F.No. 7-6/2016-M&T(I&P)
Government of India
Ministry of Agriculture and Farmers Welfare
Department of Agriculture, Cooperation and Farmers Welfare
(Mechanization & Technology Division)

Krishi Bhawan, New Delhi
Dated 28th August, 2017

Office Memorandum

Subject:- Draft BIS Test Code IS 15806: 2008-Reg.

After consultation with various stake holders, the draft **BIS Test Code IS 15806: 2008** Combine Harvester Recommendation on selected performance and other characteristics is proposed and forwarded herewith for taking necessary action for publication of the same at the earliest possible.

This issues with the approval of competent authority of this Department.

(V.N. Kale)
Additional Commissioner (Machinery)

To,

Shri Pawan Kumar
Scientist & Member Secretary, FAC 11
Bureau of Indian Standard
Bahadur Shah Zafar Marg
New Delhi

Copy to: forwarded to the following authorities concerned to implement the above draft Test Code IS 15806: 2008 with immediate effect which is duly approved by the competent authority at this Department till the final draft of the same is published by BIS.

1. Directors FMTTIs, Budni, Hisar, Anantapur & Biswanath Chariali.
2. Director, CIAE Bhopal.
3. Testing Incharge, CEAT, PAU, Ludhiana

(V.N.Kale)

Draft

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IS 15806 : 2013

भारतीय मानक मसौदा

कमबाईन - हारवेस्टर - चुनिंदा कार्यकारीताएं एवं अन्य मापदण्ड के लिए अनुशंसाएं

(पहला पुनरीक्षण)

Draft
Indian Standard

COMBINE HARVESTER

RECOMMENDATIONS ON SELECTED PERFORMANCE AND OTHER CHARACTERISTICS

(First Revision)

ICS 65.060.50

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

FOREWORD

Combine-harvester, commonly known as combine, is used for a combination of operations, such as harvesting, threshing, separating, and cleaning of various crops grown in the country.

This first revision of IS 15806: 2008 is being considered in order to incorporate Acceptance criteria for performance characteristics. This revision also incorporates the criteria for determining variants and new models of combines for the purpose of assessment of evaluative requirements.

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 : 1960 'Rules for rounding-off numerical values (*revised*)'. 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

COMBINE HARVESTER RECOMMENDATIONS ON SELECTED PERFORMANCE AND OTHER CHARACTERISTICS
(First Revision)

1 SCOPE

This standard prescribes (i) an assessment of the evaluative requirements applicable for Qualifying Minimum Performance criteria of the Combine Harvesters, (ii) tolerances on the values declared by the manufacturer, and in certain cases minimum/ maximum values of the performance characteristics, and statutory requirements under the relevant Act(s) of the Combine Harvesters, (iii) the criteria for determining variants and new model of Combine Harvesters for the purpose of testing and certification ,and (iv) definitions of some of the terms commonly used in relation to testing of combine harvester.

2 REFERENCES

The following Indian Standards contain provisions which through reference in this text, constitute provision 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:

IS/ISO No.	*Title*
IS 5994 : 1998	Agricultural Tractors - Test Code (*third revision*)
IS 6024 : 1983	Guards for Harvesting Machines (*first revision*).
IS 6025 : 1982	Knife Sections for Harvesting Machines (first revision)
IS 6283 (Part 1) : 2006	Tractors and Machinery for Agriculture and Forestry, Powered Lawn and Garden equipment - Symbols for Operator Controls and other Displays Part 1: Common Symbols (*second revision*)
IS 6283 (Part 2) : 2007	Part 2: Symbols for Agricultural Tractors and Machinery (*second revision*)
IS 8122 (Part 1) : 1994	Test Code for Combine Harvester - Thresher Part - 1 : Terminology (*first revision*)
IS 8122 (Part 2) : 2000	Combine-Harvester-Thresher - Test Code - Part 2 : Performance Test
IS 10273 : 1987	Guidelines for declaration of Power and Specific Fuel Consumption and Labelling of Agricultural Tractors (*first revision*)
IS 10378 : 1982	Knife back for Harvesting Machines

IS 12180 (Part 1) : 2000	:	Tractors and Machinery for Agriculture and Forestry - Noise Measurement - Method of Test - Part 1 : Noise at The Operator s Position - Survey Method
IS 12180 (Part 2) : 2000	:	Tractors and Machinery for Agriculture and Forestry - Noise Measurement - Method of Test - Part 2 : Noise Emitted When in Motion
ISO 4254 - 1: 2013		Agricultural machinery -- Safety -- Part 1: General requirements
ISO 4254 - 7: 2008		Agricultural machinery -- Safety -- Part 7: Combine harvesters, forage harvesters and cotton harvesters
ISO 6689-2: 1997		Equipment for harvesting – Combines and functional components – Part 2: Assessment of characteristics and performance defined in vocabulary

3 TERMINOLOGY

3.1 Confidential Test

The test conducted for providing confidential information on the performance of Combine Harvester whether ready for commercial production or not, or to provide any special data that may be required by the manufacturer / applicant.

3.2 Commercial Test

The tests conducted for establishing performance characteristics of Combine Harvester that are ready for commercial production or already in production.

3.2.1 *Initial commercial Test*

The tests conducted on indigenous or imported prototype of Combine Harvester ready for commercial production.

3.2.2 *Batch Test (Conformity of Production)*

The tests conducted on Combine Harvester which have already undergone initial commercial test and are being manufactured / sold commercially in the country.

3.2.3 Threshing Efficiency:

E_{th} = (B/A)*100, where,
B = quantity of (threshed, clean) grain collected from all outlets, viz grain tank, straw walker and sieve etc.
A = Total grain output per unit of time
C = quantity of broken grain from all outlets, viz grain tank, straw walker and sieve etc. , per unit of time
D = quantity of un-threshed grain from all outlets, viz grain tank, straw walker and sieve etc., per unit of time
And,
A = B + C +D

3.2.4 Processing Losses:

Lp = D_c + Cc + Rc + Lr + Ls , where,
Lp = Processing Losses
Dc = Percentage of unthreshed grain in the grain tank
Cc = Percentage of broken grain in the grain tank
Rc = Percentage of rubbish/ foreign matters in the grain tank (***excluding weeds and other seed materials)***
Lr = Rack loss in percentage

Ls = Shoe loss in percentage

3.2.5 Non- collectable losses:

$L_{nc} = L_r + L_s + L_h$, where,

Lr = Rack loss in percentage
Ls = Shoe loss in percentage
L_h = Header loss in percentage

3.2.6. Rack loss:

Lr = Percentage of threshed, unthreshed and broken grains passing out of the straw walker

3.2.7 Shoe loss:

Ls = Percentage of threshed, unthreshed and broken grains passing out of the sieve(s)

3.2.8 Collectable losses:

Lc = Percentage of broken and unthreshed grain in grain tank

3.2.9 Extension of definition of Self Propelled combine harvester:

A machine on which tractor is mounted as the power source will also be considered as self-propelled combine harvester for the purpose of testing, except that engine test would not be applicable if the tractor is already tested as per IS 5994.

3.3 Evaluative requirements.

Requirements under this category are the ones which are mandatory for acceptance of the Combine Harvester for the purpose of subsidies/~~NABARD financing~~.

3.4 Non Evaluative requirements.

Requirements under this category are the ones which are not mandatory for acceptance of the Combine Harvester for the purpose of subsidies/~~NABARD financing~~. However, the authorized testing agency shall observe the performance for these requirements and record in the test report.

4 ACCEPTANCE CRITERIA

4.1 Acceptance criteria for Performance characteristics

The product may be accepted for performance after confirming compliance to all evaluative requirements.

Performance characteristics of combine harvester, along with the tolerances for the declared values, and in certain cases minimum / maximum values are given in Table 1.

4.2 Acceptance criteria in case of Breakdowns /Defects

4.2.1 The product may be accepted subject to the following conditions: (a) there is no 'critical breakdown' during the course of testing, (b) there are not more than two 'major breakdowns' and neither of them is of repetitive nature; (c) there are not more than five 'minor defects' during the test and the frequency of any defect is not more than two; and (d) in no case, the total no. of breakdowns exceed five i.e. (2 Major + 3 Minor) or (1 major + 4 minor) or 5 minor breakdowns.

4.2.2 In case of multiple consequential failures resulting from a single defect / breakdown, the primary single defect / breakdown shall only be counted.

4.2.3 Replacement of gaskets, seals, 'O' rings etc, other than the defected parts during repair, dismantling & re-assembly of any aggregate shall not be considered as breakdown.

4.2.4 Categorizations of defects in terms of "Critical", "Major" and "Minor" for various sub assemblies/ parts are provided in the Annexure A, B and C.

5. TEST REQUIREMENTS

5.1 The Initial Commercial Test of combine harvester shall be made compulsory to meet the requirements of field worthiness of the combine harvester. The testing institute shall select the combine harvester randomly from the production lot, for both ICT and Batch Test.

5.2 If the engine of the combine harvester is already tested by the FMTTIs as a full package (together with all standard fitments and accessories) for combine harvester application at any approved independent recognized national testing institute, and its settings has not been changed on the combine harvester submitted for test, then bench testing of the engine of individual combine harvester should not be done and only the performance of the combine harvester with such engine as its prime-mover should be tested. The data of the engine already tested may be referred.

5.3 The normal wheel type combines shall be essentially recommended and tested in wheat and paddy crops, whereas track type combines in paddy only. Combine harvester, however, may be tested in other crops, if feasible for testing institute and also if requested by the manufacturer. Total field test duration for Initial Commercial Test of all types of combine harvester shall be minimum of 50 h for paddy and wheat crops only. In case of single crop it shall be tested for minimum of 50h. If the combine harvester is recommended for the crops other than wheat and paddy then the field performance test of additional 25 h for each crop should be conducted. ~~for which additional test fee would be charged.~~

5.4 First Batch Test shall be carried out after 5 years from the date of release of Initial Commercial Test Report and subsequent Batch Tests shall be carried out at an interval of 7 years from the previous batch test. The batch test on combine shall be done as per the test code in vogue, excluding operator's field of vision, air cleaner *oil* pull over test, position of center of gravity test.

5.5 The variant model(s) are also to be subjected to Batch Test and shall be regulated as per the provisions of ~~6.4~~.5.4

5.6 If base model is no more in production, the manufacturer may declare one of the variant models already tested, as a base model. The testing authority shall select at random declared variant model from the production line in place of the base model for Batch Test. The tests shall be carried out as per the test code in vogue, on the selected sample.

Note: In this case, under the Batch test, the comparison of Specifications & performance parameters of Base as well as variant model will be included.

Table 1 Parameters applicable for qualifying mminimum pperformance criteria

(Clause 4)

Sl No.	Characteristic	Category (Evaluative / Non - Evaluative)	Requirement	Tolerance	Remarks
1	2	3	4	5	6
i)	**Prime mover performance**				
a)	Max. Power (absolute) Average max. power observed during 2h max. power test in natural ambient condition	Evaluative	To be declared by the manufacturer	Declared value to be achieved with a tolerance of ± 5%	-
b)	Max. power observed during test after adjusting the no load engine speed as per recommendation of the manufacturer for field work, kW	Evaluative	To be declared by the manufacturer	- do -	-
c)	Power at rated engine speed, kW	Evaluative	To be declared by the manufacturer	- do -	
d)	Specific fuel consumption corresponding to average maximum power under 2h maximum power test, g/kWh.	Evaluative	-do-	+ 5 %	
e)	Max. smoke density (Bosch no.) at 80% load between the speed at max. power & 55% of speed at max. or 1000 rpm whichever is higher	Evaluative	As per CMV Rules	NIL	
f)	Max. crank shaft torque, (Nm) observed during the test after no load engine speed is adjusted as per manufacturer's recommendation for	Evaluative	To be declared by the manufacturer	± 8 %	

	field work				
g)	Back up torque, %	Evaluative	7 %, Minimum.	NIL	
h)	Max. operating temperature, ^{0}C (i) Engine oil	Evaluative	To be declared by manufacturer	NIL	The observed value under high ambient condition should not exceed maximum safe value specified by the oil company which will be provided by the applicant.
	(ii) Coolant	Evaluative	To be declared by manufacturer	NIL	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.
j)	Lubrication oil consumption	Evaluative	Not exceeding 1 % of Specific Fuel Consumption at maximum power under high ambient condition	NIL	The value would be based on the test conducted under high ambient condition
ii)	**Brake Performance at 24 km/h or maximum speed whichever is less.**				
	Max. stopping distance at a force equal to or less than 600 N on brake pedal (m) – (Cold brake and Hot brake)	Evaluative	As per requirements of CMVR	NIL	
	Effectiveness of Parking brake at a force of 600 N at foot pedal or 400 N at hand lever	Evaluative		NIL	Based on the test conducted, Yes/No, as the case may be , should be indicated

iii)	**Mechanical Vibration (Amplitude of vibration) at:**				
a)	Operator's platform	***Non*** Evaluative	120 µm max.	NIL	-
b)	Steering wheel	***Non*** Evaluative	150 µm max.		
c)	Seat with driver seated	***Non*** Evaluative	120 µm max.		
iv)	**Air cleaner oil pull over** Max. oil pull over in percentage when tested in accordance with IS 8122 (Part 2).	Evaluative	0.20% max.	NIL	-
v)	**Noise measurement:** Max. ambient noise emitted by combine at bystanders position dB (A)	Evaluative	As per CMV Rules	NIL	-
	Max. noise at operator's ear level dB (A)	Evaluative	As per CMVR	NIL	-
vi)	**Header Lifting Test** Satisfactory completion of header lifting test	Evaluative	--	NIL	-
vii)	**Discard limits**				
a)	Cylinder bore diameter	Evaluative	Should not exceed the values declared by the manufacturer	NIL	-
b)	Piston diameter	Evaluative	--do--	NIL	-
c)	Piston to cylinder liner clearance at skirt	Evaluative	--do--	NIL	
d)	Ring end gap	Evaluative	--do--	NIL	
e)	Ring groove clearance	Evaluative	--do—	NIL	
f)	Diametrical and axial clearance of big end bearing	Evaluative	--do--	NIL	
g)	Diametrical and axial clearance of main bearings	Evaluative	--do--	NIL	-

These parameters will be evaluative after three years from the date of publication of the test code.

h)	Thickness of brake lining	Evaluative	--do--	NIL	-
i)	Thickness of clutch plate	Evaluative	--do--	NIL	-

viii) **Field Performance:**

a)	Suitability for crops	Evaluative	Wheat & paddy (wheel type), Paddy (Track type)	NIL	*-If any combine harvester is exclusively designed for a particular crop then ~~already~~ to be mentioned on the test report*
b)	Average Processing losses, (%)	Evaluative			
		Wheat	Max. ~~1%~~ *3%*	NIL	As per ISO 6689-2-1997 (E)
		Barley	Max. ~~2%~~ *4%*	NIL	-
		Rice	Max. ~~3%~~ *4%*	NIL	-
		Sorghum	Max. ~~1%~~ *3%*	NIL	-
		Maize	Max. ~~3%~~ *4%*	NIL	-
		Oilseed rape	Max. ~~3%~~ *4%*	NIL	-
		Soya-beans	Max. ~~3%~~ *5%*	NIL	-

ix) **Safety requirement**

a)	Guards against all moving parts/drives and hot parts	Evaluative	Belt and chain drives, pulleys, hydraulic pipes.	--	As per IS 12239 (Part 2) as amended time to time
b)	Lighting arrangement	Evaluative	Essential as per CMVR	--	-
c)	Grain tank cover	Evaluative	Essential	--	-
d)	Spark arrester in engine's exhaust in case naturally aspirated engine	Evaluative	Essential	--	-
e)	Stone trap before concave	Evaluative	Essential	--	-
f)	Rear view mirror	Evaluative	Essential	--	-
g)	Fire extinguisher	Evaluative	Essential	--	-
h)	Slip clutch at following drives –			--	-
	1) Cutting platform	Evaluative	Essential		
	2) under shout conveyor drive	***Non*** Evaluative	Essential		

	3) Grain & tailing elevator	***Non*** Evaluative			
i)	Anti slip surfaces at operator platform & ladder & proper gripping for the control levers	Evaluative	Essential	--	As per IS 12239 (Part 2) as amended from time to time
j)	Working clearance around the controls	***Non*** Evaluative	Essential 70 mm, min.	--	As per IS 12239 (Part 2) as amended from time to time
k)	Labeling of control gauges and all operating controls	Evaluative	Essential	--	As per IS 6283
x)	Material of construction: Guards, knife blades and knife back	Non-Evaluative	Conforming to IS:6024, IS:6025 and IS 10378 respectively	--	-
xi)	Labeling of combine harvester	Evaluative	Should conform to the requirements of CMVR along with max engine power, max PTO power and SFC	--	-
xii)	Brake down (critical, major and minor)	Evaluative	-	--	See Annex. A, B & C
xiii)	Submission of Literature such as Workshop/service manual Parts catalogue Operation manual to test agency	Evaluative		--	Yes or no as the case may be

6. Testing of Variant Models

~~7.1~~ 6.1 Base Model

A Base model shall be defined as the one, which has defined specifications. Manufacturer will specify the Base Model along with list of variants, which could be added or deleted or supplemented. The Combine Harvester will be tested and Initial Commercial Test (ICT) Report shall be released.

~~7.2~~ 6.2 Variants

The variant model(s) is determined from the Base Model by the addition/deletion /supplementing of any one or more of the features given in Table 2. The variants shall be subjected to additional test(s) as stated against each feature of variant.

~~7.2.1~~ 6.2.1 All the variants which are tested or submitted along with the base model for test shall appear in the test report of the base model.

~~7.2.2~~ 6.2.2 For variants, the following checks shall be made on a fresh sample only for conformity of sample as being the same as tested earlier.

(i) Specification in full

(ii) Nominal speed test

(iii) Two hour maximum power test under normal ambient condition (if the engine is not already tested as a standardized package for Combine Harvester application)

~~7.2.3~~ 6.2.3 For variants which can be converted at test site, the variant model can be determined by adding or deleting the variant features in the same sample of base model and if any tests are required, the same can be conducted on the variant Combine Harvester. If manufacturer desires, a separate variant Combine Harvester may be submitted and the relevant tests may be carried out.

~~7.2.4~~ 6.2.4 Wherever only physical inspection on the variant Combine Harvester is required as per the Table 2, the inspection can be carried out, in consultation with the Testing Authority.

~~7.2.5~~ 6.2.5 Beyond the above definition of base model and its variants, other changes would be considered as model change

~~7.2.6~~ 6.2.6 Difference between Base Model, Variant and a New Model on the basis of engine and other parameters is given in Table 3.

Table 2 Determination of Variants

(***Clause*** 7.2)

S.No.	**Features of Variant Combine Harvester**	**Additional Tests/Inspection that will be required on the feature variant**
1.	Change in prime-mover make and model beyond10% but within 20% variation in power and engine speed.	Prime-mover performance test if it is already not tested as full package for combine application. Field performance test in one of the crops recommended by the manufacturer. Noise level test, brake test, vibration measurement and any other test that may be necessary at the discretion of testing authority.
2.	Change in crop conveyance i.e. axial flow type to Tangential axial flow type and vice versa	Field performance test for 25 h either in wheat or paddy crop.
3	Increase or decrease in the size of header unit (cutter bar) keeping all other machine specification same	Complete Field performance test as per the code in vogue
4	Change of header unit, crop feeder unit, threshing unit , separating unit, cleaning unit and/or other unit/units to suit harvesting of any other crops such as maize, mustard and any other crop recommended by the manufacturer	Field performance test for 25 h in each crops recommended by the manufacturer.
5	Addition of number of speeds with add-on modules and modifications in gear ratios to meet end customer requirements resulting in variations less than or equal to 20% of the nominal speed in maximum speed measured on Base Model.	Nominal speed test, Physical inspection, Brake test.
6.	Different type of gear box (with or without synchronizers, constant mesh, hydrostatic etc.)	Nominal speed test. Physical inspection.
7	2 wheel drive/4 wheel drive provided the nominal speed	Physical inspection. Turning space/radius test.

	remains the same	
8	Fitment of Cabin	Noise level test Conformity to CMVR
9.	Change in number of straw walkers and their size etc.	Complete Field performance test as per the code in vogue. Noise and vibration measurement.
10.	~~Location and type of operating controls like pedal, gear shift levers, system loading/ unloading levers etc.~~	Test as per IS 10703 , IS 12239 Part 1 & 2. and IS 8133
11.	Power assisted/manual steering systems	Inspection against the CMVR requirements
12.	Type of actuation systems for brake & clutch (mechanical/hydraulic/ pneumatic)	For brakes, inspection to be done against the CMV Rules. In other cases, only physical inspection and measurement of actuation forces is to be done.
13.	Changes in the Instrument panel	Inspection against relevant standard
14.	Sheet metal/styling including color ~~& decals /sticker change.~~	Conformity to IS 6283 Part1 & 2.
15.	Single/dual/dry/wet/independent clutch/increase in size of clutch.	No test required. Only physical inspection
16.	Specification of dry/wet air cleaner, its location etc.	a) Physical inspection only if air cleaner is changed from wet to dry type. b) Air cleaner oil pull over test as per IS 5994 if the air cleaner is changed from dry to wet type or combination thereof.
17.	Fitment/change of engine accessories such as Air compressors, Oil coolers, Water separators, Expansion tank with special coolant, additional hydraulic pumps, fuel tanks etc.	No test required. Only physical inspection.
18.	Type and increase in size of brake systems-disc, Drum, Oil immersed brakes	Inspection and brake test as per the CMVR requirements.
19.	Different tyre sizes – front and rear – One step up/lower tyres (radius index of tyre shall remain within ± 50 mm) and are used on the recommended rim as per IS 13154 /ITTAC/JATMA/ECE & ETRTO	Nominal speed test
20.	~~Change in position of fuel tank, its material and capacity.~~	No test required only physical inspection.
21	Change in power transmission system from tractor PTO/engine to the functioning units of the combine harvester	No test is required if the variation in speed of functional units such as thresher, reel, blades, cleaning sieves etc. is within ± 7% of the base model.
22	Provision of additional safety devices for overloads and change in type of overload protecting devices.	No test required only physical inspection.
23	Change in overall dimension of the combine harvester (length, width and height, mass)	Inspection against the requirements under CMVR
24	Provision of straw chaffer and spreader	Physical inspection and limited field test for chaffing quality and spreading performance.
25	~~Change in position and size of grain tank, change in speed of grain unloading auger.~~	Physical verification.

Table 3

Difference between Base model, Variant and a New model

(*Clause* 7.2.7)

Note:

S. No.	Parameters	Base model	Variants	New model
1	Principle of operation of Engine (spark/ compression ignition) (two stroke/ Four Stroke)	No change	No change	Change
2	Number and arrangement of cylinders	No change	No change	Change
3	Max PTO/Engine power	No Change in declaration	Power declaration exceeding 5% but not exceeding 20% of the declared values of base model. ***30% variation in power & engine speed is allowed in case of variant model with ~~SCM~~/SMS/ AC cabin or any other attachment consuming engine power.***	Power declaration above 20% of declared value of base model
4.	***Make & Models of Engine***	***No Change***	***Change Subject to the qualifying conditions at Sl. No 1,2,&3***	***Change Subject to the qualifying conditions at Sl. No 1,2,& 3.***
5	Variation in rated PTO/Engine rpm	No Change in declaration	Change, subject to qualifying condition under Sl. No.4 column 4.	Change, subject to qualifying condition under Sl. No.4 column 5

1. Name of variant model of combine harvester must be entirely or partially different from the one of base model.

2. Every modification in the engine parameters to meet the statutory/regulatory requirements shall be intimated by the manufacturer to the Testing authority. The Testing Authority may consider that the modifications in engine parameters require further tests or otherwise.

ANNEX A

(Clause 4.2.4)

CATEGORIES OF BREAK-DOWN/DEFECT
(Critical Breakdown/defects)

Code No. (1)	Aggregate (2)	Critical Defects (3)	Sub-assembly/Part. (4)
C-1	Engine	Engine seizure	Piston/ liner/piston rings
C-2	-do-	-do-	Main/Big end bearings
C-3	-do-	Breakage/crack/ bending of	Piston
C-4	-do-	-do-	Connecting rod
C-5	-do-	-do-	Crankshaft
C-6	-do-	Breakage/ crack of	Lubricating oil pump
C-7	-do-	-do-	Fuel injection pump
C-8	-do-	-do-	Governor
C-9	-do-	-do-	Cylinder block
C-10	-do-	-do-	Cylinder head
C-11	-do-	-do-	Timing gears
C-12	-do-	-do-	Valves
C-13	-do-	-do-	Cam shaft
C-14	Transmission	-do-	Clutch housing
C-15	-do-	-do-	Gear box / differential housing
C-16	-do-	-do-	Axle housing
C-17	Steering system	-do-	Steering gear
C-18	-do-	-do-	Steering shaft
C-19	-do-	-do-	Steering wheel
C-20	-do-	-do-	Steering drop arms
C-21	-do-	-do-	Drag links
C-22	-do	-do-	Tie rods
C-23	-do-	-do-	Steering knuckles
C-24	-do-	Failure of	Locking mechanism components
C-25	Brake system	Breakage / crack of	Actuating linkage parts or actuating system
C-26	-do-	-do-	Brake housing or drum
C-27	Front axle	-do-	Front axle
C-28	-do-	-do-	Stub axle
C-29	-do-	-do-	King pin
C-30	-do-	-do-	Front axle support
C-31	-do-	-do-	Pivot pin & lock
C-32	-do-	-do-	Radius rod
C-33	Rear axle	-do-	Rear axle
C-34	-do-	-do-	
C-35	-do-	-do-	Rear axle support
C-36	-do-	-do-	Pivot pin and k lock
C-37	-do-	-do-	Hydraulic cylinder
C-38	-do-	-do-	Radius rod
C-39	Wheel equipment	-do-	Wheel rim
C-40	-do-	-do-	Wheel hub

C-41	-do-	-do-	Wheel disc
C-42	-do-	-do-	Wheel bolts
C-43	Cutting platform auger	-do-	Auger shaft
C-44	Threshing drum	-do-	Drum
C-45	blower	-do-	Blower shaft
C-46	Header transport trailer	-do-	
C-47	-do-	-do-	Axle
C-48	-do-	-do-	Frame
C-49	-do-	-do-	Wheel rim
C-50	-do-	-do-	Wheel disc
C-51	-do-	-do-	Wheel bolts
C-52	Hydraulic system	-do-	Distributor
C-53	-do-	-do-	Hydraulic housing/ hydraulic lift cover housing
C-54	-do-	-do-	Hydraulic pump

ANNEX B
(Clause 4.2.4)

CATEGORIES OF BREAK-DOWN/DEFECT
(Major Breakdown/defects)

Code No. (1)	Agreegate (2)	Major Defects (3)	Sub-assembly/ Part (4)
Mj-1	Engine	Breakage/ crack/ bending of	Fan blade
Mj-2	-do-	-do-	Oil Pump
Mj-3	-do-	-do-	Water Pump
Mj-4	-do-	-do-	Fuel Tank
Mj-5	-do-	-do-	Radiator
Mj-6	-do-	-do-	Push rods or rocker arms or valves or valve locks or cam followers or cam shaft
Mj-7	-do-	Failure of	Lubrication
Mj-8	Transmission	Breakage/ crack/bending of	Clutch assembly and its components
Mj-9	-do-	-do-	All gearing elements/Belts chain drive
Mj-10	-do-	-do-	All shaft elements
Mj-11	-do-	Breakage/ crack	All bearings
Mj-12	-do-	Breakage/ crack/bending of	Gear shifting forks
Mj-13	-do-	Breakage/ crack	Levers / forks/ rails of gear shifting mechanism
Mj-14	-do-	-do-	Actuating linkage parts of clutch
Mj-15	Brake System	-do-	Brake shoe/disc
Mj-16	Hydraulic System	Breakage/ crack/ bending of	Pump or its positive drive mechanism or its elements
Mj-17	-do-	-do-	Valves
Mj-18	-do-	-do-	Ram cylinder/ piston
Mj-19	-do-	-do-	Lift cover assembly
Mj-20	-do-	-do-	Cross shaft
Mj-21	-do-	-do-	Distributor
Mj-22	-do-	Breakage/ crack	Suction/ delivery pipes
Mj-23	Wheel assembly	Breakage/ crack	Wheel bearings
Mj-24	Sheet Metal	Breakage/ crack/bending of	Operator seat (Structure)
Mj-25	-do-	-do-	Foot rest/ foot steps
Mj-26	Rear assembly	-do-	Tyne bar
Mj-27	-do-	-do-	Eccentric ring roller
Mj-28	-do-	-do-	Slip clutch
Mj-29	-do-	-do-	Support arms
Mj-30	Cutter bar	-do-	Crack arms
Mj-31	do	-do-	Pitman shaft
Mj-32	Cutting platform auger	-do-	Auger
Mj-33	do	Crack	Auger shaft
Mj-34	do	Breakage/Crack	Header lock
Mj-35	Threshing	-do-	Rasp bars

	Cylinder		
Mj-36	-do-	-do-	Bearings
Mj-37	-do-	-do-	Slip clutch
Mj-38	Concave	-do-	Concave bars
Mj-39	Rear beaters	-do-	Bearings
Mj-40	Straw walkers	-do-	Rack
Mj-41	-do-	-do-	Crank
Mj-42	-do-	-do-	Bearings
Mj-43	Stepped grain pan	-do-	Frame
Mj-44	Top sieve	-do-	Pitman shaft
Mj-45	-do-	-do-	Oscillation levers
Mj-46	-do-	-do-	Bearings
Mj-47	Bottom sieve	-do-	Pitman shaft
Mj-48	-do-	-do-	Oscillation levers
Mj-49	-do-	-do-	Bearings
Mj-50	-do-	-do-	Blades
Mj-51	-do-	-do-	Bearings
Mj-52	Bottom grain conveyor	-do-	Screws
Mj-53	-do-	-do-	Bearings
Mj-54	Grain elevator	-do-	Drive shaft
Mj-55	-do-	-do-	Bearings
Mj-56	Upper grain auger	Breakage/Crack of	Screws
Mj-57	-do-	-do-	Bearings
Mj-58	Bottom tailing auger	-do-	Screws
Mj-59	-do-	-do-	Bearings
Mj-60	Upper tailing auger	-do-	Screws
Mj-61	-do-	-do-	Bearings
Mj-62	-do-	-do-	Drive shaft
Mj-63	Grain tank	-do-	Sheet metal
Mj-64	Grain conveying auger	-do-	Screws
Mj-65	-do-	-do-	Bearings
Mj-66	Grain unloding auger	-do-	Screws
Mj-67	-do-	-do-	Bearings
Mj-68	Seat	-do-	Body
Mj-69	System waring gauges	Malfunctioning	Water temperature
Mj-70	-do-	-do-	Engine oil pressure
Mj-71	-do-	-do-	Ammeter
Mj-72	Operating levers	Breakage of	Hard accelerator
Mj-73	-do-	-do-	Header assembly raising lowering lever
Mj-74	-do-	-do-	Reel raising/ Lowering lever
Mj-75	-do-	-do-	Travel speed variation control lever
Mj-76	-do-	-do-	Main gear shifting lever
Mj-77	-do-	-do-	Threshing drum speed variator control lever
Mj-78	-do-	-do-	Concave clearance adjusting lever
Mj-79	-do-	-do-	Parking brake lever
Mj-80	-do-	-do-	Threshing and cleaning

			adjusting lever
Mj-81	-do-	-do-	Cutting and cleaning unit drive lever
Mj-82	-do-	-do-	Unloading auger engaging lever

Note:

i) Any breakage/crack listed above which is repairable without change of component is treated as minor defects.

ii) The decision whether concerned part/assembly is to be repaired/replaced shall be taken on the basis of provisions available in the published literature submitted to the Testing Authority before the start of tests. In the case of non-availability of the provision in the literature, the matter shall be decided by the testing Authority at its discretion

ANNEX C
(Clause 4.2.4)

CATEGORIES OF BREAK-DOWN/DEFECT
(Minor Breakdown/defects)

Code No. (1)	Agreegate (2)	Major Defects (3)	Sub-assembly/ Part (4)
Min-1	Electricals	Malfunctioning of	Self starter*
Min-2	-do-	-do-	Cut out /Voltage regulator*
Min-3	-do-	-do-	Dynamo*/ Alternator*
Min-4	-do-	-do-	Horn
Min-5	-do-	-do-	Light signaling system
Min-6	Engine	Leakage from	Radiator joints
Min-7	-do-	-do-	Gaskets
Min-8	-do-	-do-	Seals
Min-9	-do-	-do-	O rings
Min-10	-do-	Burst/ crack	High pressure pipe
Min-11	-do-	Malfunctioning of	Fuel injector*
Min-12	Transmission	Leakage from	Gaskets
Min-13	-do-	-do-	Seals
Min-14	-do-	Bending of	Levers/ rails of gear shifting mechanism
Min-15	-do-	-do-	Actuating linkage parts
Min-16	Steering system	-do-	Gaskets
Min-17	-do-	-do-	Seals
Min-18	-do-	-do-	O rings
Min-19	Hydraulics	-do-	Gaskets
Min-20	-do-	-do-	Seals
Min-21	-do-	-do-	O rings
Min-22	-do-	Malfunctioning of	Pump*/it's positive drive mechanism*
Min-23	-do-	-do-	Valves
Min-24	-do-	-do-	Ram cylinder/ piston
Min-25	-do-	-do-	Distributor*
Min-26	Hydraulic brake system	-do-	Gaskets
Min-27	-do-	-do-	Seals
Min-28	-do-	-do-	O rings
Min-29	Wheel Assembly	-do-	Wheel hub
Min-30	Sheet metal	Crack	-
Min-31	System warning gauge	Malfunctioning of	Ammeter
Min-32	-do-	Malfunctioning of	Water temperature
Min-33	-do-	-do-	Engine oil pressure
Min-34	Reel assembly	Breakage/crack of	Spring tynes
Min-35	Cutter bar assembly	-do-	Knife guard
Min-36	-do-	-do-	Knife guard
Min-37	Cutting platform auger	-do-	Retractable fingers
Min-38	Undershot conveyor	-do-	Chain
Min-39	-do-	-do-	Comb bar

Min-40	Threshing drum	Breakage of	Pegs/rasp bars
Min-41	-do-	-do-	Hub plates
Min-42	Concave	-do-	Concave bars
Min-43	-do-	-do-	Pegs
Min-44	-do-	-do-	Extension bars
Min-45	Rear beaters	-do-	Beater bars
Min-46	Straw walkers	Bending of	Rack
Min-47	-do-	-do-	Crank
Min-48	-do-	-do-	Sheet metal
Min-49	do	-do-	Serrations
Min-50	Stepped grain pan	Breakage of	Rods
Min-51	Top sieve	Bending of	Lips
Min-52	Bottom sieve	-do-	Lips
Min-53	-do-	-do-	Frame
Min-54	Grain elevator	Breakage of	Chain
Min-55	-do-	-do-	Pads
Min-56	Upper grain auger	Bending of	Screw
Min-57	-do-	-do-	Sprockets
Min-58	Bottom tailing auger	-do-	Screw
Min-59	-do-	Breakage of	Chain
Min-60	-do-	-do-	Sprocket
Min-61	Tailing auger	-do-	Chain
Min-62	-do-	-do-	Sprocket
Min-63	-do-	-do-	Pads
Min-64	Upper tailing auger	Bending of	Screw
Min-65	-do-	-do-	Drive shaft
Min-66	-do-	Breakage of	Chain
Min-67	-do-	-do-	Sprocket
Min-68	Grain tank	-do-	Welded joints
Min-69	-do-	Bending of	Agitator
Min -70	Grain conveying auger	-do-	Screw
Min -71	-do-	Breakage of	Chain
Min -72	Grain unloding auger	Bending of	Screw
Min -73	-do-	-do-	Drive shaft
Min -74	Switch/controls	malfunctioning	Grain tank light switch
Min -75	-do-	-do-	Work light switch
Min -76	-do-	-do-	Head light switch
Min -77	-do-	-do-	Starting switch
Min -78	-do-	-do-	Tail light switch
Min -79	-do-	-do-	Battery charging lamp
Min -80	-do-	-do-	Horn push button
Min -81	-do-	-do-	Hazard light switch
Min -82	-do-	-do-	Side indicator light switch
Min -83	-do-	-do-	Speedo meter
Min -84	Levers	Bending of	All control levers
Min -85	Seat	Breakage of	Suspension

Note:

(i) Malfunctioning marked as (*) above and requires replacement of the complete assembly shall be treated as major defects