



**PRODUCT MANUAL FOR
PERFORMANCE REQUIREMENTS FOR
SMALL SIZE SPARK IGNITION ENGINES FOR AGRICULTURAL WATER
PUMPS, SPRAYERS, TILLERS, REAPERS AND
OTHER SIMILAR APPLICATIONS
ACCORDING TO IS 7347:1974**

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification licence/certificate.

1.	Product	:	IS 7347 :1974
	Title	:	Performance Requirements for Small Size Spark Ignition Engines for Agricultural Water Pumps, Sprayers, Tillers, Reapers and other Similar Applications
	No. of Amendments	:	4
2.	Sampling Guidelines:		
a)	Raw material	:	—
b)	Grouping guidelines	:	Each variety of engine shall be tested to cover that particular variety.
c)	Sample Size	:	One engine
3.	List of Test Equipment	:	Please refer ANNEX – A
4.	Scheme of Inspection and Testing	:	Please refer ANNEX – B
5.	Possible tests in a day	:	All tests except Endurance Test
6.	Scope of the Licence :		Please refer ANNEX – C

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ANNEX A**List of Test Equipment**

Indicative list of major test equipment required to test as per the Indian Standard (For guidance only)

Sl. No.	Tests used in with clause reference	Test equipment
1	Strip Examination (clause 8.1 and 9.8)	a) Go & No-Go Plug Gauges and Snap gauge b) Ring Gauges c) Thread (Plug and Ring) Gauges d) Height gauges and Depth Gauges e) Micrometer (Inside and Outside) f) Vernier Calipers g) V-Block & Magnetic Stand h) Dial Gauges i) Feeler Gauges j) Slip Gauge Set k) Comparator l) Dial Bore Gauges and Master Rings m) Surface Plates
2	In process Control Equipments	a) Hardness Tester b) Spring Tester c) Crack Detector (recommendatory only) d) Carburetor Test Bench e) Lub-Oil Pump Tester f) Fly-wheel Balancing Equipment(s) g) Cam-Detail Checking Equipment h) Hydraulic Pressure Testing Equipment i) Connecting Rod Alignment & Twist Checking Rig j) Crankshaft Alignment & Pin Parallelism Checking Rig k) Balances (Preferably Self-indicating type) l) High Pressure Fuel Pipe Flushing Equipment m) Torque Wrenches n) Compression Pressure Tester o) Gear Marking Apparatus p) Valve Timing Apparatus q) Arrangement for Checking Bumping Clearance

3	Tests (Clause 9)	a) Test bed(s) with suitable dynamometer(s) and loading arrangements b) Pressure Gauges c) Barometer d) Hydrometer / Humidity Indicator (or dry & wet bulb thermometers with humidity chart) e) Tachometer / Stroboscope (instantaneous type) f) Fuel Measuring Apparatus g) Stop Watch h) Thermometers / Pyrometer(s) temperature gauges i) Hygrometer(s) for Specific Gravity of Fuel & Lub Oil. j) Exhaust back pressure gauge / Manometer k) Suitable water circulation arrangements for water cooled engine for rope brake drum (in case of rope brake dynamometer) / Hydraulic dynamometer etc. for maintaining consistency in working temperatures. l) Equipment for governing test m) Equipment for determination of mechanical efficiency (recommendatory) n) Arrangement for determination of calorific value of fuel. o) Apparatus for determination of lubricating oil consumption.
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The above list is indicative only and may not be treated as exhaustive.

ANNEX B**Scheme of Inspection and Testing****1. QUALITY ASSURANCE PLAN**

1.1 It is expected that manufacturers (licensees/applicants) will implement a Quality Assurance Plan i.e. a plan of regular testing and in-process controls, designed to ensure that the product bearing the Standard Mark conforms to all requirements of the Indian Standard.

1.2 The manufacturers shall define a Quality Assurance Plan defining the control unit i.e. Batch and the levels of control (i.e. the frequency and number of samples for conducting the different tests as per the Indian Standard) and submit the same to BIS Branch Office for information. The manufacturer shall comply with the same and maintain test records in accordance with para 2.4 below.

1.3 RECOMMENDED LEVELS OF CONTROL/CONTROL UNIT:

1.3.1 Control Unit: For the guidance of manufacturers, the recommended definition of Control Unit is quantity of utensil of same type, coating and classification (Light/Medium/heavy) manufactured from the same sheet thickness manufactured in a day.

1.3.2 For the guidance of manufacturers in preparing the Quality Assurance Plan, recommended levels of control are given in **Table 1**.

1.3.3 The manufacturer shall ensure inspection and testing as per the Quality Assurance Plan submitted by them on the whole production of the factory which is covered by this plan. Alternatively, the manufacturer has the option of adherence to the quality plan as per levels of control recommended in column 3 of Table 1.

1.4 However, all manufacturers shall ensure compliance of their products to all the requirements of the Indian Standard.

2. ENSURING COMPLIANCE THROUGH TESTING- It is expected that manufacturers (licensees/applicants) will establish a suitably equipped and staffed in-house laboratory (In house testing facility) for testing at least those parameters of the Indian Standard which require routine testing for ensuring quality of the product. This includes in-process controls as may be defined and put in place by the manufacturer, and testing parameters/requirements which can only be performed in the factory.

2.1 For the guidance of manufacturers, Table 1 giving the recommended levels of control is given below. Column 2 of Table 1 indicates routine tests where test equipment is required in-house as “R” or other tests which can be sub-contracted as “S”. Subcontracting is permitted to BIS recognized/empanelled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.2 For MSME manufacturers, the requirement of maintaining a laboratory/in-house testing facility for routine tests (indicated as “R” in Column 2 of Table 1) is also optional.

2.2.1 MSME manufacturers may utilize common cluster based facilities as per guidelines for the utilization of cluster based test facilities by MSMEs or the provisions of Sharing of testing facilities or get testing done from BIS recognized/empaneled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.3 Large Scale manufacturers shall maintain an in-house laboratory equipped at least with test facilities for routine tests (indicated as “R” in Column 2 of Table 1), where different tests given in the specification shall be carried out in accordance with the method given in the specification. They shall also implement a calibration plan for the in-house test equipment.

2.3.1 Alternatively, in lieu of an in-house laboratory, large scale manufacturers can also utilize the provisions of Sharing of testing facilities as per the Guidelines for Grant of Licence available on BIS website www.bis.gov.in. (Under Conformity Assessment>Product Certification Process). Even for subcontracted tests, provisions for sharing of testing facilities can be utilized.

2.4 TEST RECORDS- The manufacturers maintaining an in-house laboratory or utilizing common cluster based facilities or shared test facilities shall maintain test records for the tests carried out to establish conformity. For the tests being subcontracted to BIS recognized/empaneled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025, test reports issued by the laboratories shall be available for inspection by BIS.

3. LABELLING AND MARKING – As per the requirement of IS 7347:1974. In addition to the requirements of IS 7347:1974, the following shall also be legibly and indelibly marked on the engine:

(a) Grades of Lubricating Oil to be used

(b) Specific Fuel Consumption

The Standard Mark, as given in the Schedule of the licence, shall be marked on each Engine provided always that the product thus marked conforms to all the requirement of the specification. In addition, the licence no. CM/L-_____ and details of BIS website shall be marked at an appropriate place on product or package as follows: “For details of BIS certification please visit www.bis.gov.in”.

4. DESIGN:

4.1 The manufacturer shall submit and obtain approval of the design details and drawing of each type and rating of engine from BIS when first offered at the time of Grant of Licence and whenever there is any functional change in the engine.

4.2 Declaration on various critical components as given in Annex- I, shall be submitted by manufacturers whose quality has been established by them. In case of any change in the quality of components and source of supply it shall be brought to the notice of BIS and used for the production of ISI marked engines only after approval of the BIS.

5. REJECTION - All the production which conforms to the Indian Standard and covered under scope of the licence shall be marked with Standard Mark. Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act,2016

TABLE 1

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Methods			No. of Sample	Frequency	Remarks
		Clause	Reference				
	Critical Components	--	Para 4.2 of SIT	S	As per Para 4.2 of this Scheme		List of critical components is as per Annexure 1.
ROUTINE TESTS							
5, 9.1 (a)	Rating Test including Fuel Consumption Test	5, 9.2	IS 7347	R	One engine of each rating (out of every 100 engines or once in a week whichever is earlier)		Result of these tests shall be recorded in the Format given in Annexure 2
9.1 (b)	Governing test (for engine with governor)	9.3	IS 7347	R			
9.1 (c)	No load & speed test (for engines without Governor)	9.4	IS 7347	R			
9.1 (d), 9.5	Starting Test	9.5	IS 7347	R	Each Engine		

TYPE TESTS						
9.1 (a)	Rating Test including Fuel Consumption Test	5, 9.2	IS 7347	R	One	These tests shall be carried out on engines when first offered and whenever there is any change in design of the engine or when asked by BIS for specific reasons at any time. Tests specified as Routine tests as above shall also be carried out in routine at levels of control specified as above.
9.1 (b)	Governing Test (for engine with governor)	9.3	IS 7347	R		
9.1 (c)	No load and low speed test (for engines without governor)	9.4	IS 7347	R		These tests shall be carried out on engines when first offered and whenever there is any change in design of the engine or when asked by BIS for specific reasons at any time.
9.1 (d)	Starting Test	9.5	IS 7347	R		Tests specified as Routine tests as above shall also be carried out in routine at levels of control specified as above.
9.1 (e)	Endurance Test	9.6	IS 7347	S		
9.1 (f)	Rating Test after Endurance Test	9.7	IS 7347	S		
9.1 (g)	Strip Examination for checking of various components	8.1, 9.8	IS 7347	S		
9.1 (h)	Re-assembly, Starting Test and no load running	9.9	IS 7347	S		

ANNEXURE- 1

List of critical components

1. Piston, Piston rings and oil rings.
2. Valves.
3. Connecting rod, crank shaft and tappet.
4. Main bearing big end and bush.
5. Gaskets.
6. Studs and bolts.
7. Cylinder head.
8. Cam Shaft.
9. Gears.
10. Crank Case.
11. Carburetor.
12. Spark plug.
13. Oil seals.

ANNEXURE – 2

Engine manufacturer:		Sheet No.	
Place of test and Altitude:		Date:	
Type & Model:		Serial No.	
Bore and Stroke (in mm.):		Cubic capacity (in liter) :	
No. of cylinders:		Normal compression ratio:	
Rated r.p.m.		Constants:	
Dynamometers' Type and Arm length:			
Fuel specification (including calorific value and specification):			
Lubricating Oil Specification:			
Testers		Observers:	

	Air Temperature (°C)							Engine parameters				Fuel Consumption					
Time	Barometer mm of Hg	Wet Bulb	Dry Bulb	Engine Intake	Exhaust Temp *	Relative Humidity	Total Correction Factor	Observed rpm	Brake load in kg	Calculated Brake Power	Corrected Brake Power	Fuel Consumption rate (g/h)	Specific Fuel Consumption rate (g/h)/kW	Cooling Water Temperature (°C)		Lubricating Oil Temperature (°C)	Lubricating Oil Pressure kN/m ²
														Inlet	Outlet		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)

*Exhaust temperature to be measured at the center of pipe approximately 300 mm from engine

ANNEX C**Scope of the Licence**

Licence is granted to use Standard Mark as per IS 7347:1974 with the following scope:

Name of Product	Performance Requirements for Small Size Spark Ignition Engines for Agricultural Water Pumps, Sprayers, Tillers, Reapers and other Similar Applications
Model No	
Rated output in kW	
Type of IS rating	
Rated speed in rev/min	
Specific fuel consumption (g)/kWh	
Class of governing, if applicable	
Grades of oil and fuel to be used	
Number of cylinders	
Mechanical efficiency	
Lubricating oil consumption	
Method of cooling	
No. of stroke	
Type of Engine	