



**INTERNATIONAL TRACTORS LIMITED,
SONALIKA INTERNATIONAL DI-60 RX MILEAGE MASTER TRACTOR**



भारत सरकार

GOVERNMENT OF INDIA

कृषि मंत्रालय (कृषि एवं सहकारिता विभाग, मशीनीकरण एवं प्रौद्योगिकी 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)

ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५ TRACTOR NAGAR, BUDNI (M.P.) 466445

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Manufacturer	: M/s. International Tractors Limited. Vill. Chack Gujran, P.O. Piplanwalan, Jalandhar Road, HOSHIARPUR (Punjab) – 146 022
Test requested by (applicant)	: The Manufacturer
Selected for test by	: The Applicant
Place of running-in	: At manufacturer's works
Duration of said running-in (h):	
- Engine	: 35
- Transmission	: Nil
Method of Selection	: The tractor was submitted directly by the applicant for test. Hence, method of selection is not known.

1. SPECIFICATIONS

1.1 Tractor:	
Make	: International Tractors Limited
Model	: Sonalika International DI-60 RX Mileage Master
Variant, if any	: No variant models declared by the manufacture
Type	: Four wheeled, Rear wheel driven, general purpose, Agricultural Tractor.
Year of manufacture	: 2012
Chassis number	: JZRDD301754S3
Country of Origin	: India
1.2 Engine:	
Make	: International Tractors Limited
Model	: 3102 IL
Type	: Four stroke, naturally aspirated, water cooled, direct injection, diesel engine.
Serial number	: 3102IL23H302458F5
Engine speed (Manufacturer's recommended production setting)(rpm):	
- Maximum speed at no load	: 2200 to 2400
- Low idle speed	: 650 to 750
- Speed at maximum torque	: 1100 to 1300
Rated speed, (rpm):	
- For PTO use	: 2100
- For drawbar use	: 2100
1.3 Cylinder & Cylinder Head:	
Number	: Three
Disposition	: Vertical, in-line
Bore/stroke, (mm)	: 102/118
Capacity as specified by the applicant, (cc)	: 2893
Compression ratio, (apa)	: 18.4 (± 0.2) :1
Type of cylinder head	: Individual, inline
Type of cylinder liners	: Wet, replaceable
Type of combustion chamber	: Direct injection, Re-entrant
Arrangement of valves	: Overhead, Inline

**14.6 Steering system:**

Visual condition of the components of : Normal
complete steering assembly

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.	Adjustment/ Defects/ breakdowns and Repairs	Tractor run hours
1.	During the lifting capacity test it was observed that nearly every height the lower link was sticked in raised position, after lowering the position control lever many times & throttle low - high, the lower link are down position. This exercise was repeated done at each height.	19.2

16. SUMMARY OF OBSERVATIONS, COMMENTS & 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:

S. 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 requirements (Yes/No.)
1	2	3	4	5	6	7
16.1.1	PTO Performance :					
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: -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	30.52 (D)	32.5	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	30.52 (D)	32.5	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	272 (D)	247	No
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	168(D)	171	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10 percent, min(R)	15.5	Yes
f)	Maximum operating temperature, (°C)					
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.	132 (D)	112	Yes

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1	2		3	4	5	6	7
	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.	118 (D)	96	Yes
g)	Engine oil consumption, (g/kWh)		Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.51 (max.) (R)	0.517	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 (R)	0.20 per metre	Yes
16.1.2 Drawbar performance :							
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)		Non Evaluative	Minimum 65% of static mass with ballast	17.41 (D) 17.02 (R) Minimum	22.0	Yes
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)		Evaluative	Minimum 65% of static mass of tractor without ballast	12.79 (D) Minimum 12.84 (R) Minimum	16.25	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.	24.4 (D) 26.0 (R) Minimum	26.7	Yes
d)	Max. transmission oil temperature (°C)		Non Evaluative	The declared value should not exceed the maximum value specified by oil company	130 (D)	80	Yes
16.1.3 Power lift and hydraulic pump performance :							
a)	Maximum lifting capacity throughout the range of lift, (kN):						
1)	At hitch points	Non Evaluative	[Tolerance of minus 10%]	13.56 (D)	12.0	No	
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	12.68 (D) 7.65 (R) Minimum	9.0	Yes	



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1	2	3	4	5	6	7
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)	05	Yes
16.1.4 Brake performance at 25 kmph:						
a)	Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with road ballast, (m):					
	1) Cold brake	Evaluative	10	10 (R)	8.05	Yes
	2) Hot brake	Evaluative	10	10 (R)	8.48	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (R)	202 to 276	Yes
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
16.1.5 Noise measurement :						
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	98 (R)	93	Yes
16.1.6 Amplitude of mechanical vibrations at :						
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R)	210	No
	2) Right foot rest			100 (R)	80	Yes
	3) Seat (with driver seated)			100 (R)	60	Yes
	4) Steering wheel			100 (R)	110	No
16.1.7 Haulage requirements :						
a)	Gross mass of the trailers, (tones):					
	1) Two wheel	Non Evaluative	--	4.5 (D)	4.5	Yes
	2) Four wheel	Evaluative	--	5.5 (D)	5.5	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
	1) Two wheel	Non Evaluative	--	4.5 to 6.0 (D)	5.05 to 5.17	Yes
	2) Four wheel	Evaluative	--	4.5 to 6.0 (D)	4.73 to 4.83	Yes
c)	Fuel consumption (ml/km/tonne):					
	1) Two wheel	Non Evaluative	--	32 to 38 (D)	42.98 to 43.99	No
	2) Four wheel	Evaluative	--	32 to 43 (D)	37.37 to 38.46	Yes



1	2	3	4	5	6	7
16.1.8	Wetland cultivation :					
	Sealing for the following assemblies:	Evaluative	The identified assemblies should essentially meet the requirement of IS: 11082. No water ingress in the identified assembly given in column-2. If tractor does not meet the requirements of wetland cultivation, it may be recommended for dry land operation only.	There should be no ingress of water and mud (R)	No ingress of water and/or mud was observed	Yes
	1) Clutch assembly	-do-				
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
	4) Engine oil	-do-				
	5) Transmission oil	-do-				
16.1.9	Safety features :					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes (As per IS 12239 (part 2))	At present no requirements	Provided	--
b)	Lighting arrangement (Tractor having more than 1150 mm rear track width)	Evaluative	As per CMVR	--	Provided	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)	--	Meets the requirement	Yes
d)	Technical requirements for PTO shaft	Non-Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--	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)	--	Does not meet the requirement	No
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)	--	Conforms	Yes
16.1.10	Labelling of tractors (Provision of labelling plate):					
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	--	International Tractors Ltd.	Yes
	2) Model	Evaluative		--	Sonalika International DI-60 RX Mileage Master	Yes
	3) Year of manufacture	Evaluative		--	2012	Yes
	4) Engine serial number	Evaluative		--	3102IL23H302458F5	Yes
	5) Chassis number	Evaluative		--	JZRDD301754S3	Yes
	6) Declaration of PTO power, (kW)	Evaluative		--	30.52 (40.92)	Yes



1	2	3	4	5	6	7
16.1.11	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	102.324	102.05 to 102.07	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.45	0.171 to 0.186	Yes
(c)	Ring end gap (mm):					
	- Top comp. ring.	Evaluative	-do-	2.0	0.35 to 0.50	Yes
	- 2 nd comp. ring.		-do-	2.0	0.60 to 0.75	Yes
	- Oil ring.		-do-	2.0	0.30 to 0.50	Yes
(d)	Ring groove clearance (mm):					
	- Top comp. ring.	Evaluative	-do-	0.20	Tapered rings	Yes
	- 2 nd comp. ring.		-do-	0.20	0.063 to 0.068	Yes
	- Oil ring.		-do-	0.20	0.021 to 0.026	Yes
(e)	Clearance of main bearings (mm):					
	- Diametrical clearance	Evaluative	-do-	0.40	0.033 to 0.116	Yes
	- Crankshaft end float	Evaluative	-do-	0.70	0.25	Yes
(f)	Clearance of big end bearings, (mm):					
	- Diametrical	Evaluative	-do-	0.50	0.66 to 0.102	Yes
	- Axial	Evaluative	-do-	1.0	0.35 to 0.40	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	1.0	0.093 to 0.139	Yes
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	1.0	0.131 to 0.182	Yes

16.1.12 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	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

16.1.13 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



16.2 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.	Fitment of ROPS	With a provision for fitment of ROPS.	Not provided	Not applicable
		If ROPS fitted it should meet the requirement of IS: 11821-1992	Not provided	Not applicable
2.	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided.	Provided	Yes

16.3 Conformity with following IS:

- i) Guidelines for declaration of power and specific fuel consumption and labelling 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) / ISO 730-1:1994] : **Does not conform**
- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in March, 2009)] : **Conforms**
- v) Agricultural tractors – Operator's seat technical requirement [IS 12343 –1998 (First revision) (Reaffirmed in March, 2009)] : **Conforms**
- vi) Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision) : [IS 12239 (PT-1) 1996 (Reaffirmed in March, 2007) /ISO 4254-1:1989] : **Does not Conform**
- vii) Tractors and machinery for agriculture and forestry – Technical means for ensuring safety Part 2: Tractors (first revision) (IS: 12239 (Part-2) 1999) (Reaffirmed in March, 2009)] : **Does not conform**
- viii) Tractors and machinery for agriculture and forestry, powered 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)] : **Conforms**
- ix) Guidelines for location and operation of operator controls on agricultural tractors and machinery (first revision) IS: 8133-1983 (Reaffirmed in March, 2009)] : **Does not conform**
- x) Agricultural Tractors and Machinery - Lighting device for travel on public roads (IS: 14683-1999) (Reaffirmed in March, 2009)] : **Conforms**

16.4 Salient Observations:

16.4.1 Laboratory tests:

16.4.1.1 PTO Performance:

- i) The specific fuel consumption corresponding to maximum power was measured as 247 g/kWh against the declaration of 272 g/kWh, which does not meet the tolerance limit of IS: 12207-2014. This should look into for necessary corrective action.
- ii) The backup torque is 15.5 %.

16.4.1.2 Drawbar performance:

- i) During 10 hour drawbar test, creeping of LHS & RHS rear tyre over the rims was observed as 55 mm & 75 mm respectively, which was considered on higher side. This may be looked into for necessary corrective action.

**16.4.1.3 Hydraulic system:**

- i) The maximum lifting capacity throughout the range of lift at lower hitch points was observed as 12.0 kN against the declaration of 13.56 kN and which does not meet the requirements of IS: 12207-2014 with regard to tolerance. This should be looked into for necessary corrective action.
- ii) During the lifting capacity test it was observed that nearly every height the lower link was stuck in raised position, after lowering the position control lever many times & throttle low - high, the lower link gets down position. This exercise was repeated done at each height. This should be looked into for necessary corrective action.

16.4.1.4 Mechanical Vibration:

The amplitude of mechanical vibration on various assemblies marked as (*) in Chapter-9 of this test report are on higher side, especially at steering control wheel & LHS foot rest. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

16.4.1.5 Three point linkage:

- i) The lateral distance from lower hitch point to centre line of tractor does not meet the requirement of IS: 4468 (Part-1)-1997. This should be looked into for necessary corrective action.

16.4.1.6 Symbols of operator's controls and other displays:

The oil lubricant type & frequency, grease lubricant frequency & cautionary notice are not identifiable with the symbols as per IS: 6283 (Part-1&2)-1998. This needs to be looked into.

16.4.1.7 Location and operation of operator's control:

- i) The working clearance around the position control lever was observed as 40mm against the minimum requirement of 70 mm as per per IS: 12239 (Part 2)-1996. This should be looked into for necessary corrective action.

16.4.2 Field performance test:**16.4.2.1 Haulage performance:**

The fuel consumption (ml/km/tonne) with two wheel was observed as 42.98 to 43.99 ml/km/tonne against the declaration of 32.0 to 38.0 ml/km/tonne for two wheel trailer. This does not meet the requirement of IS: 12207-2014 and therefore, should be looked into for necessary corrective action.

16.4.2.2 Wetland cultivation (pudding operation) :

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

16.5 Component assembly inspection:

During the component assembly inspection the measured thickness of brake disc was observed as 4.83 to 4.98 mm against the initial specified declared value as 13.0+0.5 mm, therefore, should be looked into for necessary corrective action in specification.

16.6 Maintenance / Service Problems:

No noticeable maintenance or 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 of safety against accidental start of the engine.
- ii) Provision for spark arresting device in exhaust system.
- iii) Provision for retaining the fuel shut-off lever in "STOP" position.
- iv) The working clearance between the draft control lever and mudguard may be provided as per IS: 12239 (Part-2) – 1999.
- v) Provision of PTO shaft master shield.
- vii) "Minimum cautionary notice "as per clause 11.2 above referred standard has not been provided.

16.7 Adequacy of Literature supplied with machine:

16.7.1 The following literatures were supplied with the test tractor for reference during the test.

- i) Operator's manual
- ii) Service manual
- iii) Spare part's catalogue tractor models for DI -35RX,DI-39 RX,DI-42RX,DI-745III RX,DI-47RX,DI-45RX TURBO,DI-52 RX,DI-55RX,DI-55RX TURBO,DI-60 RX MM,DI-60RX MM SUPER,DI-60RX TURBO,DI-750III RX 4-CYLINDER,DI-60RX RX 4-CYLINDER.

16.7.2 It is therefore, recommended that following literature may be brought out as per IS: 8132-1999 (Reaffirmed in March, 2009) for the guidance of users and service personnel in national as well as regional languages for this model of tractor.

17. 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	12 month (July , 2013 to July, 2014)	No	Field for wet land cultivation was not available for 3-months.

TESTING AUTHORITY:

H. L. YADAV
SENIOR AGRICULTURAL ENGINEER

Test report compiled by: - Shri. Chanchlesh Singh Raghuwanshi, Assistant Agricultural Engineer

C. R. LOHI
DIRECTOR



18. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
18.1	1.13.2(iii)	These are minor non conformance and will not affect the tractor performance; however we will look into for corrective actions.
18.2	1.20.3(i),(ii), 1.20.4(i), 1.20.5(i), (ii), (iii)	We will make the action plan of all reference no. and look into for implementation of these safety features.
18.3	16.3(iii),(iv),(vii),(ix), 16.4.1.1(i), 16.4.1.2(i), 16.4.1.3(i), (ii), 16.4.1.4 (1),(4), 16.4.1.6, 16.4.2.1, 16.5, 16.7	We will make the action plan of all reference no. and look into for corrective action.

ANNEXURE - I

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	PTO performance test	15.0
3.	Drawbar performance test	15.0
4.	Power lift and hydraulic pump performance test	4.5
5.	Turning ability	0.2
6.	Location of centre of gravity	0.2
7.	Operator's field of vision	--
8.	Brake test	1.8
9.	Noise measurement	1.8
10.	Mechanical vibration test	
11.	Nominal speed test	0.8
B.	FIELD TEST:	
1.	Disc ploughing	11.0
2.	Rotavation	11.5
3.	Wet land (puddling) operation (including water proof test)	15.8
C.	HAULAGE TEST:	10.1
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	4.1
	TOTAL:	91.8

**ANNEXURE- II****BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST**

S. No	Item	Disc Plough	Rotavator	Paddy puddler
1	2	3	4	5
1.	Make	Not Provided	Shaktimaan	NA
2.	Type	Mounted	Mounted	Mounted
3.	No. of Disc/blades	02	36	10 (5x5)
4.	Type of Disc/blades	Plain concave	Hatchet	Notched concave
5.	Size of bottoms/blades, (mm)	640	255 x 50 x 10	460
6.	Spacing of bottoms/flanges, (mm)	260	250	165
7.	Lower hitch point span, (mm)	850	720	680
8.	Mast height, (mm)	500	481	460
9.	Overall dimensions, (mm):			
	- Length	1570	1750	1190
	- Width	1050	1000	2425
	- Height	1040	980	1335
10.	Gross mass, (kg)	355	345	245

ANNEXURE-III**BRIEF SPECIFICATION OF HALF CAGE WHEEL**

Sr. No.	Items	Specification
1	Type	Half cage wheel
2	Outer dia. (mm)	1085
3	Width (mm)	340
4	No. & Type of Lugs	12, straight lugs made of MS angle section welded to angle iron frame
5	Size of angle section, (mm)	50 x 50 x5
6	Length of lug, (mm)	340
7	Spacing of lug, (mm)	275
8	Weight of each cage wheel (kg)	60