wheel drive	2 WD	4WD
3.	Front axle	Dead front axle (2WD)	Live front axle (4WD)
4.	Reduction through crown wheel & pinion	4.273:1 (47/11T)	5.375:1(43/8T)
5.	Reduction through final drive	5.00 : 1 (70/14T)	4.5: 1 (54/12T)
6.	Front tyre size & ply rating	Pneumatic, ribbed 5.20 x14, 8PR	Pneumatic, traction, 6.00x12, 4 PR
7.	Make & size of front wheel rims	SSWL & 3.5 J x14	CWPL & 5J x12
8.	Make & size of rear wheel rims	CWPL 5.5 F x 18	CWPL W7 x 20
9.	Mass of tractor [front/rear/total] (kgf)	380/530/910	425/565/990

Subsequent to the examination of the case in the light of **Indian Standard: 12207-2014**, the following tests were considered to be carried out:

- Specification checking
- Nominal speed test
- PTO power performance test under normal ambient condition
- Drawbar performance test
- Noise Measurement

During the course of test, i.e. Noise at Operator's Ear Level, the maximum noise in gear H-1 was recorded as **98 dB(A)** against the maximum limit of **96 dB(A)** as per CMVR and does not meet the evaluative requirement of IS: 12207-2014.

T- 1236/1763/2019	CAPTAIN 280 4WD TRACTOR COMMERCIAL TEST (VARIANT) INCOMPLETE
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On the request of the applicant, the transmission system of tractor was checked and found that the thrust washers (shims) of sun & star pinions of differential system was damaged and replace with new one (Pt. No. 021521; 021522; 020248; and 020249). Again the test was conducted and maximum noise level in H-2 gear was recorded as **99 dB (A)** against the maximum limit of **96 dB (A)** as per CMVR and does not meet the evaluative requirement of IS: 12207-2014. Therefore, the applicant has requested to withdraw the said test sample from the test, vide letter no. Nil, dated 24.01.2019. **The applicant's request was accepted by the competent authority and hence this incomplete test report is released.**

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	SAE 15W40	SAE 15W40
2.	Main gear box and high-low gear box assembly, Rear differential unit, rear axle , rear final drive & hydraulic system	SAE 90	Oil originally filled in the tractor was not changed
3.	Steering gear box	SAE 90	-do-
4.	Grease	MP-3	MP-3

3. ESSENTIAL TESTS

3.1 SPECIFICATIONS [As Specified by the Applicant]

3.1.1 Tractor:	<u>Base model</u>	<u>Variant model</u>
Make	: Captain	Captain
Model	: 250 DI	280 4WD
Type	: Four wheeled, rear wheel driven, standard agricultural tractor.	Four wheeled, four wheel driven, standard agricultural tractor
Year of manufacture	: 2016	2018
Chassis serial number	: D216010513	D118002122
Country of origin	: INDIA	INDIA
3.1.2 Engine:		
Make	: Simpson & Co. Ltd. Chennai	Simpson & Co. Ltd. Chennai
Model	: Simpsons TIII A SC213-F20	Simpsons TIII A SC213-F20.1
Type	: Four stroke, water cooled, naturally aspirated, direct injection, diesel engine	
Serial number	: SC21304397	SC21309887
Country of origin	: India	India
Engine speed (rpm), (Manufacturer's recommended production setting),:		
- Maximum speed at no load	: 2300 to 2400	2600 to 2900
- Low idle speed	: 700 to 800	800 to 1100
- Speed at maximum torque	: 1200 to 1300	1400 to 1700
Rated speed, (rpm):		
- For PTO use	: 2200	2500
- For drawbar use	: 2200	2500

		<u>Base model</u>	<u>Variant model</u>
3.1.3 Cylinder & Cylinder Head:			
Number	:	Two	
Disposition	:	Vertical ,Inline	
Bore/stroke, (mm)	:	95 / 91	
Capacity as specified by the applicant, (cc)	:	1290	
Compression ratio	:	18.3 ± (0.3) : 1	
Type of cylinder head	:	Integral	
Type of cylinder liners	:	Wet, Non- replaceable	
Type of combustion chamber	:	Direct combustion, re-entrant cavity on piston crown.	
Arrangement of valves	:	Overhead, Inline	
Valve clearance (cold/hot):			
- Inlet valve, (mm)	:	0.25/0.25	
- Exhaust valve, (mm)	:	0.30/0.30	
3.1.4 Fuel System:			
Type of fuel feed system	:	Gravity and force feed	
3.1.4.1 Fuel tank:			
Capacity, (l)	:	20.2	20.0
Location	:	Above clutch housing	
Provision for draining of sediments/ water	:	Not provided	
Material of fuel tank	:	Sheet metal	
3.1.4.2 Water Separator:	:	Not provided	
3.1.4.3 Fuel feed pump:			
Make	:	Bosch, India	
Type	:	Plunger	
Model/Group combination No.	:	FP/KS22AD62, 9 440 030 029	9 440 030 029
Provision of sediment bowl	:	Provided	
Method of drive	:	Through camshaft of fuel injection pump	
Location	:	Integrated with fuel injection pump	
3.1.4.4 Fuel filters:			
Make	:	Bosch, India	
Model/Group combination No.	:	F002 H20 151	
Number	:	Two	
Type of elements:			
-Primary	:	Cloth	
-Secondary	:	Paper	
Capacity of final stage filter, (l)	:	0.45	
3.1.4.5 Fuel Injection pump:			
Make	:	Bosch, India	
Model/Group combination No.	:	F002 A4Z 001	F002 A4Z R05
Type	:	Inline, Plunger	
Serial number	:	51935045	719396929
Method of drive	:	Through timing gears.	
3.1.4.6 Fuel injectors:			
Make	:	Bosch, India	
Model	:	F002 C8 0015	
Type	:	Multi hole (Five holes)	
Manufacturer's production pressure setting, (MPa)	:	26 ± 0.8	
Injection timing	:	10 ± 1° before TDC	14 ± 1° before TDC

T- 1236/1763/2019	CAPTAIN 280 4WD TRACTOR COMMERCIAL TEST (VARIANT) INCOMPLETE
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3.1.4.7	Governor:	<u>Base model</u>	<u>Variant model</u>
	Make :	Bosch, India	
	Model/Group combination No. :	RSV 425...1100A2C1762R	RSV 425...1250A2C1824R
	Type :	Mechanical, centrifugal variable speed	
	Rated engine speed, (rpm) :	2200	2500
	Governed range of engine speed, (rpm) :	700 to 2400	700 to 2900
3.1.5	Air intake system:		
3.1.5.1	Pre-cleaner:		
	Make :	Captain	Not provided
	Type :	Centrifugal with transparent dust collector	Not applicable
	Location :	Above main air cleaner Inlet tube on LHS of Engine.	Not applicable
3.1.5.2	Air cleaner:		
	Make :	Captain	Luman
	Type :	Oil bath	Dry type
	Location :	On LHS of engine, outside the bonnet	
	Oil capacity, (l) :	0.3	Not applicable
	Range of suction pressure at maximum power, (kPa) :	1.9 to 2.1	1.8
	No. of element :	--	One
	Size of element, (mm) :	--	OD ID 111 55
	Length of element, (mm) :	--	237
	Oil change period/ Maintenance schedule :	After every 50 hours of operation in normal working condition.	Clean the element after every 300 hours or red indication by service indicator.
3.1.6	Exhaust System:		
	Type of silencer :	Updraft ,Cylindrical	
	Position of silencer outlet with respect to SIP, (mm):		
	- Vertical :	550	654
	- Longitudinal :	1055	1120
	- Lateral :	250, (RHS)	265 (on RHS)
	Range of exhaust gas pressure at maximum power (kPa) :	9.2 to 13.0	16.6 to 18.1
	Provision of spark arresting device :	None	None
	Provision against entry of rain water :	A bend is provided at the top of silencer	
3.1.7	Lubricating system:		
	Type :	Pressure feed system	
	Oil sump capacity, (l) :	3.80	4.0
	Total lub oil capacity, (l) :	4.10	5.0
	Oil change period :	First after 50 hours and subsequently after every 250 hours of operation	
	Cooling device, (if any) :	None	None
	Filters:		
	Type :	Full flow ,spin on, throw away type	
	Number :	One	One

		<u>Base model</u>	<u>Variant model</u>
	Pump:		
	Type :	G Rotor type	
	Method of drive :	Through timing gear.	
	Minimum permissible pressure, (kPa) :	150	
3.1.8	Cooling system:		
	Type :	Forced circulation of coolant / water	
	Name or brand name of coolant :	Castrol (apa)	
	Coolant water ratio :	1:1	
	Details of Pump :	Centrifugal, semi open impeller of 66.58 mm diameter, having six vanes and driven through crankshaft pulley by a cogged V-belt in common with alternator.	
	Diameter of fan, (mm) :	Suction type having six polypropylene blades of 292 mm diameter, and mounted on water pump shaft.	
	Means of temperature control :	Thermostat	
	Bare radiator capacity, (l) :	2.12	2.2
	Total coolant capacity, (l) :	4.60	4.5
	Radiator cap pressure, (kPa) :	88	88
3.1.9	Starting System:		
	Type :	12 V DC, Electrical	
	Aid for cold starting :	None	
	Any other device provided for easy starting :	None	
3.1.10	Electrical System:		
3.1.10.1	Battery:		
	Make & model :	Exide, 65D 26RMF	
	Type :	12V, Lead acid	
	Capacity and rating :	65 Ah at 20 hours discharge rating.	70 Ah at 20 hours discharge rating.
	Location :	On RHS of clutch housing in a separate box.	
3.1.10.2	Starter:		
	Make :	Lucas TVS	
	Model :	M70 GRS	
	Type :	Pre-engaging, solenoid operated	
	Power rating :	12V, 1.2 kW	
	Serial number :	Not available	26024566A
3.1.10.3	Generator:		
	Make :	Autolek	
	Model :	ALM 4005B	
	Type :	Alternator	
	Output rating :	12V, 36 Amp	
	Method of drive :	Through crankshaft pulley by a cogged V-belt.	
3.1.10.4	Voltage regulator :	In-built in alternator	

T- 1236/1763/2019	CAPTAIN 280 4WD TRACTOR COMMERCIAL TEST (VARIANT) INCOMPLETE
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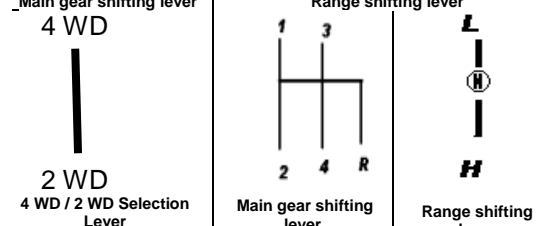
3.1.10.5 Details of lights:

Description	No. & capacity of bulbs	Height of the centre of beam above ground level,(mm)	Size of beam, (mm)	Distance between centre of the beam and outside edge of tractor at standard rear track setting, (mm)
Base model:				
Front Lights				
Head lights	2, 12V, 35/35W	935	140 x 90	417
Parking lights	2, 12V, 5W	915	40 x 60	165
Turn / Hazard lights	2, 12V, 21W	915	75 x 60	90
Rear lights				
Stop lights	2, 12V, 21 W	885	40 x 65	162
Turn / Hazard lights	2, 12V, 21W	885	40 x 65	80
Reflectors (Red)	2	885	35 x 65	120
Plough light	1, 12V, 55W	1045	110 Ø	210
Registration plate lights	Part of rear tail light assembly			
Tail light	1, 12V, 5W	885	40 x 65	120
Variant model:				
Front Lights				
Head lights	2, 12V, 35/35W	975	140 x 100	420
Parking lights	2, 12V, 5W	875	40 x 65	130
Turn / Hazard lights	2, 12V, 21W	875	75 x 65	75
Rear lights:				
Stop lights	2, 12V, 21 W	850	40 x 60	100
Turn / Hazard lights	2, 12V, 21W	850	40 x 68	135
Reflectors (Red)	2	850	40 x 60	100
Plough light	1, 12V, 55W	1055	110 φ	210
Registration plate lights	Part of rear tail light assembly			
Tail light	1, 12V, 5W	850	40 x 60	100

3.1.11 Instrument panel details:

	<u>Base model</u>	<u>Variant model</u>
i) Engine speed-cum-cumulative digital run hour meter (0 – 30 x 100)	Provided	Provided
ii) Water temperature gauge with colour zone	Provided	Provided
iii) Fuel level gauge with colour zone	Provided	Provided
iv) Lubricating oil pressure indicator	Provided	Provided
v) Battery charging warning indicator	Provided	Provided
vi) Head light long beam on indicator	Provided	Provided
vii) Turn / hazard indicator light	Provided	Provided
viii) Hazard light switch	Provided	Provided
ix) Mobile charging socket	Provided	Provided
x) Hand accelerator lever	Provided	Provided
xi) Steering control wheel	Provided	Provided
xii) Rear view mirror	Provided	Provided
xiii) Fuel shut-off knob	Provided	Provided

T- 1236/1763/2019	CAPTAIN 280 4WD TRACTOR COMMERCIAL TEST (VARIANT) INCOMPLETE
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	<u>Base model</u>		<u>Variant model</u>
3.1.12 Transmission System:			
3.1.12.1 Clutch:			
Make	Luk		
Type	Single, Dry friction plate, diaphragm type		
No. of friction plate(s)	One		
Size, (mm):OD/ID	211.55 / 140.47		213/141
Method of operation:	By pressing the clutch pedal, provided on LHS		
3.1.12.2 Gear box:			
Make	Captain (apa)		
Type	Mechanical, Combination of constant mesh and synchromesh gears.		
No. of speeds:			
- Forward	08		08
- Reverse	02		02
Location of main gear shifting levers	In the centre, in-front of operator's seat		
Location of high –low gear shifting levers	On LHS, in-front of operator's seat		
Gear shifting pattern of base model			
Gear shifting pattern of variant model			
Oil capacity, (l)	3.50		3.25
Oil changing period	Every 500 hours of operation.		
3.1.12.3 Range of nominal Speed (Kmph):			
- Forward	3.10 to 24.47		3.22 to 24.54
- Reverse	2.41 to 4.59		2.43 to 4.63
3.1.12.4 Rear Differential Unit:			
Type	Crown wheel and pinion with differential unit, accommodated inside differential housing.		
Reduction through crown wheel & bevel pinion	4.273:1 (47/11T)		5.375:1(43/8T)
Oil capacity of final drive, (l)	16.5 (In common with final drive & hydraulic system)		
Oil changing period	Every 500 hours of operation.		
3.1.12.5 Differential lock:	Not provided		
Rear axle & final drive:			
Type	Bull and pinion gear reduction unit, accommodated outside differential housing on both sides.		
Reduction through final drive	5.00 : 1 (70/14T)		4.5: 1 (54/12T)

T- 1236/1763/2019	CAPTAIN 280 4WD TRACTOR COMMERCIAL TEST (VARIANT) INCOMPLETE
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3.1.12.6	Front Differential Unit:		<u>Base model</u>	<u>Variant model</u>
	Type	:	Not applicable	Crown wheel and pinion with differential unit, accommodated inside differential housing.
	Reduction through crown wheel & pinion	:	Not applicable	4.777 :1 (43/9T)
	Differential lock:	:		Not provided
3.1.12.7	Front axle and final drive:	:		
	Make	:	Captain	Not available
3.1.13	Power lift (Hydraulic System):	:		
	- Make	:	Captain	
	- Type	:	Open centre, Live, ADDC	
	- No. and type of cylinder	:	One, single acting	
	-Type of linkage lock for transport	:	Hydraulic, mechanical knob in fully closed position act as a transport lock.	
3.1.13.1	Hydraulic pump:	:		
	- Make	:	Not available	Dowty
	- Type	:	External Gear	
	- Location	:	Mounted on in front of engine.	
	-Method of drive	:	Driven through crankshaft pulley	
	No. & Type of filter	:	Two	
		i)	Fine wire mesh strainer at suction line, inside the gearbox.	
		ii)	Full flow spin on throw away type	
	Hydraulic oil capacity, (l)	:	16.5 (In common with differential & final drive)	
	Oil change period	:	Every 500 hours of operation.	
	Provision for external tapping	:	Provided	
	Details of control levers:			
		i)	Position control lever (Black)	
		ii)	Draft control lever (Red)	
		iii)	Mode selection valve knob at distributor	
	Method of draft sensing	:	Through top link	

3.1.13.2 Three point linkage:

Sl. No.	Observations	As per IS: 4468- (Part-2) -1993 Re-affirmed (October, 2017) (Cat. 1N Narrow Hitch), (mm)	As measured (mm)		Remarks in case of variant model	
			Base model	Variant model		
1	2	3	4	5	6	
I.	Upper hitch points:					
	a)	Dia of hitch pin hole	19.30 to 19.51	20.54	20.52	Does not conform
	b)	Width of ball	44.0 (max.)	37.50	37.97	Conforms
II.	Lower hitch points:					
	a)	Dia of hitch pin hole	22.40 to 22.73	22.54	22.50	Conforms
	b)	Width of ball	34.8 to 35.0	35.00	34.85	Conforms
III.	Lateral distance from lower hitch point to centre line of tractor.		218	218	218	Conforms

T- 1236/1763/2019	CAPTAIN 280 4WD TRACTOR COMMERCIAL TEST (VARIANT) INCOMPLETE
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1	2	3	4	5	6
IV.	Lateral movement of lower hitch points	50 (min)	70	117	Conforms
V.	Distance from end of power take-off to centre of lower hitch point (lower links in horizontal position)	300 to 375	345	345	Conforms
VI.	Transport height	600 (min)	695	715	Conforms
VII.	Power range (Without force)	420 (min)	435	440	Conforms
VIII.	Leveling adjustment	75 (min)	250	250	Conforms
IX.	Lower hitch point tyre clearance	100 (min)	255	140	Conforms
X.	Lower hitch point height	200 (max)	200	200	Conforms

3.1.13.3 Drawbar:

3.1.13.3.1 Linkage Drawbar [Refer Fig. 1]:

Notation	As per IS: 12953-1990, (Re-affirmed in 2017) & IS: 4468 (Pt-2)- 1993, (Re-affirmed in October, 2017), (mm) (Cat 1N)	As measured, (mm)		Remarks in case of variant model
		Base model	Variant model	
A	400 ± 1.5	400	401	Conforms
B	75 (min)	80.00	80	Conforms
C	30 (min)	32.10	32	Conforms
D∅	21.79 to 22.0	22.00	21.9	Conforms
E	39.0 (min)	39.00	39.9	Conforms
F∅	12.0 (min)	12.00	12	Conforms
G	15.0 (min)	15.00	15.6	Conforms
H∅	25 ± 1	25.00	25	Conforms
J	80 ± 1.5	80.00	79.7	Conforms
No. of holes	05	05	5	Conforms

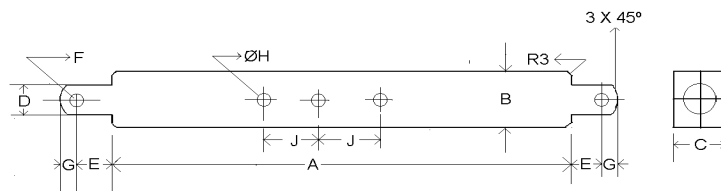


Fig. 1: DIMENSIONAL NOTATIONS FOR LINKAGE DRAWBAR

	Base model	Variant model
3.1.13.3.2 Swinging drawbar	Not provided	
3.1.14 Power take-off shaft:		
Type	Type-I, Not independent	
Method of engaging	By a hand lever, provided on RHS and in front of operator's seat.	
No. of shaft(s)	One	One
Distance behind rear axle, (mm)	280	285
PTO speed corresponding to rated engine speed, (rpm):		
Gear No.	Base model	Variant model
L1 and H1	551	627
L2 and H2		1055
L3 and H3		1697
L4 and H4		2500
LR and HR		470

Engine to PTO speed ratio:	Base model	Variant model
Gear No.:		
L1 and H1	3.99 : 1	3.993 :1
L2 and H2		2.371 :1
L3 and H3		1.474:1
L4 and H4		1 :1
LR and HR		5.314 : 1
Whether PTO Shaft is capable of transmitting the full power of engine	Yes	

3.1.14.1 Specifications of Power Take-Off Shaft:				
Specification	As per IS:4931-1995	As observed		Remarks in case of variant model
	(Type-I)	Base model	Variant model	
1	2	3	4	5
Nominal speed (rpm)	540 ± 10	540 rpm of PTO shaft corresponds to 2156 rpm of engine		Conforms
No. of splines	6	6	6	Conforms
Direction of rotation	Clockwise	Clockwise	Clockwise	Conforms
Location	The position of the centre of the end of PTO shaft shall be within 50 mm to right or left of the centre line of the tractor.	Centrally located	Centrally located	Conforms
Dimensions (mm) (See Fig. 2):				
D∅	34.79 ± 0.06	34.84	34.77	Conforms
d∅	28.91 ± 0.05	28.65	28.88	Conforms
B∅	29.4 ± 0.1	29.30	29.43	Conforms
A∅(optional)	8.3 ± 0.1	8.30	8.35	Conforms
W	8.69-0.09 -0.16	8.53	8.68	Conforms
A	7	7	7	Conforms
b(optional)	25 ± 0.5	25.0	25.3	Conforms
C	38	38	38	Conforms
X	30°	30°	30	Conforms
B	76 (min)	82	87	Conforms
h*	450 to 675	440	465	Conforms

*350 mm tractors having track width less than 1150 mm

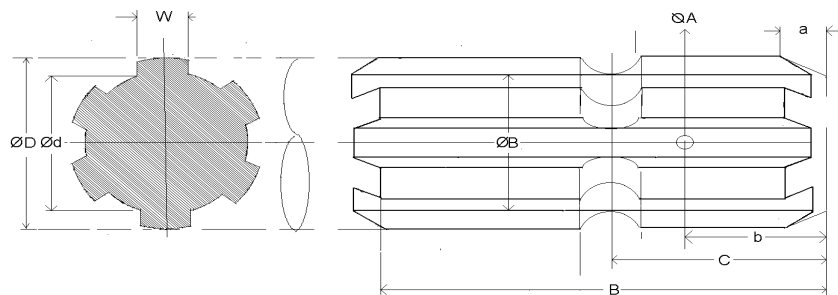


Fig. 2: DIMENSIONAL NOTATIONS FOR TYPE-I POWER TAKE-OFF SHAFT

3.1.14.2 Power Take-Off Shaft Shield	Base model	Variant model
:	Not provided	Not provided

		<u>Base model</u>	<u>Variant model</u>
3.1.15	Towing hitch:		
3.1.15.1	Front:	Not provided	
3.1.15.2	Rear:		
	Type	Clevis	
	Location	At the rear of differential housing	
	Height above ground level, (mm)	350 (Fixed)	
	- Type of adjustment	None	
	Distance of hitch point, (mm):		
	- From rear axle centre	330	315
	- From power take-off shaft end	50	30
	Dia of pin hole, (mm)	27.75	27.72
	Width of clevis, (mm)	76.40	76.88
3.1.16	Steering:		
	Make	Rane	
	Type	Mechanical, recirculation ball & nut type having single drop arm.	
	Location	Above clutch housing	
	Method of operation	Manual, by steering control wheel	
	Diameter of steering control wheel, (mm)	380	400
	Steering oil capacity, (l)	0.400	0.30
	Oil change period	Every 500 hours of operation.	
3.1.17	Brakes:		
3.1.17.1	Service Brake:		
	Make	Captain (apa)	
	Type	Mechanical, internal expanding shoe & drum.	
	Location	On rear axle shafts, outside the differential housing	
	Area of liners. (cm ²)	82.08(on each wheel side)	96.9 (on each wheel side)
	Material of liners	Non Asbestos (apa)	
	Method of operation	Independent / combined pedal operation by right foot.	
3.1.17.2	Parking Brake:		
	Type	Mechanical arrangement for locking the service brake pedals.	
	Method of operation	By locking the service brake pedals by a hand lever provided on RHS of operator's seat.	
3.1.18	Wheel Equipment:		
3.1.18.1	Steering Wheel(s):		
	Make	Speed ways	MRF
	Number	Two	Two
	Type of tyre	Pneumatic, ribbed	Pneumatic, traction
	Size & Ply rating	5.20-14 & 8 PR	6.00-12 & 4PR
	Maximum permissible loading capacity of each tyre at 210 kPa pressure, (kg)	375	325
	Recommended inflation pressure, kPa :		
	- for field work	216	170
	- for transport	245	200
	Track width, (mm)	860 (standard), 960	860 (std.)
	Method of changing track width	By reversing the rim	
	Make & size of rim	SSWL 3.5J x 14	CWPL ,5 J x 12

T- 1236/1763/2019	CAPTAIN 280 4WD TRACTOR COMMERCIAL TEST (VARIANT) INCOMPLETE
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3.1.18.2	Driving wheel:	<u>Base model</u>	<u>Variant model</u>
	Make :	MRF	MRF Shakti
	Number :	Two	Two
	Type of tyre :	Pneumatic, traction	Pneumatic, traction
	Size & Ply rating :	8.00-18 & 4	8.3-20 & 6 PR
	Maximum permissible loading capacity of each tyre at 160 kPa pressure, (kg) :	515	710
	Recommended inflation pressure, (kPa)		
	- for field work :	84	90
	- for transport :	157	160
	Track width, (mm) :	830 (standard), 950	825 (std.), & 950
	Method of changing track width :	By reversing the wheel discs.	
	Make & size of rim :	CWPL,5.5 Fx18	CWPL, W7 x 20
3.1.18.3	Wheel base (mm) :	1555	1545
	Method of changing wheel base, if any :	None	None
3.1.19	Operator's seat:		
	Make :	Captain (apa)	
	Type :	Cushioned with back rest	
	Type of suspension :	Two helical springs	
	Type of dampening :	None	
	Range of adjustment,(mm):		
	- Vertical (back rest) :		Nil
	- Lateral :		Nil
	- Longitudinal :	± 45	± 25
3.1.20	Provision for safety and comfort of operator:		
3.1.20.1	Conformity with IS:12343-1998:		
	Operator's seat meets the requirements of IS:12343-1998, (Re-affirmed in March, 2009) except the following:		
	<u>Base model</u>	<u>Variant model</u>	
	(i) Vertical distance from SIP to centre of steering control wheel & accelerator pedal	Meets the requirement.	
	(ii) Vertical distance from SIP from foot rest.	--	
3.1.20.2	Conformity with IS: 6283 (Part-1 & 2)-2006 & 2007(Re-affirmed in March, 2009):		
	Controls and displays are identifiable with symbols as per IS : 6283 (Part 1&2) – 1998, except the following:		
	<u>Base model</u>	<u>Variant model</u>	
	(i) The symbol for pressurized, open & slowly	Meets the requirement.	
	(ii) Grease lubricant frequency.		
3.1.20.3	Conformity with IS:8133-1983 (Re-affirmed in March, 2009):		
	Meets the requirements of IS:8133 - 1983 (reaffirmed March, 2009, except the following:		
	<u>Base model</u>	<u>Variant model</u>	
	(i) Meets the requirements	(i) The fuel shut off knob does not remain in STOP position without sustained manual effort.	

3.1.20.4 Conformity with IS: 12239 (Part-1)-1996 (Re-affirmed in March, 2007):

Meets the requirements of IS:12239(Part-1)-1996, **except the following:**

<u>Base model</u>	<u>Variant model</u>
(i) The spark arrester has not been provided in the exhaust system.	(i) The spark arrester has not been provided in the exhaust system
(ii) Operator's work place hand holds for easy mounting & dismounting of the operator	(ii) Operator's work place hand holds for easy mounting & dismounting of the operator

3.1.20.5 Conformity with IS:12239 (Part-2)-1999 (Re-affirmed in March, 2009):

Meets the requirements of IS:12239 (Part-2)-1999, except the following:

<u>Base model</u>	<u>Variant model</u>
(i) The working clearance around the hand control between draft control lever & mudguard is less than 70 mm	(i) The working clearance between the position and draft control lever is less than 70 mm
--	(ii) Power take off master shield has not been provided.
--	(iii) Provision of differential lock.
--	(IV) Provision for ballasting front axle

3.1.20.6 Conformity with IS: 14683 – 1999 (Re-affirmed in March, 2009) :

Base model | Variant model

Lighting meets the requirements of IS: 14683 – 1999.

3.1.21 Mass of tractor Kg):Unballast	<u>Base model</u>	<u>Variant model</u>
- Front :	380	425
- Rear :	530	565
- Total :	910	990

3.1.22 Over all dimensions (mm):	<u>Base model</u>	<u>Variant model</u>
- Length :	2630	2640
- Width :	1075	1070
- Height :	1700	1760
Minimum ground clearance :	230	258
	(Below transmission housing)	

3.1.23 Labeling of tractor as per IS: 10273-1987 (Reaffirmed in March, 2009):

The labeling plate riveted on inner side of LHS mudguard, provides the following information.

Name of Manufacturer	:	CAPTAIN TRACTORS PVT. LTD. Padavla Road ,Veraval (Shapar),Tal:Kotda Sangani,Dist. Rajkot (Gujarat) INDIA
Make	:	CAPTAIN
Model	:	280 4WD
Chassis Serial Number	:	D118002122
Engine Serial Number.	:	SC21309887
Year of Manufacturer	:	2018
Maximum PTO Power, (kW)	:	16.8
Specific fuel consumption, (g/kWh)	:	245

3.1.24 Number of external lubricating points:	<u>Base Model</u>	<u>Variant model</u>
- Oiling :	Nil	Nil
- Grease cups :	02	Nil
- Grease nipples :	07	07

3.1.25 Colour of tractor: Base model | Variant model
 Chassis & engine : Chocolate gray
Sheet metal:
 Bonnet & Mudguard : Red
 Rim & disc : Silver

3.2 NOMINAL SPEED TEST

Movement	Gear No.	No. of engine revolutions for one revolution of driving wheel		Nominal speed at rated engine speed when fitted with 8.00-18 size tyres of 395 mm radius index, (kmph)	Nominal speed at rated engine speed when fitted with 8.3-20 size tyres of 420 mm radius index, (kmph)	Variation in nominal speed (%)
		Base model	Variant model	Base model	Variant model	
Forward	L1	108.57	122.84	3.02	3.22	6.62
	L2	64.39	73.04	5.09	5.42	6.48
	L3	39.95	45.28	8.20	8.75	6.71
	L4	27.21	30.77	12.04	12.88	6.98
	H1	56.89	64.37	5.76	6.15	6.77
	H2	33.72	38.23	9.72	10.35	6.48
	H3	20.96	23.71	15.63	16.70	6.85
	H4	14.23	16.11	23.03	24.54	6.56
Reverse	RL	144.46	163.37	2.27	2.43	7.05
	RH	75.74	85.52	4.33	4.63	6.93

	<u>Base model</u>	<u>Variant model</u>
Number of revolutions of front wheels for one revolution of rear-wheels :	Not applicable	1.369

3.3 PTO PERFORMANCE TEST

S. No.	Particulars	Base Model	Variant Model
1.	Date(s) of test	18.08.2016 to 31.08.2016 & 14.12.2016 to 16.12.2016	18.05.2018
2.	Tractor run at this Institute prior to start of PTO test, (h)	12.81	1.08
3.	Dynamometer test bench used	Eddy Current, SAJ AG-250	
Maximum power two hours test under natural ambient condition was conducted. The results of Power take-off performance test under natural ambient, of base & variant models are tabulated in Table-1 .			

Table-1							
	Power, (kW)	Speed, (rpm)		Fuel Consumption			Specific energy, (kWh/l)
		PTO	Engine	(l/h)	(kg/h)	(kg/kWh)	
1	2	3	4	5	6	7	8
a) Maximum power – 2 hours test (under natural ambient condition):							
Base model	14.5	551	2198	4.66	3.90	0.269	3.10
Variant model	17.4	627	2502	5.56	4.64	0.267	3.13

T- 1236/1763/2019	CAPTAIN 280 4WD TRACTOR COMMERCIAL TEST (VARIANT) INCOMPLETE
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S. No.	Parameters	Base Model		Variant Model
		Natural Ambient	High Ambient	Natural Ambient
1	2	3	4	5
i)	No load maximum speed, (rpm)	2390	2382	2793
ii)	Equivalent crankshaft torque at maximum power (Nm)	62.9	60.5	66.4
iii)	Maximum equivalent crank shaft torque (Nm)	69.7	66.3	--
iv)	Engine speed at maximum equivalent crankshaft torque, (rpm)	1301	1600	--
v)	Backup torque (%)	10.8	9.6	--
vi)	Smoke level , maximum light absorption coefficient (per meter)	0.09	-	--
vii)	Range of atmospheric condition :			
	- Temperature, (°C)	26 to 31	41 to 44	25 to 26
	- Pressure, (kPa)	98.9 to 99.6	100 to 100.4	98.1 to 98.3
	- Relative humidity, (%)	35 to 45	21 to 24	66 to 68
viii)	Maximum Temperature, (°C):			
	- Engine oil	81	106	86
	- Coolant (water)	90	103	89
	- Fuel	53	67	49
	- Air intake	35	51	29
	- Exhaust gas	570	587	623
ix)	Pressure at maximum power:			
	- Intake air, (kPa)	1.9 to 2.1	1.8 to 2.1	1.8
	- Exhaust gas, (kPa)	9.2 to 13.0	9.1 to 12.3	16.7 to 18.1
x)	Consumptions:			
	- Lub. oil, (g/kWh)	--	0.37	--
	- Coolant (water), (% of total coolant capacity)		2.17	--

4.0 OTHER APPLICABLE TESTS

4.1 DRAWBAR PERFORMANCE TEST

	<u>Base Model</u>	<u>Variant Model</u>
Date(s) of test	: 09 & 10.01.2017	24.11.2018
Tractor run at the Institute prior to start of drawbar performance test, (h)	: 38.2	6.8
Type of track	: Concrete	Concrete
Height of drawbar, (mm):		
- Without ballast	: 450	420

4.1 The drawbar test was conducted to test the gear performance under un-ballasted condition in H-2; H-1; L-3; L-2 & L-1 gears. The maximum power in H-1 gear was recorded as **15.1 kW** at **10.10 kN** pull. In L-1 gear **8.2 kW** power and **10.27 kN** pull was recorded at 15 % wheel slip and observed that the pull developed in L-1 gear is more than 100% weight of tractor i.e. **9.56 kN**. Hence the gear performance under un-ballasted condition was repeated.

4.1.1 The results of drawbar performance test consisting of maximum power and pull without ballast is tabulated in **Table - 2**.

4.1.2 The maximum noise level in H-2 gear was recorded as **99 dB(A)** against the maximum limit of **96 dB(A)** as per CMVR and does not meet the evaluative requirement of IS: 12207-2014. Hence further drawbar test was not conducted.

Table - 2

DRAWBAR PERFORMANCE TEST

Gear	Travel Speed, (Km/h)	Draw-bar power, (kW)	Draw-bar pull, (kN)	Engine Speed (rpm)	Wheel Slip, (%)	Fuel consumption		Specific Energy, (kW/h/l)	Atmospheric conditions			Temperature (°C)			Max. sustained pull, (kN)	
						kg/kWh	l/h		Temp (°C)	Pre-Ssure (kPa)	R.H. (%)	Fuel	Trans. oil	Coolant		En-gine oil
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
i) Maximum power test (Tractor unballasted):																
L1	2.83	7.5	9.47	2626	14.7	0.362	3.25	2.31	27	99.7	35	39	77	78	102	9.98
L2	4.66	12.3	9.47	2571	14.8	0.326	4.80	2.56	26	99.8	36	38	75	82	103	9.73
L3	8.05	13.9	6.19	2502	6.3	0.306	5.09	2.73	27	99.6	38	39	75	83	98	7.43
H1	5.33	13.0	8.77	2504	14.5	0.325	5.05	2.57	25	99.8	41	36	63	84	102	9.38
H2	9.82	13.7	5.00	2503	3.4	0.311	5.10	2.69	24	99.9	43	36	56	83	98	6.00

Remarks:- Maximum noise was recorded as 98. dB(A) in L-2 gear; 97 dB(A) in H-1 gear and 99 dB(A) in H-2 gear against the maximum limit of 96 dB(A) as per CMVR and does not meet the evaluative requirement of IS: 12207-2014. Hence further drawbar performance test was not conducted.

T- 1236/1763/2019	CAPTAIN 280 4WD TRACTOR COMMERCIAL TEST (VARIANT) INCOMPLETE
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4.2 LOCATION OF CENTRE OF GRAVITY

Condition	Particulars	Base model	Variant model
		Co-ordinates	
Tractor unballasted condition but with all the liquid reservoirs full & the operator replaced by a 75 kg mass on the seat	Height above ground, (mm)	558	451.4
	Distance forward from the vertical plane containing the axis of rear wheels, (mm)	594	643.8
	Distance from the median plane parallel to the longitudinal axis of tractor bisecting the track, (mm)	6.3 (towards RHS)	-7.92 (toward RHS)

4.3 TURNING ABILITY

Test sample	Characteristics	Minimum turning diameter,(m)		Minimum clearance diameter,(m)	
		LHS	RHS	LHS	RHS
Base model	Brake applied	5.59	5.62	6.12	6.12
	Brakes released	6.12	6.29	6.64	6.81
Variant model	Brake applied	6.08	5.83	6.38	6.13
	Brakes released	7.23	7.33	7.57	7.69

4.4 NOISE MEASUREMENT

4.4.1 Noise at bystander's position:

Date of test : 26.06.2018
 Type of track : Concrete
 Background noise level, dB (A) : 49

Atmospheric conditions:

Temperature, (°C) : 34
 Pressure, (kPa) : 96.4
 Relative humidity,(%) : 62
 Wind velocity, (m/s) : 3.4

TEST DATA:

S. No.	G e a r	Travelling speed before acceleration, (kmph)	Noise level, dB (A)
1.	L1	2.64	81
2.	L2	4.44	81
3.	L3	7.00	81
4.	L4	10.46	80
5.	H1	5.04	81
6.	H2	8.52	81
7.	H3	13.43	82
8.	H4	19.64	82

4.4.2 Noise at operator's ear level:

Date of test : 24.11.2018
 Type of track : Concrete
 Background noise level, dB(A) : 54

Atmospheric conditions:

Temperature, (°C) : 29
 Pressure, (kPa) : 99.4
 Relative humidity, (%) : 34
 Wind velocity, (m/s) : 1.1

TEST DATA:

Gear	Drawbar pull at which the tractor develops the max. noise level, (kN)	Corresponding travelling speed, (kmph)	Noise level dB (A)
L1	2.09 to 9.47	2.83 to 3.39	95
L2	9.28 to 9.47	4.64 to 4.77	97
*L3	8.05 to 8.39	5.23 to 6.19	97
H1	8.54	5.37	98
H2	5.00 to 5.07	9.76 to 9.88	97

* Gear corresponds to the nominal travelling speed nearest to **7.5** kmph.

4.4.2.1 Noise at operator's ear level (Repeat test):

Date of test : 12.12.2018
 Type of track : Concrete
 Background noise level, dB(A) : 55
Atmospheric conditions:
 Temperature, (°C) : 23
 Pressure, (kPa) : 99.5
 Relative humidity, (%) : 39
 Wind velocity, (m/s) : 1.3

TEST DATA:

Gear	Drawbar pull at which the tractor develops the max. noise level, (kN)	Corresponding travelling speed, (kmph)	Noise level dB (A)
L1	6.52 to 9.47	2.83 to 3.12	95
L2	9.20 to 9.47	4.64 to 4.86	98
*H1	8.40 to 8.59	5.32 to 5.44	97
H2	5.00 to 5.01	5.82 to 9.88	99

* Gear corresponds to the nominal travelling speed nearest to **7.5** kmph.

5. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

S. No.	Adjustments/Defects/Breakdowns and Repairs	Tractor run hours
1.	During the turning ability test, it was noticed that the brake was not working when four wheel drive was engaged. On the request of the applicant both the LHS and RHS break drums were cleaned and brake shoes were roughened by emery paper.	5.54
2.	During the noise performance at operator's ear level the maximum noise in gear H-1 was recorded as 98 dB(A) and in gear H-2; L-3& L-2 was recorded as 97 dB(A) against the maximum limit of 96 dB(A) as per CMVR and does not meet the evaluative requirement of IS: 12207-2014. Hence, tractor transmission was checked and found that thrust washers of sun and star pinions of differential system was damaged. On the applicant's request thrust washers (shims) (Pt. No. 021521; 021522; 020248 and 020249) were replaced with new one and backlash of crown wheel and pinion was adjusted to 0.20 mm as per recommendations.	9.72

**6. COMPARISON BETWEEN BASE MODEL AND VARIANT MODEL
(Based on Table 3 & 4 of Indian Standard 12207: 2014)**

Sl. No.	Clause No.	Features	Observation on base model (T-1081/1606/2017, April,2017)	Observation on variant model	Remarks		
1	2	3	4	5	6		
1.	i)	Single/dual/Dry / wet/ Independent clutch/ Increase in size of clutch	Single, dry friction plate of 212 mm diameter	Single, dry friction plate of 213 mm diameter	Similar		
2.	ii)	Air cleaner:	Oil bath type on LHS of engine	Dry type on LHS of engine	Changed		
3.	iii)	Exhaust system:			Changed		
		Position of silencer outlet with respect to SIP, (mm):					
		- Vertical	550	654			
		- Longitudinal	1055	1120			
		- Lateral	250, (RHS)	265 (on RHS)			
		Range of exhaust gas pressure at maximum power (kPa)	9.2 to 13.0	16.6 to 18.1	Changed		
4.	iv)	Location and type of operating controls	Same configuration in base & variant models (refer para 3.1.12.1, 3.1.12.2, 3.1.14.1 & 3.1.17)		No change		
5.	v)	Gear Box:					
		- Type	Mechanical, Combination of constant mesh and synchromesh gears.		No change		
Reduction ratio of transmission:							
		Movement	Gear	Base model	Variant model	Variation (%)	Remarks
		Forward	L1	108.57	122.84	13.14	Changed
			L2	64.39	73.04	13.43	Changed
			L3	39.95	45.28	13.34	Changed
			L4	27.21	30.77	13.08	Changed
			H1	56.89	64.37	13.15	Changed
			H2	33.72	38.23	13.37	Changed
			H3	20.96	23.71	13.12	Changed
		Reverse	H4	14.23	16.11	13.21	Changed
			LR	144.46	163.37	13.09	Changed
		HR	75.74	85.52	12.91	Changed	
Range of speeds (kmph):							
		- Forward	3.02 to 23.03	3.22 to 24.54 (6.48 to 7.05 % variation)	Changed (Within limit)		
		- Reverse	2.27 to 4.33	2.43 to 4.63 (6.93 to % 7.05variation)			
6.	vi)	Additional no. of speed	None	None	No change		
7.	vii)	Differential unit:	Crown wheel and pinion with differential unit, accommodated inside differential housing.		No change		
		Reduction through crown wheel & pinion	4.27:1 (47/11T)	5.375:1(43/8T)	Changed		
8.	viii)	Fitment of accessories:					
		- Additional hydraulic pump	None	None	No change		
		- Air compressor	None	None	No change		
		- Radiator:					
		Bare radiator capacity, (l)	2.12	2.20	No change		
		Total coolant capacity, (l)	4.60	4.50	Similar		
9.	ix)	Steering System and type	Mechanical, recirculation ball & nut type having single drop arm.		No change		

T- 1236/1763/2019	CAPTAIN 280 4WD TRACTOR COMMERCIAL TEST (VARIANT) INCOMPLETE
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1	2	3	4	5	6		
10.	x)	Brake system:					
		Type of actuation system for brake & clutch.	Independent / combined pedal operation by right foot & by pressing the clutch pedal, provided on LHS.		No change		
11.	xi)	Provision of accessories:	Same configuration in base & variant models (refer para 3.1.13.2 & 3.1.15)		No change		
		- Min. & Max. height of rear towing hitch (mm)	330 (fixed)	350 (fixed)	Changed		
12.	xii)	Type of three point linkage	Same configuration in base & variant models (refer para 3.1.13.2 & 3.1.13.3)		No change		
13.	xiii)	PTO shaft (s):	Same configuration in base & variant models (refer para 3.1.14) except the following:		No change		
14.	xiv)	Engine to PTO speed ratio:					
		Gear No.	Engine to PTO speed ratio				
		L1 and H1	399.1	3.993 :1	No change		
		L2 and H2		2.371 :1	No change		
		L3 and H3		1.474:1	No change		
		L4 and H4		1 :1	No change		
		LR and HR		5.314 : 1	No change		
15.	xv)	Features and Location of Electrical and Instrumentation:					
		Battery:					
		Make & Model	Exide, 65D 26RMF	Exide & MFS70R	Changed		
		Capacity & rating	65 Ah at 20 hours discharge rating.	70 Ah at 20 hours discharge rating.	Changed		
		Starter:					
		Make & model	Lucas TVS & M70GRS	Lucas TVS & M70GRS	No change		
		Generator:					
		Make & model	Autolek	Autolek	No change		
		Instrumentation panel:	Same configuration in base & variant models (refer para 3.1.11)		No change		
		16.	xvi)	Tyres size & Ply rating:			
				Front wheel tyre type , size & ply rating	Pneumatic, ribbed, 5.20– 14, 8PR	Pneumatic, traction, 6.00 –12, 4 PR	Changed
		Rear wheel tyre size & ply rating	8.00-18 ,4PR	8.3-20, 6PR	Changed		
		Front wheel rim size	SSWL ,3.5 J x 14	CWPL ,5 J x 12	Changed		
		Rear wheel rim size	CWPL, 5.5 F x 18	CWPL, W7 x 20	Changed		
17.	xvii)	Type of drive:	2WD	4WD	Changed		
18.	xviii)	Sheet metal:					
		Style of bonnet	Common style	Common style	No change		
		- Colour	Red	Red	No change		
		-Decals (Sticker)	CAPTAIN 250 DI	CAPTAIN 280 4WD	Changed		
		Fitment of ROPS, Cab & Canopy	ROPS not fitted Canopy fitted	ROPS not fitted Canopy fitted	No change		
19.	xix)	Type of hydraulic system:					
		Type of hydraulic pump	Gear type pump	Gear type pump	No change		
		Location of hydraulic pump	In front of engine, below radiator		No change		
		Drive of the hydraulic pump	Driven through crankshaft pulley		No change		
		Rated speed of pump, (rpm)	2200	2500	Changed		
20.	xx)	Positioning of Hydraulic Sensing Mechanism	Through top link	Through top link	No change		

T- 1236/1763/2019	CAPTAIN 280 4WD TRACTOR COMMERCIAL TEST (VARIANT) INCOMPLETE
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1	2	3	4	5	6
21.	xxi)	Change related to ergonomics, safety comfort, statutory / regulatory requirements:			
	a)	IS: 10273	Conformed	Conforms	No change
	b)	IS: 4931	Did not conform	Conformed	Changed
	c)	IS: 4468	Did not conform	Does not conform	No change
	d)	IS: 12953	Conformed	Conforms	No change
	e)	IS: 12343	Did not conform	Conform	Changed
	f)	IS: 12239 (Pt-I)	Did not conform	Does not conform	No change
	g)	IS: 12239 (Pt-II)	Did not conform	Does not conform	No change
	h)	IS: 8133	Conformed	Does not conform	Changed
	i)	IS: 6283	Did not conform	Conforms	Changed
j)	IS: 14683	Conformed	Conforms	No change	
22.	xxii)	Final Reduction:	5: 1 (70/14T)	4.5 : 1 (54/12T)	Changed
23.	Change related to statutory/ regulatory requirements (As per Table 4):				
a)	Engine operating principle (spark/ compression ignition, two/four stroke)	Compression Ignition, 4 stroke	Compression Ignition, 4 stroke	No change	
b)	Number & arrangement of cylinders	Two & vertical ,Inline	Two & vertical ,Inline	No change	
c)	PTO power, (kW)	14.5	16.8	Changed	
d)	Engine displacement, (cc)	1290	1290	No change	
e)	Rated engine speed, (rpm)	2200	2500	Changed	

7. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

7.1 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.

SI. 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
7.1.1	PTO Performance :							
a)	- Max. power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: -5 / +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	14.5 (D)	16.8 (D)	14.5	17.4	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	14.5 (D)	16.8 (D)	14.5	17.4	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+ 5%	259	259	269	267	Yes

T- 1236/1763/2019	CAPTAIN 280 4WD TRACTOR COMMERCIAL TEST (VARIANT) INCOMPLETE
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1	2	3	4	5 a	5 b	6 a	6 b	7
7.1.2 Drawbar performance :								
a)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	5.80 (D)	65% (D)	7.34	9.47	Yes
				5.80 Min (R)	6.21 Min (R)			
b)	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.	10.9 (D)	12.6 (D)	12.2	13.9	Yes
				10.9 (R)	13.1 (R)			
c)	Maximum transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	120 (D)	120 (D)	58	77	Yes
7.1.3 Noise measurement:								
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	88 (R)	88 (R)	81	82	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96 (R)	96 (R)	94	99	No
7.1.4 Safety features :								
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes (As per IS 12239 (part 2) -1999	--	--	Meets the requirement	Meets the requirement	Yes
b)	Lighting arrangement (Tractor having more than 1150 mm rear track width)	Evaluative	As per CMVR 14603-1999	--	--	Meets the requirement	Meets the requirement	Yes
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)	--	--	Did not meet the requirement	Not applicable	--
d)	Technical requirements for PTO shaft	Non-Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--	--	Did not meet the requirement	Meets the requirement	Yes
e)	Dimension of three point linkage	Non-Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	--	--	Did not meet the requirement	Does not meet the requirement	No

T- 1236/1763/2019	CAPTAIN 280 4WD TRACTOR COMMERCIAL TEST (VARIANT) INCOMPLETE
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1	2	3	4	5 a	5 b	6 a	6 b	7
f)	Specification of linkage and swinging drawbars	Non-Evaluative	Should meet the requirements of IS 12953 and IS 12362 (part 3) (as amended from time to time)	--	--	Meets the requirement	Meets the requirement	Yes
7.1.5	Labeling of tractors (Provision of labeling plate):							
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	--		CAPTAIN		Yes
	2) Model	Evaluative		--		280 4WD		Yes
	3) Year of manufacture	Evaluative		--		2018		Yes
	4) Engine number	Evaluative		--		SC21309887		Yes
	5) Chassis number	Evaluative		--		D118002122		Yes
	6) Declaration of PTO power, kW	Evaluative		--		16.8		Yes
7.1.6	Literature (Submission to test agency)							
(a)	Operator manual	Evaluative	Provided/Not Provided	As per relevant IS Code (IS 8132)		Provided		Yes
(b)	Parts Catalogue	Evaluative	Provided/Not Provided			Provided		Yes
(c)	Workshop/Service manual	Evaluative	Provided/Not Provided			Provided		Yes

7.2 Salient Observations:

7.2.1 Laboratory tests:

7.2.1.1 PTO Performance:

- i) The maximum power in case of base & variant model was observed as **14.5 & 17.4 kW** against the declaration of **14.5 & 16.8 kW** respectively, which is within the tolerance limit specified in **IS: 12207-2014**.

7.2.1.2 Noise measurement:

During the noise at operator's ear level test, the maximum noise level was recorded as **99 dB(A)**, which is higher than the maximum permissible limit of **96 dB(A)** and does not meet the evaluative requirement of IS: 12207 – 2014. Therefore, the applicant has requested to withdraw the said test sample from the test, vide letter no. Nil, dated 24.01.2019. The applicant's request was accepted by the competent authority and hence, this incomplete test report is released. Thereafter, the applicant has withdrawn the test sample from the test. Therefore, the applicant has asked to offer another sample for variant test.

7.2.1.3 Three point linkage:

- i) The diameter of hitch pin hole of upper hitch point and lateral distance from lower hitch point to the center line of tractor does not meets the requirement of IS: 4468 (Part-1)-1997. This should be looked into for necessary corrective action.

7.2.1.4 Location and operation of operator's control:

Working clearance between draft control lever and operator's seat does not meet the requirement of the IS: 12239 (Part-2)-1996. This should be looked into for necessary corrective action.

7.3 Maintenance / Service Problems:

No noticeable maintenance or service problem was observed during the test however suitable draining system should be provided for draning sediment/water.

T- 1236/1763/2019	CAPTAIN 280 4WD TRACTOR COMMERCIAL TEST (VARIANT) INCOMPLETE
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7.4 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) The fuel shut-off lever does not remain in stop position
- iii) Provision for master shield for PTO shaft
- iv) Provision for differential lock.
- v) Provision for ballasting the front axle

7.5 Adequacy of Literature supplied with machine:

7.5.1 Literature was supplied with the tractor for reference during the test.

- a) Operator's manual (Captain 120 DI, Captain 120 DI 4WD, Captain 250 DI, Captain 250 DI 4WD, Captain 250 DI 4WD+, Captain 280 4WD tractors)
- b) Service Manual (Captain DI 280 4WD tractors)
- c) Parts catalogue (Captain DI 280 4WD tractors)

7.5.2 The printed literature supplied with the test sample is in English was found adequate. The literature may be brought out as per IS: 8132-1999 (Reaffirmed in 2014) for the guidance of user and service personnel in national as well as other regional languages.

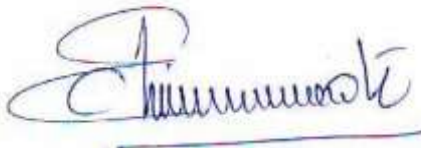
8. CITIZEN CHARTER

Time frame for Testing & Evaluation as per Citizen Charter	Duration of Test	Whether the Test Report is released within the time frame given in Citizen Charter	Remarks
10 Months	(7 Months) May, 2018 to December,2018	Yes	None

TESTING AUTHORITY:




**C.K. TIJARE
AGRICULTURAL
ENGINEER**



**C.V.CHIMOTE
TEST ENGINEER**



**Y.K. RAO
SENIOR AGRICULTURAL
ENGINEER**



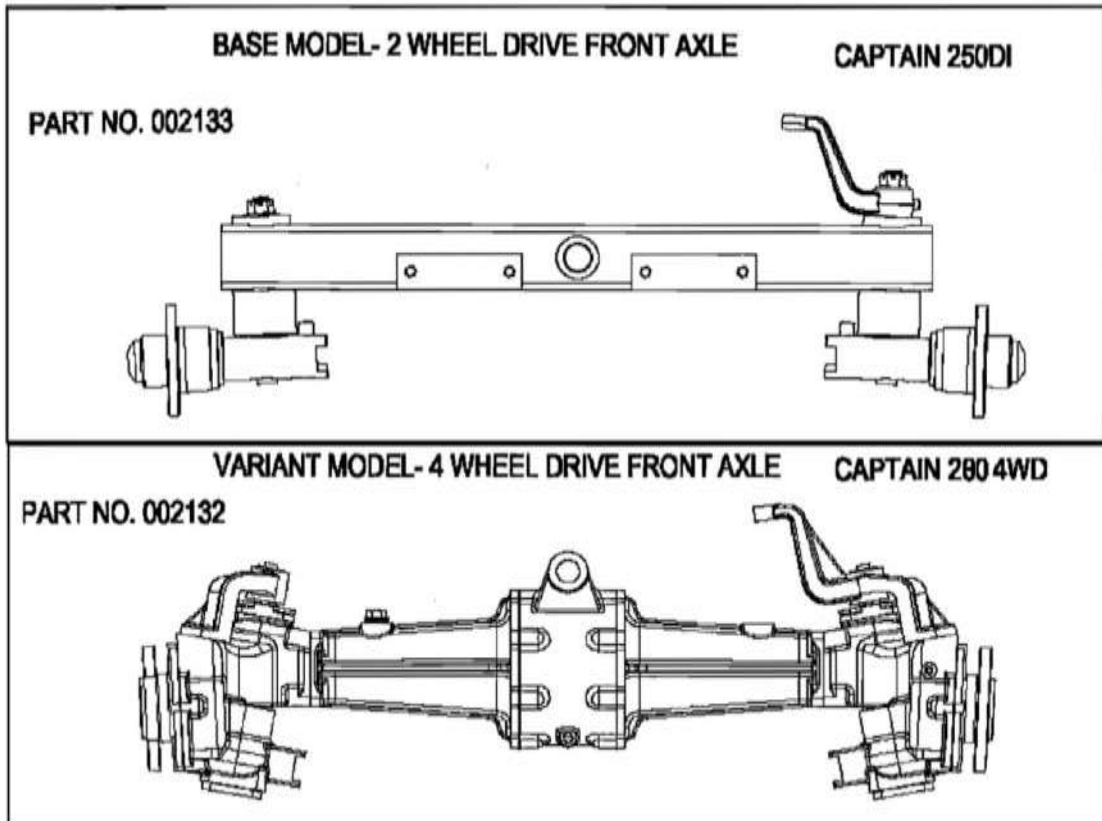
**J.J.R.NARWARE
DIRECTOR**

This test report is compiled by **Shri Shivkumar Sharma**, Senior Technical Assistant

9. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
9.1	7.2.1.2, 7.2.1.3, 7.2.1.4 & 7.3	Suggestion and recommendation will be incorporated for the quality of product. Will be studied & necessary action will be taken.
9.2	7.4, 7.5.2	Suggestion and recommendation will be incorporated for the quality of product.

ANNEXURE-I



TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	Nominal speed test	1.0
3.	PTO performance test	2.4
4.	Drawbar performance test	6.4
5.	Centre of gravity of test	0.2
6.	Turning ability test	0.2
7.	Noise measurement	0.7
B.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	1.8
	TOTAL:	12.7