

Lesson 5: Procedure of testing and standard code for testing of tractor performance

Introduction

The International Organization for Standardization (ISO) is the apex body in the area of standardization at international level and has its membership on National Standards Bodies of various countries. In the context of farm machinery, it has been observed that acceptance of farm machinery by the farmers largely depends on their quality. Hence, in order to reap the benefits of standardization including manufacture of high quality products, a need was felt for preparation of India Standards for agricultural machinery. Organized efforts in this direction were made by the Bureau of Indian Standards (BIS) in late 50's by way of setting up a Technical Committee for formulation of standards for this group of industry. The committee is generally consisted of representatives of Government department, research, education and testing institutions and the manufacturing industries. National Centre for Agricultural Mechanization (NCAM) is responsible for standardization of agricultural machinery in Nigeria.

Procedure of testing

ISO, BIS, NCAM and other testing centers have published standards on machine/components for different agricultural machineries. Mostly testing of the particular machine is undertaken as per relevant clauses of the code. In case, the standard has not been published for the machine, code and procedure is developed by these testing centers and same used for testing purposes. These test procedures help in formulation of test codes. The complete testing of a machine involves:

- i. Checking of specifications
- ii. Development of test facilities and instrumentation
- iii. Conduct actual tests
- iv. Analysis of the data
- v. Presentation of data and report writing
- vi. Product certification marks scheme

i. Checking of specifications: Generally the test codes include few important specifications of the machine/equipment those are mandatory to meet a specific requirement. Few specifications have to be specified by the manufacturer and the testing center has to verify such dimensions within the tolerance limits.

ii. Development of facilities and instrumentation: The test codes give a guide line for development of test set up required for carrying out a specific test in the machine/equipment/component. The testing center has to develop a setup which should meet the

requirements specified in the test procedure of the test center. As far as possible the high quality instrumentation should be included in the test set ups.

iii. Conduct actual tests: The actual tests should be carried out on the machine as per the test procedure specified and data recorded in the given blank tables.

iv. Analysis of data: The data obtained during testing is analyzed for presentation in the required format. Use of computer should be encouraged.

v. Presentation of data and report writing: The report should include the sections for the clauses those comply with the standard and those do not conform to the standards.

vi. Product Certification Marks Scheme: Product Certification Mark on an article certifies that the article complies with the requirements specified in the relevant Indian standards and also guarantees that the manufacturer operates a quality control system in his production which is monitored in terms of regular inspections and checks in such a form as to give assurance that the article will comply with the requirements of the relevant standards. The Certifications Marks schemes also provide an inbuilt mechanism for ensuring the quality of the product right from the raw material stage to the finished product.

3. Tractor Tests Eligible for OECD Approval:

Compulsory Tests: Approval shall require checking as follows:

- Main power take-off and five extra points for calculating fuel consumption characteristics
- Hydraulic power and lifting force
- Drawbar power and fuel consumption (un ballasted tractors)

Tractors without a main power take-off or with one that cannot transmit the full engine power can be tested at the engine flywheel or by drawbar tests. The testing station in agreement with the manufacturer shall make the choice between the two methods. Tractors without a lifting system and/or without a hydraulic service coupling remain eligible under the Code. However, the design of these tractors shall be specified in the test report. Optional tests may be performed and reported in any combination provided they are requested simultaneously with the compulsory tests

Optional Tests: Approval of any optional tests shall require checking as follows:

- Engine test
- Additional Power take-off ratio (economy)
- Reagent consumption during Power take-off and Drawbar Power testing
- Hydraulic power: optional tests
- Performance at the belt or the belt pulley shaft
- Performance in a hot atmosphere
- Low temperature starting test

- Additional drawbar tests
- Ten-hour test (ballasted tractors)
- Axle power determination
- Turning area and turning circle
- Centre of gravity
- Braking (wheeled tractors only)
- External noise level (wheeled tractors only)
- Waterproofing test

Repeats of Any of the Compulsory or Optional Tests at Different Settings: Approval shall require checking as follows:

- Eligibility for the same category
- Compliance with test conditions under the Code
- Clear specification of differences from original tests and caveat
- Compliance with Specimen Test Report
- Results.

Other Tests: Tests performed according to other internationally recognized methods, to be reported and clearly marked as not being subject to the OECD approval procedure. Such test methods would have to be mentioned in the report and made available to the OECD in a published form, in either of the official languages of the Organization.

4. Bureau of Indian Standards (BIS) for Tractors:

Tractor Test:

The brief outline of various types of tests performed by Center of Farm Machinery Testing and Training Institute (CFMTTI), Budni (MP) are as under. Tractor test is carried out in accordance with Indian Standard (IS):5994-1998 as amended from time to time. A tractor is subjected to the following tests & evaluation

Laboratory Tests

- Checking of specifications
- PTO performance test
- Belt pulley test(optional)
- Drawbar performance test
- Power lift & hydraulic performance test
- Brake test
- Air cleaner oil pull over test
- Noise measurement
- Mechanical vibration measurement
- Location of center of gravity
- Turning ability
- Visibility

Field tests: - For Initial commercial tests (ICT) for 35 h and for batch test of 35 h. (if there is any major breakdown during the ICT) of field tests with the following implements

Plough / Rotavator (20 hrs. for I.C.T & 20 hrs for Batch Test)

Puddling test of 10 Hrs duration under actual field conditions followed by Water Proof Test of 5 h for ICT and batch test if applicable.

Haulage test: This is done with 2/4 wheel trailers and the gross load recommended by the manufacturer. Components & assembly inspection is done to assess the wear, breakdowns, etc.

Power Tiller Test

Performance evaluation of power tiller is conducted in accordance with Indian Standard (IS):9935-2002 as amended from time to time. A power tiller is put into the following tests and evaluation:

Laboratory Tests

- Specification checking.
- Engine performance test.
- Rotary shaft performance test.
- Drawbar performance test.
- Parking brake test.
- Noise measurement.
- Air cleaner oil pull over test.
- Mechanical vibration measurement.
- Turning ability test.
- Chemical composition test and wear characteristics test of rotavator blades.

Field tests: For Initial commercial tests & batch test 35 h, of field tests with the following implements

- Mould board ploughing (20 hrs. for I.C.T. only) dryland
- Dry rotavation (35 hrs. for I.C.T. & 35 hrs. for Batch tests)
- Puddling under actual field condition (15 h for I.C.T. & Batch test both)

Haulage test: Components and assembly inspection is done to assess the wear, breakdowns, etc.

5. Quality system

The organizational structure, responsibilities, procedures, processes and resources used to implement quality policy and objectives are collectively referred to as quality systems. To cope with the growing change of competitiveness, ISO 9000 series of standards has been formulated by ISO to provide for quality management systems. Indian has adopted ISO 9000 series of standards as IS/ISO 9000 series of standards. These standards provide not only guidance and

criteria for formal control of products and services by the company but also give an assurance to the purchaser and the set of stated requirements

ISO 9000 series of standards are generic in nature and applicable to the wide arena of business activity covering all the four main heads: Hardware, Software, Processed materials and Services

ISO 9001 is applicable to those manufacturers who have design, development and production facilities.

ISO 9002 is applicable to those manufacturers who have only production in facilities.

ISO 9003 is suitable only for trade houses.

In common usage the concept of quality is linked to excellence which is subjective in nature. Thus the perception of quality varied from person to person, what may be of good quality to one, may be of poor quality to the other or vice versa, depending upon the individual needs, wants and desires. Quality should not be defined in comparative terms as poor, fair, good or excellent. Quality is an absolute entity and viewed from the point of customers. Quality is the goal of each and every business. So, the objective definitions of quality are:

- Fitness for use
 - Fitness for purpose
 - Conformance to requirements
 - Conformance to specifications
 - Customer satisfaction
 - Product satisfaction
 - Product designed and made to work properly
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- Worth for money