

# RESTRICTED (DRAFT/PROVISIONAL) QUALITY ASSURANCE PLAN

**FOR** 

(HALF COUPLING)

DRG.NO.176.23.120-4

(LF NO:6201023064)

No.HVF/T-72C/QAP/23/HALF COUPLING/244464-00

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QUALITY ASSURANCE (RIG-OE)
HEAVY VEHICLES FACTORY
AVADI CHENNAI – 600 054

# **QUALITY ASSURANCE PLAN (QAP)**

### <u>FOR</u>

### HALF COUPLING

DRG. NO. 176.23.120-4

PREPARED BY

(C.NANDA KUMAR) JWM/QA (RIG-OE) REVIEWED BY

(AWNÉÉSH YADAV) JWM/QA (RIG-OE /TA)

**APPROVED BY** 

(SUBHAM BIJLWAN) AWM/QA-RIG-(OE)

ISSUED BY

QUALITY ASSURANCE (RIG- OE) HEAVY VEHICLES FACTORY AVADI CHENNAI – 600 054

SI. no	CONTENTS	PAGE .No.
1.	IMPORTANT NOTES	4
2.	INTRODUCTION	4
3.	AIM	4
4.	SCOPE	5
5.	DOCUMENTS	5
6.	ITEM USED ON	5
7.	LIST OF DRAWINGS	6
8.	BILL OF MATERIAL	6
9.	CONDITIONS OF USE/ STORAGE INSTRUCTIONS	6
10.	SAMPLING PLAN	6
11.	VISUAL INSPECTION	7
12.	DIMENSIONAL CHECKS	7
13.	MATERIAL CHECKS	8
14.	ACCEPTANCE / PERFORMANCE TESTS	9
15.	FITMENT AND PERFORMANCE TEST	10
16.	INTERCHANGEABILITY	10
17.	CALIBRATION CHECKS	10
18.	MARKING/IDENTIFICATION	10
19.	PRESERVATION CHECK	11
20.	PACKING CHECK	11
21.	DOCUMENTATION	11
22.	REFERENCE	11
23.	ANNEXURE-A	12
24.	FIGURE	13
25.	APPENDIX-A	14

#### 1. IMPORTANT NOTES

#### Note-1

This is only a provisional and will be amended from time to time according to the requirement. No addition, deletion and reproduction will be done without permission of The Chief General Manager, Heavy Vehicles Factory, Avadi, Chennai – 54.

#### Note -2

Any instruction contained in this does not prejudice the terms and conditions of the contract what so ever. In case of any contradiction between the contents of this QAP and the clause in the contract, the latter will prevail.

#### Note-3

The stores should be manufactured strictly only as per the drawings supplied by the Inspection Authority and not as per the samples, if any received by the manufacturer for guidance purpose.

#### Note-4

Any amendment issued by the Inspection Authority shall be incorporated in the QAP and the records for the amendments carried out should be maintained as per the Performa at Appendix-"A".

#### Note-5

In case of any contradiction between the contents of this QAP and drawings/specifications/GOST issued along with the contract, the latter only will prevail.

#### 2. INTRODUCTION

- 1. This quality plan lays down the inspection and testing procedure to be carried out on the component **HALF COUPLING TO DRG.NO 176.23.120-4** being procured indigenously. This is prepared, based on the acceptance standards and inspection parameters laid down in collaborators documents and on the inspection test standards followed in respect of similar indigenous items.
- 2. This QAP is the property of Government of India and is liable for amendments as and when required. The Chief General Manager, Heavy Vehicles Factory, Avadi, Chennai 600 054, is the inspecting Authority for this assembly. Any query / clarification on the content of this QAP shall be referred to this Factory. Any departure from these instructions is allowed only after written approval from the above authority. Notwithstanding the tests indicated in this QAP, the inspecting Officer has the right to carry out any test to check conformance to the paper particulars quoted in the Supply Order, which he may consider necessary to satisfy himself about the stores which he has to accept.

#### 3. AIM

The QAP is aimed at standardizing the Inspection procedure and acceptance norm for HALF COUPLING TO DRG.NO:176.23.120-4.

It also aims at giving adequate information to the manufacturer on the quality requirements so that the required quality control methods are established. This is also meant to guide authorized Inspection Officer in his routine inspection

and to set out main points to which his attention must be drawn to ensure that the accepted stores meet the stipulated standards.

#### 4. SCOPE:

This QAP outlines in general terms, the checks and methods to be used during inspection of HALF COUPLING TO DRG.NO.176.23.120-4 including the technical requirements of the drawings. The recommended Quality Plan stipulated herein is mandatory and should be strictly adhered to.

For inspection purpose, only the latest issue of this QAP will be made applicable and copies of this QAP can be obtained from the issuing authority i.e. The Chief General Manager, Heavy Vehicles Factory, Avadi, and Chennai.

- i. Tender enquiry (TE) and supply order (S.O) will be issued with QAP stating that inspection will be done as per QAP.
- ii. In case of TE, It is responsibility of the vendor to obtain the copy of QAP and give the statement of compliance that vendor will abide by the QAP in case supply order is placed.
- iii. In case of S.O, it is the responsible of the vendor to obtained copy of QAP and give the statement of compliance that the vendor will follow QAP. However, GM/HVF reserves the right to revise/update the QAP from time to time.

#### 5. DOCUMENTS:

- a) On placement of firm supply order, One set of relevant technical documents required for manufacturing the components as applicable (i.e. for Casting, forging, heat treatment processes, machining, etc., up to final inspection and acceptance of the components) like GOST/Drawing/Specification, Technical data book, process sheet etc, and technical instructions on the subject item is to be obtained by the contractor from AHSP through DDO/HVF.
- b) Any clarification required on these documents to be obtained from the Inspecting Authority i.e. The Chief General Manager, Heavy Vehicles Factory, Avadi, Chennai - 600 054. Equivalents to the collaborators specifications and standards will be decided only by the Inspecting Authority and should not be unilaterally decided. For any change in the specifications, standards or written approval, any alterations in specification can be affected and not otherwise.
- c) The process instruction sheets supplied by the collaborators are available with the Authority Holding Sealed Particulars, i.e. The Controller ate of Quality Assurance (Heavy Vehicles), Avadi, Chennai for the reference. The relevant process sheets may be studied at the premises of the AHSP after obtaining necessary permission.
- d) The supplier after scrutiny of the concerned process sheets and connected paper particulars should establish the necessary production and inspection facilities. Particularly the inspection test rigs, stands, fixtures, template, gauges etc should be provided as recommended in these process sheets. If process sheet / Process Book is not available the details particulars/parameters available in the drawings to be strictly adhered.

### 6. ITEM USED ON:

1) 176.23CB-3CB

#### 7. LIST OF DRAWINGS:

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
1	176.23.120-4	HALF COUPLING	M-

#### 8. BILL OF MATERIALS: (Individual items as mentioned in table to Para 7)

SI NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	Qty	
1	176.23.120-4	HALF COUPLING	STEEL 20X2H4A GOST 4543-71	1	l

**Note:** Vendor/Contractor may use approved alternate material, if any specified in drawing/specification.\* Also refer Para no: 13.

#### 9. CONDITIONS OF USE/STORAGE INSTRUCTIONS

This assembly/item should be properly packed to protect from transit / handling damage and influence of atmospheric precipitations. In addition, the following parameters should be ensured:

- (a) The threaded parts if any should be covered with suitable plastic caps to prevent damages.
- (b) If the item consists of assemblies, each assembly should be packed separately.
- (c) The stores are to be suitably covered for preventing ingress of dust and Dirt/entry of sunlight / moisture.
- (d) The packaging slip shall contains
  - (i) Certificate of testing- NABL Certificate.
  - (ii) Guarantee/ Warranty Certificate.
  - (iii) Service and maintenance instructions.
  - (iv) Delivery Slip with Inspector's Acceptance Mark.
  - (v) Undertaking letter / Certificate of conformance (As applicable).
- (e) The stores are not permitted to be stored together with oils. Petrol, acids, alkaline and other substances to avoid damage to the metal / rubber components.

#### 10.SAMPLING PLAN:

SI. No.	Sampling Plan	Pilot	Bulk					
Acceptance test ( as below)								
(i)	(i) Visual Inspection 100% 100%							
(ii)	Dimensional Inspection(including hardness)	100%	General Inspection level III, single sampling, Normal Inspection, AQL 2.5 of IS 2500 (Part-I)-2000					
(iii)	Material Inspection (including Chemical, Mechanical & Physical properties)	1 No	1 No. for each batch of raw material or heat treatment lot /as required by specifications and as required by HVF for confirmation of material.					
(iv)	Pressure testing							
(v)	Machining/Fitment/	01 No.	01 No. per batch / As required.					

SI. · No.	Sampling Plan	Pilot	Bulk
	Performance trial on higher assembly / Tank		
vi)	Interchangeability Test		
vii)	Calibration Reports/Certificates of Test stand/Jigs/ Equipment's/Fixtures/ Gauges/Mandrels/etc.	100 %	100 %
viii)	Marking/Identification	100%	100%
ix)	Packing/ Preservation	100%	100%

#### Note:-

A New (First time supplier of this item) supplier should obtain clearance from HVF for bulk production which will be issued only after inspection/evaluation of pilot samples by HVF.

# 11. VISUAL INSPECTION [Sampling plan as per Para- 10 (i)]

The stores are to be visually examined on 100 % of pilot /bulk and same should be free from any defects and all the finishing requirements shall satisfy as indicated in technical conditions of the assembly / component drawing.

The components shall be checked for the following and should be free from the defects:

- Defects in construction
- Cracks/Dents/Scratches
- Fitment of all components
- Presence of foreign particles
- Moisture and dust
- Corrosion of metal parts
- Mechanical imperfections & distortion
- Any form of deterioration of material and finishing.

Packing and preservation should be ensured as per drawings/relevant TY specification (To be ensured on receipt at consignee end).

# 12. DIMENSIONAL CHECK[Sampling plan as per Para- 10(ii)]

The dimensions including geometrical parameters of individual component, sub assembly and major assembly shall be checked and ensured as per respective drawing. Dimensional check should be carried out as per sampling plan. However, the inspecting authority/rep. may at his discretion, tighten the inspection level and acceptance quality level on the critical items and adopt check point during manufacture.

### 12.1HALF COUPLING TO DRG.NO:176.23.120-4

- 1. All dimensions including geometrical parameters shall be confirmed as per drawing/specification.
- 2. Surface finish/Roughness should be confirmed as per drawing and specification.
- 3. For admissible alternate method for manufacture in dimensions/material if any, refer drawing/specification.
- 4. Place for testing the hardness refer drawing.
- 5. Spline/Gear details dimensions including profile is to be confirmed as per drawing.

### 13) MATERIAL CHECKS [SAMPLING PLAN AS PARA - 10 (iii)].

Material specimen /test bars of the components shall be in conformity as per the material mentioned in the relevant documents/drawing. NABL test reports for all the parameters as per relevant specifications to be submitted. Test samples to be submitted by the vendor to HVF, if required. The material check will be carried out as per sampling plan.\*However, if the manufacturer proposes any alternative materialat the stage of tender enquiry, the same has to be approved and a written concurrence should be obtained from AHSP through DDO/HVF, before usage of such materials.

#### 13.1 HALF COUPLING TO DRG.NO:176.23.120-4

a)The component should be manufactured from

STEEL 20X2H4A GOST 4543-71.

b) Chemical properties: As per STEEL 20X2H4A GOST 4543 -71.

	CONTENT OF ELEMENTS%									
С	Si	Mn	Cr	Ni	S	Р	Cu	Ni		
		*** **********************************	01		MAX					
0.16	0.17	0.30	1.25	3.25						
to	to	to	to	to	0.025	0.025	0.30	0.30		
0.22	0.37	0.60	1.65	3.65						

Note: For mass fraction of other elements refer GOST 4543-71.

c) Mechanical properties: As per STEEL 20X2H4A GOST 4543 -71.

Yield point, N/mm <sup>2</sup> / (kgf/mm <sup>2</sup> )	Ultimate strength, N/mm² (Kgf/mm²)	Elongation %	Relative reduction of area %	Impact strength KCU / (Kgm/cm <sup>2</sup> )
		Not less than	***************************************	
1080 (110)	1270 (130)	9	45	(78) 8

Note: For other parameters refer GOST 4543-71.

# 14) PERFORMANCES/ACCEPTANCE TEST: HALFCOUPLING

TO DRG.NO: 176.23.120-4

- 1. Casehardening of surfaces Г and Д is permitted. To be checked on test pieces.
- 2. Nitriding h 0.25...0.4 mm; ≥600 HV is allowed. Core hardness 35...39 HRC.
- 3. High temperature cynading h 0.3...1.1 mm; ≥79HRA is allowed. To be checked on test pieces.
- 4. After heat treatment, the splines should be checked by complex gauge, made as per the maximum dimensions of mating component. checking as per GOST 6528-53.
  - 5. Relative position of splines and cams is optional.
  - 6. On surface Γ, tool marks with a depth 0<sup>+0.2</sup> mm are
- 7. Straightness of manufacturing of cams should be checked by blueing impression of lateral face with the mating component 172.23.103 with an effort 490 N (50 to kgf). The impressions should be located on the plane not less than 60% along the mating surfaces on each side in the type of continuous or individual spots. Total absence of contact not more than two faces of cams is permitted. In this case clearance between, teeth space faces and width space should 0.4 ± 0.2mm.
- Components should roll on as per 176.23TY-3. To be marked by single serial number Type IIO-3 GOST 2930-62 To be used along with component 172.23.103.
  - 8. Instead of checking by impression method, the profile and dimensions of cams may be checked before heat treatment by complex gauge, made as per the nominal dimensions of mating component. By doing so, clearances along the lateral surfaces 0.05 0.05 mm are allowed. and deviation for depth  $\pm 0.2$ mm.
  - 9. \*Dimensions and surface finish to be ensured by tool.
  - 10. To be stamped.
  - 11. Coating: Chemical phosphotizing, oxidizing and oil finish or chemical oxidizing, oil finish.
  - 12. Other requirements are as per specification 520.TY1.

### GEAR/SPLINE DETAILS:

m	
Z	14
1 -	30°
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$\times$	U
~1 ·	28
176.3	23.117-3
	Z L s X da

### **Explanatory Note**

1. Stage wise inspection and process of the component as specified in TD Book / Process Book / illustration book is to be confirmed by the supplier during manufacturing the components.

- 2. Firm shall submit the inspection process details/reports to HVF.
- 3. If required/applicable HVF shall witness/verify stage wise inspection/process details during manufacturing of the components.
- 4. The component may be subject to endurance test, when fitted in higher assembly as specified in process/ illustration/ TD book.
- 5. Apart from above, all other relevant test for acceptance, (i.e. heat treatment process, heat treatment cycles, Type test, Periodic test & etc.) of the item as specified in GOST / Specification / drawing / TD book shall be carried out by the firm and the report/ certificates shall be submitted to HVF.
- Firm has to follow the manufacturing details/parameters for producing the component as specified in the technical data / process book and confirm as per the TD/Process Book. The inspection reports carried out for the same is to be submitted to HVF. HVF will carry out verification for cross confirmation if required.

### 15) FITMENT AND PERFORMANCE TEST:

- a. Pilot samples should be checked for fitment and Performance test to ascertain the efficacy of the system under different operating conditions by fitting in higher assembly and repeating it for functional checks, wherever required.
- b. Items of Bulk supplies may be subjected to performance trial in tank in case of repeated failure/defects during exploitation.

#### 16) INTERCHANGEABILITY:

The assemblies/component should be interchangeable component wise and assembly wise, except the Component are to be supplied as a set and to be assembled selectively.

### 17) CALIBRATION CHECKS

### (TEST STANDS/JIGS/FIXTUERS/GAUGES/INSTRUMENTS):

The supplier / Contractor should have suitable Instruments, Test Stand, jigs, fixture, mandrels and gauges to carry out quality checks, to ensure conformance of components/assembly as per drawing and Specification /T.R points.

The supplier/contractor should submit calibration reports for instruments/fixtures/gauges/mandrels etc., which are used during process of inspection activities.

#### 18) MARKING/IDENTIFICATION.

Marking of the items is to be carried out as called for in the relevant drawing, drawing/T.R points.

Inscription if any on the components is to be carried out as called for in the drawing/T.R points. Unless otherwise specified in the drawing/ specification, marking should not be carried out over the components.

For traceability, marking of part No., Manufacturer name, supply order No, Serial No/Qty., batch No. and manufacture date & year are to be carried out. Suitable method can be adopted, provided that the above parameters are legible

and considering the parameters mentioned in the drawing and specification. (For refer QAP Para No: 14(10))

### 19) PRESERVATION CHECK

- a) Preservative coatings are to be strictly adhered to as called for in the drawing. However, equivalent BIS Standards can also be followed, subject to the thickness of the coating/preservative is maintained as per the drawing/specification.
- b) Other preservations as necessary to prevent damages due to moisture and dust during process, storage and transit are to be carried out. Conventional Methods can also be resorted to.

### 20) PACKING CHECK

Components / Assemblies are to be packed separately to avoid damages during transit / handling of the same. Part No. and No. of sets are to be marked on the packing.

Packing and preservation should be ensured as per drawings/relevant TY specification (To be ensured on receipt at consignee end).

Finished products shall be wrapped / packed using black and opaque polyethylene sheet or bags.

#### 21) DOCUMENTATION

- Firm has to maintain all the documents as per QAP with respect to the SI.No.to have traceability.
- Vendor has to submit Bill of materials, Material test reports, Class 'C' /Endurance test reports (wherever specified in drawing/TY specification/QAP) and Complete PIR (pre-inspection report)at the time of offeringthe item for inspection. HVF will commence inspection only after scrutiny of these documents.
- 3. The testing/inspection responsibility to test all the parameters as per QAP and drawing specifications as mentioned in Annexure -A (enclosed).
- 4. Pre inspection reports (PIR) of firm like, 1. Chemical analysis (NABL Certificate), 2.Mechanical properties (NABL Certificate), 3. Pre-forming process, 4. Coating certification (Wherever applicable), 5. Calibration reports of instruments and 6. 100 % Dimensional inspection reports including reports of Spline/Gear profiles and other relevant reports for acceptance of the item as specified in GOST/ Specification / drawings etc etc are to be submitted.

### 22) REFERENCE:

- a) Drawing No:176.23.120-4, 172.23.103
- b) Material specification as per drawing:

STEEL 20X2H4A GOST 4543-71

- c) GOST4543-71, GOST 2930-62, GOST 6528-53.
- d) Specification 520 TY1, 176.23TY-3.

		Ψ	η	T	· · · · · · · · · · · · · · · · · · ·				
DEMABKS		100% by firm/ vendor.	100% by firm/ vendor.	100% by firm/ vendor SP followed by HVF.	100% by firm/ vendor SP followed by HVF.	SP followed by HVF.	SP followed by HVF.	100% by firm/ vendor.	100% by firm/ vendor.
NO YTI III	DGQA	Œ	Œ	Œ	œ	œ	α	œ	α
INSPECTION RESPONSIBILITY	HVF	>	>	W/P	N/W	N/W	W//P	>	>
a u	Firm	ட	Ф	۵.	G.	۵	Ω.	Ω.	<u>C</u>
ACCEPTANCE	CRITERIA	Confirm to drawing and QAP as per bill of material	Confirm to QAP	Confirm to drawing and QAP	All the values to confirm with QAP (Para no:13.1 (a), (b), (c))	Confirm to QAP Para no:14(2)& 14(3)	Confirm to QAP Para no: 14(11)	Confirm to QAP Para no: 18&14(10).	Confirm to QAP Para no 19 & 20
STANDARDS TO BE	אחרוד	As per the relevant drawing and QAP.	Refer QAP Para no: 8 or item list.	Refer drawing / QAP Para no: 12.1	As perGOST 4543-71	Refer QAP Para no: 14(2)&14(3)	Refer QAP Para no:14(11)	Refer QAP Para no:18 &14(10).	Refer QAP Para no 19 & 20
TESTS/ INSPECTION	PARAMETERS	Firm has to produce all the document as per QAP	Firm has to prepare the BOM as per QAP	Dimensions as per the drawing	Chemical composition & Mechanical / Physical Properties	Hardness	Coating	Marking / traceability	Preservation & packing
ASSEMBLY/ SUB	ASSEMBLY	Pre inspection reports (PIR) of firm	Bill of material (BOM)	Dimensional checks	Material tests	Hardness checks	Coating checks	Marking / traceability	Preservation & packing
CATEGORY HALF COUPLING TO DRG. NO 176.23.120-4									
S.	2	<u></u>	2	т	4	လ	9	7	∞

# Note:

For conformity of the items (Chemical/Physical/Mechanical properties).

1. One sample per heat / batch shall be tested under NABL Lab/Govt. Approved lab by firm. In case of non-compliance to standards entire lot shall be rejected or not to use in production further.

2. For cross conformation of material, manufacturer has to submit test sample pieces for the items used / test slab and button for rubber items / HVF will draw samples from supplied lot for Witnessing (W) at HVF premises. In case of non-compliance to standards entire lot will be rejected.

3. All other relevant tests as specified in GOST/ Specification/ Drawing is to be carried out by firm and to be confirmed.

SP-Sampling Plan

R-Review

V-Verify

W- Witness

4
of 1
2
a.
Page

P- Perform

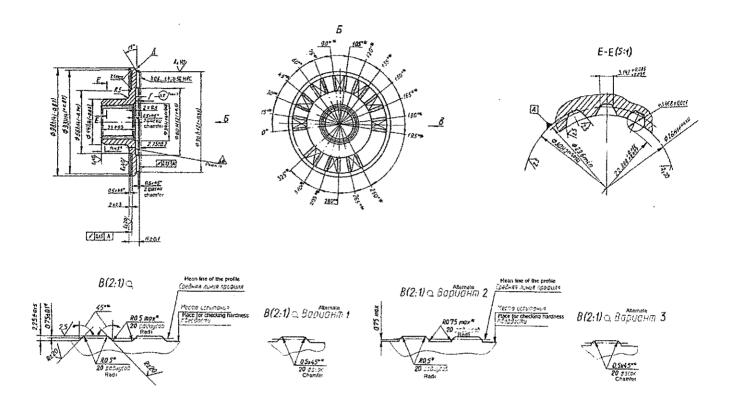


FIG: HALF COUPLING TO DRG.NO.176.23.120-4. (For reference only)

### APPENDIX 'A'

### **RECORD OF AMENDMENTS**

SI. No	Amendment No. & date	Amended by	Date of Insertion	Initial

### FORMAT FOR THE METHOD OF MANUFACTURE/INFRASTRUCTURE AVAILABLE

Nomenclature & Drawing No: \_\_\_\_\_

1	2	3	4	5	6	Remarks
MANUFACTURING TECHNOLOGY&TESTING/ INSPECTION FACILITIES REQUIRED TO PRODUCE THE ITEM		POSSESSED BY THE VENDOR IN HIS OWN PREMISES –(P&M LIST &TESTING/INSPECTION EQUIPMENT LIST TO BE SUBMITTED)	PROVIDE DETAILS OF THE FACILITIES ASKED IN COLUMN (3)THAT ARE AVAILABLE IN-HOUSE (SELE-DECLARED P&M LIST (Nomenclature of machine, make/model, capacity/size & accuracy, date of installation, vintage of machine /year of manufacturing of machine)AND TESTING/INSPECTION EQUIPMENT,LIST (Nomenclature of the testing/inspection equipment make/model, size & range, Date of calibration)also to be submitted)	IF NOT POSSESSED BY THE VENDOR IN HIS OWN PREMISES IT MAY BE OUT SOURCED.(MOU/TIE-UP WITH THE OUTSOURCING VENDOR/SUB-VENDOR AND THEIR P&M LIST &TESTING/INSPECTIN EQUIPMENT LIST TO BE SUBMITTED)	PROVIDE DETAILS OF THE FACILITIES ASKED IN COLUMN (5)OUT-SOURCED FIRMS(NAME &ADDRESS OF THE OUTSOURCING VENDOR TO BE DECLARED BY THE FIRM IN FIRM'S LETTERHEAD, SELF-DECLARED P&M LIST (Nomenclature of machine, make/model, capacity/size& accuracy, date of installation, vintage of machine /year of manufacturing of machine)AND TESTING/INSPECTION EQUIPMENT,LIST (Nomenclature of the testing/inspection equipment make/model, size& range, date of calibration)AND MOU/TIE-UP ALSO TO BE SUBMITTED)	
Technology 1						
Technology 2						
Technology 3						

Test/ inspection1			
Test/ Inspection2			
Test/ Inspection3			

<sup>\*</sup>The above details furnished by the vendor is to be self-certified for technical evaluation

<sup>\*</sup>Inspection of item will be carried out at par with QAP, which is attached along with TE