


- iv) The manufacturer shall furnish the speed-torque characteristic of blower. This is required for matching the motor and the impeller.
- v) Torque necessary for the blower when working against constant rated head and delivering the rated output.
- vi) The supplier shall enclose the following characteristic curves: at 20° & 55° C.
 - a) Total and static head Vs. Air delivery
 - b) Total and static efficiency vis. Air delivery
 - c) Air horse power Vs. Air delivery.
 - d) Power absorbed Vs. Air delivery
 - e) Motor output Vs. Air delivery
- vii) Vibration level in microns.
- viii) Necessary dimensional drawings of the blowers showing the constructional and assembly details should be submitted.
- ix) Normal setting recommended for the working of the realy to monitor the operation of the blower.
- A2 Special tools to be supplied as part of the contract for maintenance and operation.
- A3 Spare parts supplied as part of the contract.
- A4 Chemical composition of sheet steel used for manufacture of impellers.
- A5 Detailed calculations for impeller locking arrangement indicating safety factors in design.

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चित्तरंजन रेल इंजन कारखाना
पश्चिम बंगाल, भारत
CHITTARANJAN LOCOMOTIVE WORKS
WEST BENGAL, INDIA
क्रमांक/NO. CLW/EC/B-14. Alt. 1/3
दिनांक/DATE : 06/07/2000

A P P E N D I X -A₀
(Clause-12.1)

DATA SHEET FOR BLOWER

A-1

The supplier shall furnish the following particulars of the blower set at the time of tender, other wise tender will be considered incomplete.

- i) Type, model and make
- ii) Free air delivery in m^3 per minute and total head in mm WG corrected to $20^\circ C$ and 760mm barometric pressure.
 - a) At rated voltage (unbalanced)
 - b) at lowest voltage (unbalanced) of the driving motor
- iii) Design data-
 - a) Impeller diameter
 - b) Type of impeller blades
 - c) Number of blades
 - d) Method of fixing of the blades
 - e) Clearance between inlet cone and impeller (Maximum and minimum)
 - f) Maximum shaft speed of the impeller
 - g) Motor shaft and impeller bore diameter (Maximum and minimum) (sketch to be enclosed)
 - h) Method of fixing of impeller on motor shaft and locking arrangement (Sketch to be enclosed)
 - i) GD^2 value of the impeller (indicate the maximum variation in manufacture).

N O T E : GD^2 VALUE OF THE IMPELLER WILL BE MADE USE OF FOR CALCULATING THE STARTING PERFORMANCE OF THE BLOWER WITH REGARD TO THE SPECIFIED ELECTRIC MOTOR. AS SUCH THE VALUE TO BE FURNISHED SHOULD TAKE INTO ACCOUNT THE INERTIA, THE FRICTION AND THE RESISTIVE TORQUE OF THE IMPELLER WHILE IT IS BEING STARTED.

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Limit of vibration intensity

Name of the equipment	The peak to peak value shall not exceed
1. Traction motor cooling blower coupled with 26kw, 2 pole motor .	25 microns on motor bearing and 40 microns at all positions of blower casing
2. Transformer oil cooling blower coupled with 22 kW 4 pole motor .	-do-
3. Smoothing reactor and silicon rectifier cooling blower coupled with 2.2kw 2pole motor.	10μ microns on motor bearing and 15.0 microns at the blower casing
13.8.2 Routine test-same as 13.8.1	
13.9 <u>Condition of bearing by shock pulse</u>	
13.9.1 <u>Type test</u>	Condition of bearing shall be checked at 5% unbalanced voltage at 320, 415 and 500V. The deflection shall be within green zone of the instrument.
13.9.2 <u>Routine test</u>	Condition of bearing shall be checked at balanced 415V on each machine. The deflection shall be within the green zone of the instrument.

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Specification for motor driver blower



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for the air delivery test, start the blower successively at the following unbalanced supply voltages:

290V
320V
415V

Measure oscillographically or by any other accurate method Starting time of the motor blower unit to come upto full speed from zero speed. Record final load current and voltage reading.

13.5.2 Routine Test: Conduct test on 10% of the blowers at 290V unbalanced. The starting time obtained shall not exceed 6 seconds.

Note : Measurement of starting time & current by oscilloscope is mandatory during type-test. During routine test measurement may be done by oscilloscope or by any other accurate method.

13.6 Starting duty test

13.6.1 Type test: The blower unit shall be subject to repeated start and stop cycling for 1000 times at a supply voltage 415V unbalanced. The 'ON' and 'OFF' period shall be 1 minute in each case. If the unit takes more than 1 minute to stop freely, the next start shall commence immediately after the unit has stopped.

At the end of the test the efficacy of impeller locking device shall be checked, The impeller shall then be dismantled and various parts like key, key-way and the fit of the impeller on the shaft shall be examined for abnormal wear.

13.7 Endurance test

13.7.1 Type test, This test shall be conducted for a period of 48 hours with rated output and head and with a 415V unbalanced supply at the motor terminals.

After the test, the blower and the motor shall be dismantled and examined for wear and tear of the parts, condition of end rings and bearings etc.


13.3 Measurement of vibration intensity

13.8.1 Type test- For the measurement of vibration intensity an electronic vibration measuring equipment having a frequency range of 5 to 2000 cps. shall be employed. The machine under test shall be mounted in accordance with IS:4729. The machine shall run at rated voltage and rated speed.

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Specification for motor driven blower


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दिनांक/DATE: 06/07/2000

- vii) Condition of bearing by shock pulse meter
- v) Condition of bearing by shock pulse meter
- viii) Checking of dimensions, workmanship, clearance of impeller fixing and locking arrangement.

13.3 Unless otherwise specified in the context, the tests and the method of measurements adopted shall comply with Indian Standard specification for centrifugal and axial flow fans.

13.3.1 Manufacturers should use instruments of 0.2 accuracy class only during type test. During routine test 0.5 accuracy class instruments may be used. However, all meters should be properly calibrated and copies of calibration certificates for all instruments used during test should be submitted along with test results.

13.4 Air delivery test

13.4.1 Type test-Tests shall be carried out with the supply to the driving motor maintained at 290V, 320V, 415V & 500V unbalanced. Adequate number of observations shall be made on both sides of the operating point to plot the characteristic curve. Measure the following quantities.

Line voltage
Line current
Power input
Speed
Total pressure
Ambient temperature

The manometer pressure readings shall be taken atleast at 2 points to arrive at a mean value.

Calculate the blower output at standard conditions

$$W_T = 1.2 \text{ kg/m}^3$$


Record method of test, details of equipment used and their calibration for observed and calculated results.

Plot curves of total head developed in mm water gauge, static head in mm water gauge, speed efficiency, air horse power, power input to the motor in kW against output in cubic metre per minute.

13.5 Starting time test

13.5.1 Type test - With test installation similar to that adopted

specification for motor driven blower


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WEST BENGAL, INDIA
क्रमांक/NO. CLV/ES/D-14 ALT/3
दिनांक/DATE: 06-07-2000

9. Marking plate:

9.1 Each blower shall have indelibly marked on a suitable name plate atleast the following informations:

- | | |
|---|---------------------------------|
| (a) Manufacturer's name, type and serial number | (f) Power consumption in Kw. |
| (b) Air delivery | (g) Impeller diameter |
| (c) Total head at 20°C | (h) Weight |
| (d) Rated speed | (i) Manufacturing date and year |
| (e) Make of the motor | |

10. Technical documents:

10.1 The manufacturer shall supply detailed maintenance instructions as desired by the purchaser.

11. Drawings:

11.1 The drawing (to be given by the purchaser) giving the overall dimensions of the blower shall be supplied with the tender.

12. Data:

12.1 The particulars of the blower set shall be furnished in the data sheet at Appendix 'A'.

13. Tests:

13.1 General-Tests are classified as type and routine tests. Type tests shall be carried out on one machine for 50 machines supplied.

13.2 The following are the different tests on the complete blower unit:

a) Type tests:

- i) Air delivery test
- ii) Starting time test,
- iii) Starting duty test
- iv) Endurance test
- v) Vibration level test
- vi) Weighment

b) Routine Tests

- i) Checking of obligatory dimensions & clearances, workmanship and impeller fixing/locking arrangement.
- ii) Starting time test
- iii) Vibration level test
- iv) Any one unit out of 20 unit of MVSL & MVSI, picked up at random shall be subject to air delivery test as per Cl 13.4

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Specification for motor driven blower

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The cold pressed blades shall be stress relieved. The blades shall be welded but the welded joints will be free from undue stress either by stress relieving or by improved welding techniques. The quality of welding shall also be tested by the purchaser from time to time. Necessary test certificates should be produced as and when required.

6.2 Pocket for mounting air flow relay-A pocket for mounting an air flow relay for minimum air flow protection to be fitted by the Railways shall be provided on the casing on the outlet side of centrifugal blowers and on the inlet side of the axial flow blowers. The dimensions and mounting arrangement will be given by the Railways.

6.3 Traction motor blowers- The casing shall be designed to minimise loss of head and shall not deform during lifting. Suitable guards shall be provided on the inlet side of the blowers to prevent accidental contact with the rotating impeller.

6.4 Transformer oil cooler blower- The construction shall permit the motor with the impeller being withdrawn from the motor side of the involute casing without the need to dismantle the suction side of the casing which is bolted to the transformer oil cooling radiator.

A suitable inspection hole with proper cover shall be provided at the bottom of the discharge duct to facilitate removal of foreign matter. A suitable, designed guard shall also be provided at the delivery end.

6.5 Smoothing reactor blower- The mounting arrangement of the blower on the casing shall be properly secured so as to avoid loosening during the vibrations encountered in service. A suitably designed guard shall be provided on the top of the inlet casing.

6.6 Silicon rectifier blower- The mounting arrangement of the blower on the casing shall be properly secured so as to avoid loosening during the vibrations encountered in service.

7. Finish:

7.1 The fan, motor, the blades and the casing shall be suitably treated to remove rust and should be coated with an anti-rust primer and finished with two coats of light grey paint as per ISC-631 of IS-5. All hardware's shall be cadmium plated.

8. Interchangeability:

8.1 The motors, blowers impellers and casings shall be interchangeable such that the performance of the blower is kept within the limits of the standard.

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Specification for motor driven blower

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5. Design and general construction

5-1 Drive and coupling- The fan impeller shall be directly mounted on the motor shaft. In case of cast aluminium impellers, a steel boss of hexagonal shape should be cast integrally with the Impeller. The drive may be locked by a key of adequate strength with the impeller in position by a securing bolt and washer at the shaft end. The bolt shall be further locked against unscrewing in service by locking plates, Alternatively, a tapered shaft without a key but with locking arrangement by bolt and locking plate may be used. The impeller mounting arrangement shall be subjected to prior approval by CLW.

5.2 Direction of rotation- An arrow indicating the direction of rotation shall be permanently marked on the blower casing.

5.3 Balancing- The rotor and the blower impeller shall be dynamically balanced individually after coupling. The vibration level shall not exceed the limit specified in sheet No. 16. **The balancing shall be done as per ISO 1940 grade G2.5**

5.4 Mounting arrangement- The mounting arrangement shall be subjected to prior approval by CLW.

5.5 Lifting arrangement- Suitable lifting arrangements for the blower fan and the motor separately and for the complete unit shall be provided. In case of transformer cooling blower the casing shall be so designed that it should be possible to remove the motor with the impeller without dismantling the entire casing.

6. Special constructional features:

6.1 Special manufacturing process- As the blowers operate for long periods at high speeds, the end rings, the impeller blades etc should be designed with a higher margin of safety as compared to normal industrial design. Non cast impeller shall be fabricated out of high tensile steel of weldable quality of minimum 2.5mm thick conforming to either DOMEX 400E or St-55 MP of IS:8500 or St-52 of IS:1079 or SAILMA or stainless steel of grade AISI 304 or any other steel having superior or similar quality for the application of Traction motor cooling blower (MVMT), which has been adequately tested to ensure mechanical strength and dimensional uniformity. For transformer oil cooling blower M.S conforming to IS:1079 (Gr.0) or IS:2062 grade ~~xx~~ C or any other steel having superior quality may be used for fabrication of impeller. Casing for blowers should be fabricated from M.S conforming to IS:1079 (Gr.'0') or IS:2062 Grade B/C or any other steel having superior quality of minimum 3.15mm thickness. The tenderer should clearly indicate grade of steel used otherwise the tender will be treated as cancelled.

specification for motor driven blower

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9.2 The tenderer shall give sufficient information to prove that his factory has adequate facilities and capacity to manufacture the equipment, to meet fully the technical requirements of the specification and quality of material and workmanship.

9.3 The tenderers are permitted to quote for alternative designs for the equipment and sub-assemblies. For such deviations full particulars shall be furnished as required in para 3.1

9.4 Quotations shall not be considered complete unless all informations are furnished and are therefore liable to be rejected.

9.5 Quality Assurance Plan

Tenderers should submit their own Quality Assurance Plan (QAP) for this item, otherwise offer is liable to be technically unsuitable.

10.0 Special condition

10.1.1 Once a prototype is approved no contractor shall change his source of supply or sub contractor for purchased components and sub assemblies without CLW's approval.

10.1.2 Complete type test shall be done on the equipment once in every five years to judge the consistency in the material, workmanship and performance of the equipment ie. the motor as well as the blower motor set of each type.

10.2 Identification:


Blower and motor manufacturers should clearly emboss the following details at suitable visible places on different parts like impeller, casing, hub etc for blower and rotor, stator etc. for motor to assess the performance of various makes and to determine their codal life for replacement decision.

- Month and year of manufacturing,
- Serial no.
- Name of manufacturer.

10.3. ISO Certification:

CLW reserves the right to procure the item from ISO certified manufacturers only.

Specification for
motor driven blower


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- 6) Detailed technical write-up indicating method of working of the equipment, precautions to be taken while working, periodicity of attention to various parts, lubrication details etc.
- 7) Drawings of terminal box indicating cable entry and clamping, sizes of terminals etc.
- 8) Detailed technical particulars, method of working, maintenance attention required and dimensional drawings of any patented or specialised components or equipments used.
- 9) Spare parts catalogue indicating in detail the list of spares, their identification code and recommended spares for 2 years of running maintenance. Where necessary photograph of important spares shall be included.
- 10) Address of suppliers of components or part requiring periodical replacement and not manufactured by the main supplier himself.

IV. Drawings:

Detailed dimensional assembly drawings in twenty (20) copies shall be supplied indicating the constructional features. In the case of rotary equipments like blowers, motors etc. drawings shall without exception be in 'AO' size for each view, viz. Plan, elevation, end-elevation, half elevation etc.

Two sets of the above drawings shall also be supplied in reprintable tracing cloth.


- 8.0 Guarantee: The supplier shall give a guarantee of clear 24 months from date of supply of equipment or a clear 18 months guarantee, on all components, from the date of commissioning of the equipment on the locomotive whichever is earlier and any damage or defect noticed during the period due to defective material or bad workmanship will be replaced by the supplier free of cost. The manufacturer shall arrange to send his Technical Officer for any investigation to the place (anywhere on the Indian Railways) where the equipment will be working on the locomotive and shall submit a report of his investigation together with his proposals for any modification or improvements to the Deputy Chief Electrical Engineer (Design) for approval before commencing the repair works under guarantee.

9.0 Submission of tender quotation:

- 9.1 All tender documents including the quotation shall be submitted in triplicate including any correspondence till a contract is finalised.

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Specification for motor driven blower.


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दिनांक/DATE : 06-07-2006

I. Type test report of certificate:

This shall be supplied in standard 'A4' size of sheets with punched holes for filing. It shall be suitably enclosed in a cover. Type test reports shall have to be signed both by the suppliers' engineers and CLW's engineers. Ordinarily 10 copies of the report shall be supplied in the format described in Appendix 'C'.

II. Routine test certificate:

This shall be supplied in standard 'A4' size of sheets with punched holes for filing. Routine test certificate shall be submitted along with each individual equipment in 6 copies. Where an equipment or apparatus is composed of sub-units, in addition to the overall test certificate for the total assembly, routine test certificates shall be supplied for the individual sub-units also.

III. Maintenance manuals.

Maintenance manuals shall be prepared in standard 'A4' size paper with punched holes for filing. A draft manual shall be submitted in 3 copies within two months of the clearance of the prototype equipment, to the Dy.Chief Electrical Engineer (Design), Chittaranjan Locomotive Works, Chittaranjan, District Burdwan. One copy of the corrected draft shall be returned to the supplier, duly signed by the above officer or his authorized representative.

10(Ten) copies in excess of no.of the equipt. supplied of the maintenance manual duly incorporating the corrections shall then be despatched by the supplier to the Dy.Chief Electrical Engineer(Designs) by Registered post, at the same time as the first lot of bulk supply of equipment is despatched.

Technical documents, drawings and details to be furnished by suppliers as part of the maintenance manual wherever applicable.

- 1) A dimensioned drawing of the equipment in 'A4' or 'A3' size as necessary indicating salient features including weight. Separate drawings indicating machining tolerance at bearing seats etc. of rotors of motors.
- 2) Enlarged dimensioned view of the bearings
- 3) Exploded isometric view of the equipment indicating sequence of assembly or disassembly.
- 4) Photograph of the equipment and important components to give an appreciation of these.
- 5) Full technical data as per specification.

Specification for
motor driven blower.

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दिनांक/DATE : 06-07-2007

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TENDER SPECIFICATION NO: CLW/ES/B-14

ALT.	A	B	C		
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This specification supersedes earlier specification no: CLW/ES/B-3 Alt. R

Enclosed drawings/sketches:

1. CLW/ES/SK-1/B-14
2. CLW/ES/SK-2/B-14
3. CLW/ES/SK-3/B-14
4. CLW/ES/SK-4/B-14
5. CLW/ES/SK-5/B-14
6. CLW/ES/SK-6/B-14
7. CLW/ES/SK-7/B-14

SPECIFICATION FOR MOTOR DRIVEN BLOWER
(MVMT, MVRH, MVSL, MVSI)
FOR
25 KV A.C. Electric Locomotive
CLASS: WAG-7/ WAP-4

Total no. of sheets in this specification:

Alt.	-	A	B	C				
Sheets	69	74	85	88				

ISSUED BY:
Dy. Chief Electrical Engineer / D-I
Chittaranjan Locomotive Works
P.O. Chittaranjan
Distt. Burdwan
West Bengal

Specification for
Motor Driven blower.

उप.मु.बि.अ. (अभि.)
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दिनांक/DATE: 06-07-2000

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SCHEDULE OF TECHNICAL REQUIREMENTS FOR MANUFACTURING OF ALL BLOWERS FOR CONVENTIONAL & 3-PHASE LOCOMOTIVES

SCOPE: - The Schedule of technical requirements (STR) specifies the requirements to be met by vendors who manufacture, test and supply the All Blowers for Conventional & 3-phase locomotives, this STR should be read in conjunction with the CLW,s technical specification for this item. The firm should satisfy themselves having complied with the requirements of the specification and this STR.

(A) M&P Requirements: -

Sl. No.	Description	Capacity	Remarks
1.	Shearing / Power Press M/c	Standard	For shearing / Cutting the job
2.	Profile Cutting / Gas Cutting M/c	Suitable Size	For profile cutting
3.	Welding M/c	350 Amps	For Welding the job.
4.	Grinding Machine	Suitable Size	For surface grinding and smoothing.
5.	Drilling Machine	Up to 1½" dia	For drilling holes of different sizes
6.	Pn. Gun for Rivet welding	Suitable Size	For Rivet joint
7.	Crane / Proper handling / Lifting facility	Suitable Size	Suitable lifting arrgt. for blower fan & motor.
8.	Proper Jig & Fixture, Punching & Labeling Arrgt. Directional Arrow.	Suitable Size	For accurate shaped & size and also for identification/ traceability of the job.
9.	Space Require		For storage of raw material, in process & finished product.

(B) Measuring Equipments: -

Sl. No.	Description	Capacity	Remarks
1.	Vernier Caliper, Micro meter, Scale / Steel Tape	Standard	For measuring of dimension.
2.	Tensile Testing M/c	2000 Kgf	For measuring the Tensile strength.
3.	Sock pulse Meter	Suitable Size	For condition of bearing
4.	Balancing Testing M/c	Suitable Size	Rotor & Blower impeller shall be dynamically balanced.
5.	Vibration Testing M/c	Suitable Size	For vibration test
6.	Air Flow measuring Equip.	Suitable Size	For measuring the air delivery.
7.	Weighing M/c	Suitable Size	For measuring the weight of the unit.
8.	Variable 3- Ø supply	0- 500 V(Ph-Ph)	For apply 3- Ø supply to motor
9.	Tong Tester	Suitable Size	For measuring the starting, running current

(C) Quality requirement:-

1. Input Raw Material – Metallurgical Test is to be done & Sources of raw material to be specified.
2. Stage-wise Inspections are to be done & Check List for the same is to be made.
3. Final Inspection is to be done & Check List for the same is to be made.
4. Welding –quality & Finish are to be ensured at each stage.
5. Valid ISO accredited certificate required.

Dy. CEE/D-I

CEE/Loco

CEE

AEE/D-III

M. Ghosh
10/06/09

12.	Stop watch, Thermometer & Weighing M/c	Standard Size	For measuring Wt., time & temp.
13.	Oscilloscope	Standard	Measuring parameters through curve
14.	Weld Test (DPT, MPI, etc)	Standard	For welding test
15.	Metallurgical Test / Crack Test (UT)	Standard	For Crack Test.

(C) Process Control Requirements: -

Welding	Qualified Welding Process by NABL / Govt. Lab Process	Qualified Welders by NABL / Govt. Lab

M. Chhabra
10/3/09/09

AEE/D-III

Dy. CEE / D-I May pls recommend for approval of STR please

CEE / Loco

[Signature]

Asst. Dy. CEE
7/9/09

CEE *[Signature]*
3.10.09

Page 1 of 2

SCHEDULE OF TECHNICAL REQUIREMENTS FOR MANUFACTURING OF ALL BLOWERS (EXCEPT OCU) FOR CONVENTIONAL & 3-PHASE LOCOMOTIVES

SCOPE: - The Schedule of technical requirements (STR) specifies the requirements to be met by vendors who manufacture, test and supply the All Blowers (except OCU) for Conventional & 3-phase locomotives, this STR should be read in conjunction with the CLW,s technical specification for this item. The firm should satisfy themselves having complied with the requirements of the specification and this STR.

(A) M&P Requirements: -

Sl.	Description	Capacity	Remarks
1.	Shearing / Power Press M/c	Standard	For shearing / Cutting the job
2.	Profile Cutting / Gas Cutting M/c	Suitable Size	For profile cutting
3.	Welding M/c	350 Amps	For Welding the job.
4.	Grinding Machine	Suitable Size	For surface grinding and smoothing.
5.	Drilling Machine	Up to 1 1/2" dia	For drilling holes of different sizes
6.	Pn. Gun for Rivet welding -	Suitable Size	For Rivet joint
7.	Crane / Proper handling / Lifting facility	Suitable Size	Suitable lifting arrgt. for blower & motor.
8.	Proper Jig & Fixture, Punching & Labeling Arrgt. Directional Arrow.	Suitable Size	For accurate shaped & size and also for identification/ traceability of the job.
9.	Space Required		For storage of raw material, in process & finished product.
10.	Aluminum Casting facility & turning M/c for all casting impeller.	Suitable Size	Require for all Aluminum Casting impeller

(B) Measuring Equipments: -

Sl.	Description	Capacity	Remarks
1.	Vernier Caliper, Micro meter, Scale / Steel Tape	Standard	For measuring of dimension.
2.	Multimeter, Tachometer, Tong Tester, Meggar	Standard	For measuring of Elec. parameters
3.	Control panel comprising wattmeter, ammeter, voltmeter, frequency meter etc with Variable 3- Ø supply (0-500v) having facility for creating unbalance upto 5%.	Suitable Size	For final testing of blower with motor
4.	Tensile Testing M/c	2000 Kgf	For measuring the Tensile strength.
5.	Sock pulse Meter	Suitable Size	For condition of bearing
6.	Dynamic Balancing M/c	Suitable Size	Rotor & Blower impeller shall be dynamically balanced.
7.	Vibration Testing M/c	Suitable Size	For vibration test
8.	Air Flow measuring meter.	Suitable Size	For measuring the air delivery.
9.	Testing rig	As per IS: 3588	For different type of testing purpose.
10.	Manometer	Suitable Size	For pressure measurement.
11.	ON-OFF timer	Suitable	For starting duty test

Indian Railways
Chittaranjan Locomotive Works
Chittaranjan, Burdwan
Fax No.0341-2525644

No.ELDD/1720/SG


Dated:05.06.2009.

Sub: Approval of Schedule of Technical Requirement for Manufacturing of All Blowers for Conventional & 3-phase locomotives

Schedule of Technical Requirements for manufacturing of All Blowers for Conventional & 3-phase locomotives has been prepared and furnished at SN- side.

Dy. CEE/D-I is requested to kindly forward.

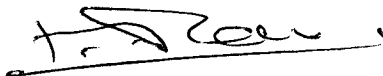
Competent Authority may kindly approve the same.


AEE/D-III

Dy. CEE/D-I

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CEE/Loco



CEE

CEE(Loco)
AL blowers
require castings
also.
What about the
reqd. for castings
for ~~the~~ castings
CE

OSU
B. L. 10/09

Indian Railways
Chittaranjan Locomotive Works
Chittaranjan, Burdwan
Fax No.0341-2525644

No.ELDD/1720/SG


Dated: 03.09.2009.

Sub: Approval of Schedule of Technical Requirement for Manufacturing of All Blowers (except OCU) for Conventional & 3-phase locomotives

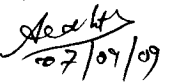
Schedule of Technical Requirements for manufacturing of All Blowers (except OCU) for Conventional & 3-phase locomotives has been prepared and furnished at SN- side.

Dy. CEE/D-I is requested to kindly forward.

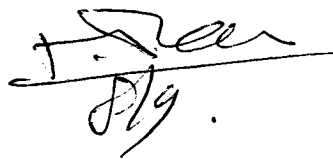
Competent Authority may kindly approve the same.


03/09/09
AEE/D-III


Dy. CEE/D-I may pls see command for approval of STR pls.


07/09/09

CEE/Loco


Plg.

CEE


3.10.09

AEE/3.