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भारतीय मानक मसौदा

कृषि पहिएदार ट्रैक्टर का एहतियाती रखरखाव — रीति संहिता

(आई एस 6840 का दूसरा पुनरीक्षण)

Draft Indian Standard

**PREVENTIVE MAINTENANCE OF AGRICULTURAL
WHEELED TRACTORS — CODE OF PRACTICE**

(Second Revision of IS 6840)

ICS 65.060.10

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FOREWORD

Formal clause will be added later

Agricultural wheeled tractor is a well-recognized farmer's asset due to its suitability for performing a large number of farming operations conveniently and economically. Therefore, in order to get maximum benefit out of tractor, its proper periodical maintenance is of utmost importance.

This standard was first published in 1972, to help the users in proper upkeep and maintenance of the tractor to get maximum benefit with low cost of operation. Subsequently, based on the experience gained in the use of this standard by the Central Farm Machinery Training & Testing Institute, Budni, it was revised in 2013.

This current revision has been brought out to incorporate various provision that are becoming common in the operating systems of agricultural tractors, such as:

- a) use of water separator in fuel supply system,
- b) use of coolant (anti-freeze solution) in water in cooling system,
- c) alternator in electrical system,
- d) dry type air cleaner in air intake system,
- e) 4-wheel drive transmission and advancement in use of improved quality of material and lubricants,

Apart from above, guidelines for periodical maintenance and precautionary measures to be taken while performing various operations have been updated as per current practices.

In revision of this standard considerable assistance has been derived from the technical information provided by Central Farm Machinery Training & Testing Institute, Budni.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS: 2 : 2022. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Draft Indian Standard

**PREVENTIVE MAINTENANCE OF AGRICULTURAL
WHEELED TRACTORS — CODE OF PRACTICE**

(Second Revision of IS 6840)

1 SCOPE

This standard covers detailed procedure for preventive maintenance of agricultural wheeled tractors.

2 REFERENCES

The standards given below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
IS 6283 (Part 1) : 2023/ ISO 3767-1: 2016	Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other display Part 1 Common symbols (<i>third revision</i>)
IS 6283 (Part 2):2023/ ISO 3767-2: 2016	Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other display Part 2 Symbols for agricultural tractors and other machinery (<i>third revision</i>)
IS 6847:1995	Code of practice for installation of agricultural wheeled tractor (<i>first revision</i>)

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

3.1 Agricultural Tractor — A self-propelled vehicle having wheels or tracks, designed primarily to operate trailed or mounted agricultural implements and machines, including trailers, and to supply power to operate them with the vehicle itself in motion or remaining stationary.

3.2 Agricultural Wheeled Tractor — An agricultural tractor in which wheels are the driving members.

3.3 Preventive Maintenance — Systematic series of inspections and operations performed periodically to maintain or improve the efficiency and performance of the tractor.

4 INSTALLATION

The user should ascertain that the tractor has been installed in accordance with IS 6847.

5 CLEANING

5.1 The tractor should be cleaned thoroughly and regularly.

5.1.1 The spilt fuel and oil should be wiped off.

5.1.2 The accumulated dirt and mud should be removed by pressure of water or air, taking care that the vital parts are properly covered to prevent ingress of water under pressure.

6 LUBRICATION

Lubrication of different assemblies reduces friction between the moving parts, assists in cooling the engine, seals gases within the combustion chamber and helps in keeping the inner assemblies clean. It is, therefore, essential to lubricate the tractor periodically.

6.1 The lubrication schedule for different assemblies as specified by the manufacturer in the owner's maintenance manual shall be followed.

6.2 The grades of grease and oil as recommended by the manufacturer shall be used.

6.3 Only clean lubricants shall be used.

6.4 The device by means of which lubricant is applied should be clean.

6.5 The quantities of lubricant in different assemblies as specified by the manufacturer shall be maintained.

6.6 All openings through which oil is poured should be thoroughly cleaned and dust covers restored.

7 PERIODICAL MAINTENANCE

7.1 Periodical maintenance should be performed systematically at intervals of 8 to 10, 50 to 60, 100 to 120, 200 to 250, 480 to 500 and 960 to 1000 engine working hours. The manufacturer's recommendations as per printed literature of the tractor regarding periodical maintenance shall be followed.

7.2 Different operations which should be performed at different intervals are given in Annex A for guidance.

8 PRECAUTIONS

While performing different operations it is necessary that full precautions should be taken. For guidance, some precautions which should be observed are given in Annex B.

9 GENERAL INSTRUCTIONS

9.1 For Operator

9.1.1 The person driving the tractor should have a valid driving license from appropriate authority.

9.1.2 The operator should be familiar with all the symbols for different controls as specified in IS 6283 (Parts 1 and 2).

9.1.3 Unnecessary racing of the tractor should be avoided.

9.1.4 The operator should know the operations to be performed before starting, during working and at the time of stopping the tractor.

9.2 For Owner

9.2.1 The owner should keep a log-book for daily record of the working hours of the tractor, the quantities of fuel and oil filled in it and the type and output of work performed by it. All the services performed should also be recorded. A proforma for the log-book and servicing record is given in Annex C.

9.2.2 In case of any trouble, the owner should consult the authorized dealer or their representative for the area.

9.2.3 Implements and machines recommended for that make of the tractor by the manufacturer should be used.

9.2.4 In case the owner himself is operating the tractor, he should also observe the instructions given in **9.1**.

10 STORAGE

While placing the tractor in storage for more than 30 days the instructions given below should be followed:

- a) Store in a dry, well protected place. If under cover storage is not available, use a waterproof material/ tarpaulin to cover the tractor.
- b) Remove all the weights from the tractor body. Check the bolts and nuts for looseness and tighten them if necessary.
- c) Wash and clean the tractor thoroughly (allow sufficient time for the engine to cool before washing the tractor).
- d) Clean all unpainted/bare parts and where rust prevention is necessary, apply multi-purpose grease or a corrosion inhibitor.
- e) Lubricate the chassis thoroughly, use rust preventive oil in all oil cups and oil holes in place of engine oil.
- f) Drain lubricant from the crankcase while the engine is warm. Flush with crankcase cleaning oil. Refill fresh lubricant of the grade recommended by the manufacturer with 5 to 10 percent rust preventive oil. Run the tractor for a period sufficient to splash the lubricant in all parts.
- g) Remove the storage battery from the tractor and store in accordance with manufacturer's recommendation.
- h) Drain the cooling system in the case of liquid- cooled engines.
- j) Inflate the tyres to a pressure a little higher than usual. Place blocks under the axles to take weight of the tyres and to prevent them from touching the ground. If water is filled in tyres, drain the same.
- k) Plug the crankcase breather pipe and exhaust pipe, if covers are not provided.

11 REMOVAL FROM STORAGE

While removing the tractor from storage the following procedure should be followed:

- a) After inflating the tyres to correct pressure, remove the blocks placed under the axles.
- b) Check the electrolyte of the battery. Get the battery charged fully and fit it to the tractor.
- c) Clean the tractor thoroughly.
- d) Remove the plugs from the crankcase breather pipe and exhaust pipe, if placed (*see 10 (k)*).
- e) Lubricate the chassis.
- f) Check oil level in air cleaner. In case of diesel engine, check oil level in fuel pump also.
- g) Drain the transmission case and final drive and refill with lubricant of the grade recommended by the manufacturer.
- h) Close all drain cocks on the cooling system and refill the system with clean water.

- j) Close drain cocks on the fuel system. Drain sediment bowl. Fill the tank with clean fuel; in case of diesel engine, bleed the air from the fuel system.
- k) Take off the valve cover and flush the valve operating mechanism with engine oil. Press down each valve with a hand tool to make sure that it is operating freely.
- m) Pour or spray small amount of engine oil into each cylinder. Crank up the engine several times, so that the oil may loosen the piston rings and may take out any partially oxidized oil from the valves and pistons.
- n) Drain the crankcase, flush it with flushing oil and refill it with oil of the grade recommended by the manufacturer up to the level prescribed by him.
- p) Start the engine and allow it to run slowly for several minutes in order to get the fresh oil distributed throughout the engine before putting load.
- q) Check all gauges for their proper functioning.
- r) Walk around tractor and perform a visual inspection looking for evidence of oil/water leak.
- s) With the engine fully warmed up, release the parking brake and test the brake for proper adjustment as you move forward. Adjust brake if necessary.
- t) Check the operation of hydraulic controls. Adjust if necessary.

NOTE — Where there is no provision to crank up the engine from front, this could be done by turning the power take-off.

ANNEX A

(Clause 7.2)

PERIODICAL MAINTENANCE

A-1 AT EVERY 8 TO 10 ENGINE WORKING HOURS OR DAILY

A-1.1 Clean the tractor and implement and park on level surface.

A-1.2 Check coolant level in radiator/expansion tank and top-up if necessary.

A-1.3 Check oil level in different assemblies with the tractor on a horizontal surface. Top up, if necessary, when the engine is cold.

A-1.4 Remove sediments from the air pre-cleaner bowl. Clean the oil-bath of the air cleaner, if the tractor operates in dusty and tropical surroundings.

A-1.5 Top up the fuel tank, if necessary, preferably in the evening, after day's work to avoid condensation. (Warning: Be sure to close the fuel tank after refueling)

A-1.6 Drain the water collected in the water separator (if fitted) by opening drain shutoff-valve and then close drain shutoff-valve.

A-1.7 Check water drain plug of fuel filter.

A-1.8 Clean the radiator. Remove dust and dirt accumulated in the core and top up the cooling system, using clean water. (Warning: Do not remove the radiator cap while the coolant is hot. When cool, slowly rotate the cap to the first stop and allow sufficient time for excess pressure to escape before removing the cap completely)

A-1.9 Make sure that the tension of the V-belts driving the dynamo/alternator and the fan is in accordance with the manufacturer's recommendations.

A-1.10 Check the tightness of the fuel, oil and water pipes and hoses, cleaners, fillers and drain plugs to avoid leakage.

A-1.11 Make sure that the inflation of the front and rear tyres are in accordance with the manufacturer's recommendations.

A-1.12 Check the electrical units. Make sure that the ends of the cables are properly connected to the terminals.

A-1.13 Check the level and specific gravity of the electrolyte in the storage battery.

A-1.14 Lubricate the tractor in accordance with manufacturer's recommendations. Lubricate the front wheel hub bearing after puddling operation.

A-1.15 Check all ball joints of the steering linkage. Make sure that the bolts and screws of the front axle, wheel hubs, wheel discs and wheel weights are tight.

A-1.16 Check all the fastening bolts and screws, and make sure that they are tight.

A-1.17 Inspect the brake pedals and clutch pedal for free travel and smooth operation. Adjust if necessary. (Warning: make sure to adjust both brake pedals equally when being locked together. Incorrect/unequal adjustments of brake pedals can cause the tractor to swerve/roll-over)

A-1.18 Start the engine and ensure that,

- a) the engine runs smoothly without knocking and abnormal noise;
- b) the oil pressure gauge is registering sufficient pressure;
- c) the warning lights, if provided, are functioning properly;
- d) the alternator/dynamo is generating proper current; and
- e) the voltage regulator is functioning properly.

A-1.19 Engage the hydraulic lift and check the movement of the lifting arms and three-point linkage.

A-2 FIRST 50 ENGINE WORKING HOURS

A-2.1 Carry out the operation given in **A-1**

A-2.2 Change engine oil and oil filter

A-2.3 Change primary fuel filter

A-2.4 Change hydraulic oil filter

A-2.5 Check oil level in front axle reduction hub (4WD) and top up if necessary.

A-2.6 Check oil level in front axle differential housing (4WD) and top up if necessary.

A-2.7 Adjust the clutch.

A-3 AT EVERY 50 TO 60 ENGINE WORKING HOUR OR WEEKLY

A-3.1 Carry out the operation given in **A-1**.

A-3.2 Clean and lubricate all greasing points.

A-3.3 Check and top up front axle housing (4WD) oil level.

A-4 AT EVERY 100 TO 120 ENGINE WORKING HOUR

A-4.1 Carry out the operations given in **A-3**.

A-4.2 Clean the primary element (Outer) of dry type air cleaner.

A-4.3 Disconnect the cables of the electrical equipment from terminals, apply grease or petroleum jelly to the terminals and reconnect.

A-4.4 Inspect the water pump. Make sure that there are no leaking points.

A-4.5 Lubricate the alternator/dynamo putting 8 to 10 drops of light engine oil in each of the oil caps, if provided.

A-5 AT EVERY 200 TO 250 ENGINE WORKING HOUR

A-5.1 Carry out the operations given in **A-4**.

A-5.2 In case of dry type air cleaner, clean outer (primary) element. Under dusty condition, clean outer element more often.

A-5.3 Change primary fuel filter.

A-5.4 Clean fuel feed pump filter.

A-5.5 Drain oil from oil sump and flush with the flushing oil. Refill with oil of recommended grade and up to the level recommended by the manufacturer and change oil filter.

A-5.6 Check transmission, hydraulics and steering oil level and top up if necessary.

A-5.7 Change transmission and/ or hydraulic oil filter.

A-5.8 Lubricate the joints of the throttle control linkage and other ball joints.

A-5.9 Clean front axle reduction hubs (4WD).

A-5.10 Clean and lubricate front axle swivel bearings (4WD).

A-5.11 Clean drive shaft sleeve for 4WD front axle.

A-5.12 Check the clearance of the front wheel hub bearing.

A-5.13 Check PTO clutch lever free play and adjust if necessary.

A-5.14 Check the toe-in and adjust if necessary.

A-6 AT EVERY 480 TO 500 ENGINE WORKING HOURS

A-6.1 Carry out the operations given in **A-5**.

A-6.2 Check and adjust valve tappet clearance.

A-6.3 Clean transmission breather.

A-6.4 Clean and lubricate front wheel bearings.

A-6.5 Change primary and secondary fuel filters.

A-6.6 Interchange the tyres of the front wheels to secure uniform wearing.

A-6.7 Clean the magnetic drain plug.

A-6.8 Test and clean the self-starter, alternator/dynamo and switching contacts of the starter relay.

A-6.9 Check the injector and adjust, if necessary.

A-7 AT EVERY 960 TO 1 000 ENGINE WORKING HOURS OR YEARLY [WHICHEVER OCCURS FIRST]

A-7.1 Carry out the operations given in **A-6**.

A-7.2 Replace outer (primary) element of dry type air cleaner.

A-7.3 Replace inner (secondary) element of dry type air cleaner. (Warning: Do not attempt to clean secondary element)

A-7.4 Change the oil in the gear-box, steering housing, power take-off case and hydraulic system, the grade and level of the oil being as recommended by the manufacturer.

A-7.5 Drain the old coolant, flush the entire cooling system and fill with new anti-freeze solution in recommended ratio.

A-7.6 Flush the fuel tank.

A-7.7 Change front axle housing (4WD) oil.

A-7.8 Change front axle final drive hubs (4WD) oil.

A-7.9 Change brake oil (if applicable).

A-7.10 Inspect the brake lining. Clean and adjust the brakes.

A-7.11 Get the compression pressure of engine checked and get the engine overhauled, if necessary.

ANNEX B
(Clause 8)
PRECAUTIONS

B-1 COOLING SYSTEM

B-1.1 Never run the tractor without water/coolant.

B-1.2 Always maintain the level of water/coolant as recommended by the manufacturer. Also maintain coolant water ratio as per recommendations.

B-1.3 Never fill water/coolant when the engine is hot. Use clean water and recommended coolant only.

B-1.4 Never remove the radiator cap abruptly when the engine is hot.

B-1.5 Never attempt to lubricate the fan bearing when the engine is running.

B-1.6 Check the water/coolant temperature gauge for its proper functioning.

B-2 LUBRICATION SYSTEM

B-2.1 Use clean oil of the recommended grade.

B-2.2 Use crankcase flushing oil or same grade of lubricant for flushing the crankcase.

B-2.3 Drain the crankcase only when the engine is hot and the oil is well agitated.

B-2.4 Never check the oil level while the engine is running. Maintain the engine oil level by dipstick as indicated in manual.

B-2.5 Never use cotton waste for cleaning the components.

B-2.6 Metal type oil filter element should be cleaned with bristle brush and any solvents such as petrol and diesel oil.

B-2.7 Check the oil pressure gauge for its proper functioning.

B-3 AIR CLEANER SYSTEM

B-3.1 Never try to remove the oil cup when the engine is running.

B-3.2 Refill only clean oil of the recommended grade and maintain the oil level in the cup as indicated.

B-3.3 Never use petrol or other highly volatile fuel for cleaning the filter element. Always clean with a jet of compressed air.

B-3.4 In case of dry type air cleaner use compressed air not exceeding 1.3 bar, blow the dust from the inside through the element to the outside to clean primary (outer) element. Never blow air from outside to inside, this will cause dust accumulation.

B-3.5 Never try to attempt cleaning of secondary (inner) element of dry type air cleaner.

B-3.6 Always wear eye or full-face protection while cleaning the air cleaner element, failure to comply could result in serious injury.

B-3.7 Never wash tractor when engine is running as it will damage the filter element.

B-3.8 Never ignore glowing of air cleaner clog lamp; it can lead to dust entry into engine.

B-3.9 Never use a cracked rubber hose.

B-4 FUEL SYSTEM

B-4.1 Use only clean fuel of recommended grade.

B-4.2 Be careful not to let the fuel tank become empty, otherwise air will enter into the fuel supply system.

B-4.3 Be careful not to spill during refueling or wipe it off at once as it may cause fire.

B-4.4 To prevent condensation of water accumulation in the fuel tank, fill the fuel tank before parking overnight.

B-4.5 Always use a strainer in refueling to prevent fuel line choking and FIP contamination. Clean the strainer with clean fuel as and when it becomes dirty.

B-4.6 Clean water separator, when float reaches red line (or any other indicator indicates) by opening drain shut-off valve and drain water. Then close the drain shut-off valve.

B-4.7 Handle the fuel filter very carefully, as the mesh is extremely fine.

B-5 TRANSMISSION AND WHEEL SYSTEM

B-5.1 Avoid riding over the clutch pedal.

B-5.2 Never overload the engine.

B-5.3 Select proper gear based on the load and or road condition.

B-5.4 Never over lubricate the bearings.

B-5.5 Release the clutch slowly to avoid jerks and to improve the life of clutch plate.

B-5.6 Drain the transmission case only when the oil is warm and flush carefully to remove dirt and metal particles completely from the transmission case.

B-5.7 Always keep recommended inflation of the front and rear tyres. Also inspect the tread side walls for damage.

B-5.8 Check the front and rear wheel fasteners for tightness. Apply recommended torque for tightening.

B-6 HYDRAULIC SYSTEM

B-6.1 Use only clean hydraulic fluid of the recommended grade.

B-6.2 Maintain the oil level as prescribed by the manufacturer.

B-6.3 Before working on hydraulic system (servicing/adjustments on implements), raise the implement, install the lift locks, disengage power and shut-off the tractor engine. Make sure that all moving parts have stopped and pressure in the system is relieved.

B-6.4 Always set the system to position control when not in field, such as while attaching/transporting implement or when no implement is attached.

B-7 ELECTRICAL SYSTEM

B-7.1 Never touch concentrated electrolyte.

B-7.2 Never add concentrated electrolyte in the battery. Always add distilled water to match the recommended electrolyte level.

B-7.3 Never remove the battery caps while engine is running. Wear an eye protection and rubber gloves when working with electrical components.

B-7.4 While disconnecting the cable from the battery, disconnect negative terminal first and while connecting the cable to the battery, connect positive terminal first.

B-7.5 Never let the terminals of the battery to corrode. Battery terminals should be cleaned and apply petroleum jelly (Vaseline). Never apply grease.

B-7.6 To prevent battery explosions, keep sparks, lighted matches and open flame away from the top of battery.

B-7.7 Never check battery charge by placing a metal object across the posts. Always use a voltmeter or hydrometer.

B-7.8 Never drive the tractor, if the dynamo/alternator is not functioning.

B-7.9 Never touch bare wirings.

B-8 BEFORE, DURING AND AFTER OPERATION

B-8.1 Before starting the tractor, make sure that there is no leakage of the oil and fuel and the tyres are properly inflated.

B-8.2 Check the engine oil level with the help of dipstick.

B-8.3 Check the coolant level in expansion tank. With cold engine it should be between High & Low mark. When the coolant level drops due to evaporation, add soft water only. Whereas, in case of leakage, add anti-freeze and soft water in the recommended ratio.

B-8.4 Check transmission oil level with the help of dipstick.

B-8.5 Sit on the operator's seat and adjust the seat if required and wear a seat belt (if provided). Apply parking brake, place the PTO control lever in 'OFF' position, lift control lever in 'DOWN' position and transmission levers in 'NEUTRAL' position, before starting the tractor.

B-8.6 Do not operate starter more than 20 seconds at a time. If engine does not start, wait at least two minutes before another attempt. If engine does not start in four attempts, refer troubleshooting chart in the manual.

B-8.7 After starting the tractor, warm up the tractor and monitor control panel. Make sure that all the instruments fitted in the panel are functioning properly.

B-8.8 If battery charging indicator, oil pressure indicator/gauge fails to glow or temperature gauge indicates a hot temperature, stop the engine and determine the cause.

B-8.9 Do not get on and off the tractor while it is operating.

B-8.10 While attaching a mounted implement to the tractor be careful not to get between the lower links of the hydraulic lift.

B-8.11 While adjusting the hydraulic lift and cleaning the parts do not stay on the implement.

B-8.12 Before raising or lowering the mounted implements precautions should be taken to avoid accidents.

B-8.13 Do not smoke or keep flame, near the fuel tank.

B-8.14 Always engage the clutch gently.

B-8.15 When making an emergency stop on highways or on way to or from fields, make sure that both the wheels are braked simultaneously.

B-8.16 Never ride or allow anybody to ride on the drawbar or the implement during operation and or transportation.

B-8.17 Always keep the tractor in gear when going down steep slopes.

B-8.18 Always drive the tractor at a speed slow enough to ensure safety, especially on rough ground or near ditches.

B-8.19 Be careful when working on hillside. Watch out for holes and ditches into which a wheel may drop and cause the tractor to overturn.

B-8.20 Reduce the speed before making a turn or applying the brakes.

B-8.21 During night operation keep the driving lamps and working lamp(s) ON.

B-8.22 When the tractor is overloaded and the engine speed slows down, do not regulate the speed by repeated release of the clutch. In such cases, shift the gear to lower range or reduce the load.

- b) Fuel in the fuel tank on start of the month, in litres;
- c) Fuel in the fuel tank on close of the month, in litres;
- d) Total fuel issued during the month, in litres;
- e) Total fuel consumed during the month, in litres;
- f) Total engine working hours during the month; and
- g) Average fuel consumption, in litres/hour.

C-2 SERVICING RECORD

- a) Name of the service station;
- b) Date of servicing;
- c) Odometer or hour recorder reading at the time of servicing;
- d) Expected date for next service;
- e) Total kilometers or engine working hours since the last service;
- f) Nature of job performed during servicing; and
- g) Charges paid.

Signature of the
owner of the tractor

Signature of the
owner of the service
station with seal