EXPRESSION OF INTEREST (EOI) FOR MANUFACTURING AND SUPPLY OF SUBASSEMBLIES, PARTS, COMPONENTS ETC FOR APPLICATION IN DIESEL LOCOMOTIVES (Development of Specification):

Motive Power Directorate of Research, Designs & Standards Organisation (RDSO), Lucknow, under the Ministry of Railways (MOR), is interested in developing sources for subassemblies, parts, components etc for application in diesel locomotives. Details of such items, for which this part of EOI intends to cover the stage of development of specification, are as follows:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description</th>
<th>Details of Specification</th>
<th>Contact Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Traction Motor Bellows (Meta Aramide Fabric with Silicon Rubber Coating) for use on Broad Gauge Alco &amp; HHP Diesel-Electric Locomotives</td>
<td>--</td>
<td>Vijay Goel, Joint Director/Motive Power-EM Room No: 106 Building: Manak Bhawan Tel. No.: 0522-2465733 Email: <a href="mailto:mp.directorem@gmail.com">mp.directorem@gmail.com</a></td>
</tr>
</tbody>
</table>

Details of the above-mentioned Functional Requirement Specification (FRS) are attached herewith.

Firms who have enough experience/capabilities in the field, have ISO certificate and are interested in developing and supply of above items are requested to submit details in the prescribed format attached herewith to the concerned officer mentioned against each item.

In case of any doubt, please contact the concerned officer mentioned against each item in office at Lucknow, on any working day.

Annexures: A & AA

Executive Director
Motive Power Directorate.
FORMAT FOR LETTER OF RESPONSE

Respondents Ref No.:
Date:

Designation of officer to whom the respondent replies
Room No. 
Building:
Research Designs & Standards Organization
Ministry of Railways
Manak Nagar
Lucknow,
INDIA 226011

Dear Sir,

Subject: RESPONSE TO – EOI FOR PARTICIPATION __________________________

1. We, the undersigned, offer the following information in response to the Expression of Interest sought by you vide your Notification No._______, dated _____.

2. We are duly authorized to represent and act on behalf of ________________ (hereinafter the “respondent”)

3. We have examined and have no reservations to the EOI Document including Addenda No(s) ____________________.

4. We are attaching with this letter, the copies of original documents defining:
   4.1. the Respondent’s legal status;
   4.2. its principal place of business;
   4.3. its place of incorporation (if respondents are corporations); or its place of registration (if respondents are cooperative institutions, partnerships or individually owned firms);
   4.4. Self-certified financial statements of Last three years, clearly indicating the financial turn over and net worth.
   4.5. Copies of any market research, business studies, feasibility reports and the like sponsored by the respondent, relevant to the project under consideration

5. We shall assist MOR and/or its authorized representatives to obtain further clarification from us, if needed.

6. RDSO and/or its authorized representatives may contact the following nodal persons for further information on any aspects of the Response:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Contact Name</th>
<th>Address</th>
<th>Telephone</th>
<th>E Mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7. This application is made in the full understanding that:
   7.1 Information furnished in response to EOI may be used confidentially by RDSO for the purpose of development of the product.
   7.2 RDSO reserves the right to reject or accept any or all applications, cancel the EOI and subsequent process without any obligation to inform the respondent about the grounds of same.
   7.3 We confirm that we are interested in participating in development of the product.

8. We certify that our turnover and net worth in the last three years is as under:

<table>
<thead>
<tr>
<th>Financial Year</th>
<th>Turn over</th>
<th>Net worth</th>
</tr>
</thead>
</table>

9. In response to the EOI we hereby submit the following additional details annexed to this application.
   9.1 Details of various items being manufactured/consultancy undertaken.
   9.2 Details of customer(s) and supplies made in the field of item under EOI.
   9.3 Experience and expertise for the items proposed in EOI.
   9.4 Details of man-power with their qualification and experience.
   9.5 Detailed proposal for items proposed in EOI including alternative proposal, if any.
   9.6 Details of Intellectual Property Rights (IPR) held, patent filed/held and MOU/agreement signed.
   9.7 Details of ISO certification.
   9.8 Undertaking as per Annexure-AA

10. The undersigned declare that the statements made and the information provided in the duly completed application are complete, true, and correct in every detail. We also understand that in the event of any information furnished by us being found later on to be incorrect or any material information having been suppressed, RDSO may delete our name from the list of qualified Respondents. We further understand that RDSO will give first preference to the applicants considered relevant for the purpose.

11. Our response is valid till (date in figures and words):______________________________

Yours sincerely,

(Sign)
Name
In the Capacity of
Duly authorized to sign
the response for and on behalf of
Date
Annexure-AA

(To be taken on non-judicial stamp paper of appropriate value as applicable in the respective state and duly notarised and witnessed)

UNDERTAKING

I, son of ................. aged about ........ Years resident of ............ do hereby solemnly affirm as under:

1. That the deponent is the Authorised signatory of (Name of the Sole Proprietorship Concern/Partnership Firm/ Registered Company/ Joint Venture).

2. That the deponent declares on behalf of (Name of the Sole Proprietorship Concern/ Partnership Firm/ Registered Company/Joint Venture) that:

   a) In regard to matters relating to the security and integrity of the country, no charge sheet has been filed by an agency of the Government and/or conviction awarded by a Court of Law for an offence committed by the (name of the entity) or by any sister concern of the (name of the entity) which would constitute disqualification of (name of the entity or any of it’s sister concerns).

   b) In regard to matters other than the security and integrity of the country, (name of the entity) has not been convicted by a Court of Law or indicted / passed any adverse order by a regulatory authority against it or it’s any sister concern which relates to a grave offence, or would constitute disqualification. Grave offence is defined to be of such a nature that it outrages the moral sense of the community.

DEPONENT

VERIFICATION

I declare that the contents of para 1 to 2 above are true as per my knowledge and nothing has been hidden.

DEPONENT
FUNCTIONAL REQUIREMENT SPECIFICATION FOR TRACTION MOTOR BELLows
(META ARAMIDE FABRIC WITH SILICON RUBBER COATING)
FOR USE ON BROAD GAUGE ALCo & HHP DIESEL-ELECTRIC LOCOMOTIVES

1. INTRODUCTION

The Traction Motor Bellow is a component fitted between traction motor and underframe. TM bellows used on bogies of diesel electric locomotives at present are made of moulded rubber and leather type.

The bellows are used to transfer air from blowers inside the locomotive body to the traction motors. They are required to take up the relative motion between the locomotive body and the bogies. During operation, the bellows will be subjected to deflection and twisting.

Changing periodicity of TM bellows in ALCO locomotives and HHP locomotives is 2 and 6 years respectively. Therefore, superior quality of material is required for improved reliability and enhancement of life beyond 6 years for both types. It would be preferred if periodicity of change is achieved as 8yrs for ALCo TM bellows to match with POH schedule & 9 years for HHP locos to match half the life of POH schedule i.e. 18 years.

1.1 EXISTING BELLOWS (RUBBER & LEATHER TYPE) DESIGN DETAILS:

In case of ALCo locomotives, both ends of bellow i.e. flanges are fastened to traction motor on one side & underframe bottom plate on other side.

However, in case of HHP locomotives, the lower end is fastened with traction motor while upper end only touches underframe bottom plate & floats during loco movement. The bellows used on HHP loco are fitted with coil spring inside the bellow for compression and expansion of the bellow during loco operation.

These bellows are made up of either rubber or leather material & both types are used in ALCo as well as HHP locos. Testing of finished TM bellows of each type is carried out as per applicable RDSO’s specification mentioned against each variant. However, testing standards for each material are indicated in Cl. 1.2 below.

The material specification for associated hardware components in case of leather & rubber type bellows of HHP locos are listed in relevant drawings.

A) ALCo Locomotives (RDSO controlled item):

<table>
<thead>
<tr>
<th>Type</th>
<th>Material</th>
<th>Drawing No. &amp; specification no</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>Chrome tanned grain leather.</td>
<td>RDSO spec. no. MP-0.2400.25 &amp; RDSO drawing no. SK.DP-3503</td>
</tr>
<tr>
<td>Type 2</td>
<td>Moulded Rubber bellows without fabric.</td>
<td>RDSO spec. no. MP-0.2400.22 &amp; RDSO drawing no. SK.DP-3849 (copy enclosed for your reference)</td>
</tr>
</tbody>
</table>

B) HHP Locomotives (DLW controlled item):

<table>
<thead>
<tr>
<th>Type</th>
<th>Material</th>
<th>Drawing No. &amp; specification no</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>Chrome tanned grain leather.</td>
<td>RDSO specification no. MP-0.2400057 &amp; DLW drawing no. 17022460</td>
</tr>
<tr>
<td>Type 2</td>
<td>Moulded Rubber bellows without fabric (with coil spring fitted)</td>
<td>DLW TM air duct assembly drawing no. 17031904 (copy enclosed for your reference). Relevant specifications for associated components are indicated in drawing).</td>
</tr>
</tbody>
</table>

1.2 EXISTING BELLOW MATERIAL STANDARDS:
### 1.2.1 Leather for ALCo & HHP locomotives:
The leather used for the manufacture of bellows conforms to the following requirements:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Property</th>
<th>Requirement</th>
<th>Test procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Crackiness of the grain</td>
<td>Shall not crack on single folding</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Tensile Strength (kgf / sq. cm)</td>
<td>210 (min.)</td>
<td>IS: 5914</td>
</tr>
<tr>
<td>3</td>
<td>Tensile Elongation at 1kg/sq. mm, force after 15 min., %</td>
<td>25 - 30</td>
<td>IS: 5914</td>
</tr>
<tr>
<td>4</td>
<td>Tearing strength, kg/cm of thickness, Min.</td>
<td>45</td>
<td>IS: 5914</td>
</tr>
<tr>
<td>5</td>
<td>Water penetration time</td>
<td>Min. 90 minutes</td>
<td>EN 345 S3</td>
</tr>
<tr>
<td>6</td>
<td><strong>Accelerated ageing test:</strong> for 72 hrs. at 100 ±1°C in an air oven, change in tensile strength, %</td>
<td>± 10%</td>
<td>As done for Rubber to IS:3400 Part IV</td>
</tr>
<tr>
<td>7</td>
<td><strong>Swelling test:</strong> 24 hours at 27±2°C, in a fluid consisting of 70 parts pure ISO-octane (2:2:4 tri-methyl pentane) and 30% parts of pure toluene, swelling in % (max.)</td>
<td>70%</td>
<td>As done for Rubber to IS:3400 Part VI</td>
</tr>
<tr>
<td>8</td>
<td><strong>Chemical tests :</strong> &lt;br&gt; a) Chromium content, % by mass, min. &lt;br&gt; b) Solvent extractable substances, % by mass &lt;br&gt; c) pH of water solubles</td>
<td>3.5 &lt;br&gt; 3.0 to 7.0 not below 3.5</td>
<td>IS: 582</td>
</tr>
</tbody>
</table>

### 1.2.2 Neoprene Rubber for ALCo Locomotives:
Neoprene rubber used for bellows conforms to following requirements:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Property</th>
<th>Requirement</th>
<th>Test procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hardness (Shore ‘A’)</td>
<td>60 ± 5</td>
<td>ASTM D 2240</td>
</tr>
<tr>
<td>2</td>
<td>Tensile strength (kgf/cm²), min.</td>
<td>105</td>
<td>IS:3400 Part I</td>
</tr>
<tr>
<td>3</td>
<td>Elongation at break %, min.</td>
<td>200</td>
<td>IS:3400 Part I</td>
</tr>
<tr>
<td>4</td>
<td>Compression set (max) %, 24 hrs. at 100+1°C</td>
<td>25</td>
<td>IS:3400 Part X</td>
</tr>
<tr>
<td>5</td>
<td><strong>Accelerated ageing test for 72 hrs. at 100 ±1°C in an air oven, change %</strong> &lt;br&gt; ➢ Hardness (shore 'A') &lt;br&gt; ➢ Tensile strength &lt;br&gt; ➢ Elongation at break</td>
<td>± 10% &lt;br&gt; ± 25% &lt;br&gt; ± 30%</td>
<td>IS :3400 Part IV</td>
</tr>
<tr>
<td>6</td>
<td><strong>Swelling test:</strong> 24 hours at 27±2°C, in a fluid consisting of 70 parts pure ISO-octane (2:2:4 tri-methyl pentane) and 30% parts of pure toluene, swelling in % (max.)</td>
<td>70%</td>
<td>IS: 3400 Part VI</td>
</tr>
<tr>
<td>7</td>
<td>Chemical test</td>
<td>Neoprene</td>
<td>IS:3400 (Part 22)</td>
</tr>
</tbody>
</table>

### 1.2.3 Neoprene Rubber for HHP Locomotives:
Neoprene rubber used for bellows (without hardware) conforms to following requirements:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Test Parameters</th>
<th>Requirement</th>
<th>Test procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Duro Hardness</td>
<td>60 ± 5</td>
<td>ASTM D2000</td>
</tr>
<tr>
<td>2</td>
<td>Tensile strength, Min</td>
<td>2000 Psi</td>
<td>ASTM D2000</td>
</tr>
<tr>
<td>3</td>
<td><strong>Aged 70 Hrs in IRM 903 Oil or equivalent at 100°C</strong> &lt;br&gt; ➢ Volume Change % &lt;br&gt; ➢ Max. Tensile Strength Change. % &lt;br&gt; ➢ Max. Elong. Change %</td>
<td>40-110 &lt;br&gt; -65 &lt;br&gt; -55</td>
<td>ASTM D2000</td>
</tr>
<tr>
<td>4</td>
<td><strong>Heat Aged 70 Hrs at 100 °C</strong> &lt;br&gt; ➢ Max. Tensile Strength Change. % &lt;br&gt; ➢ Max. Ult. Elong. Change. % &lt;br&gt; ➢ Max. Duro Change %</td>
<td>-15 &lt;br&gt;-40 &lt;br&gt;+15</td>
<td>ASTM D2000</td>
</tr>
<tr>
<td></td>
<td>Max. Compression Set after 22 hours at 100°C, %</td>
<td>50 (Compressed 30%)</td>
<td>ASTM D2000</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Polymer Identification test of rubber</td>
<td>Neoprene</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>Low temp. brittleness test</td>
<td>-40 °F</td>
<td>ASTM D 2137, Method A</td>
</tr>
</tbody>
</table>

1.2.4 Tests for Finished Bellows (Leather & Rubber Type):

These tests are carried out on following bellows:
- ALCo Rubber & Leather type both
- HHP Leather type only

The manufacturer will supply a sufficient number of pieces to conduct the tests.

a) Appearance & Dimensional check:

The appearance of the bellows shall be checked and no abnormality shall be permitted in respect of rubbing impairment on the rubber surface, pin holes, stripping off of the adhered parts and no peeling of paint. Various dimensions shall be checked to ensure their conformity with the relevant drawing and specification.

b) Maximum stretch test:

Amount of transverse movement shall not be < 75 mm.

i) The bellow shall be stretched using 200 kg weight for Alco leather & rubber bellow & 250 kg for HHP leather bellow on the bottom periphery. In the stretched condition, angular twist of 5° shall be given, while keeping an offset of 250mm between top and bottom openings. There shall be no failure, breaking and crack etc. The test shall be repeated three times.

ii) When the bellow is transformed as shown in the figure given above, the amount of transverse movement shall not be less than 75 mm (Alco leather & rubber bellow) & 35 mm (HHP leather bellow).

c) Leak and balloon test:

A suitable test rig shall be provided by the manufacturer to build up air pressure inside the bellow. The bellow shall neither allow any air leak nor balloon up when air under pressure of 5 PSI for Rubber type (ALCo) & 0.5PSI for Leather type (ALCo & HHP both) is maintained inside. Leak and balloon test shall be conducted after the tests at (i) and (ii) above.

d) Endurance test:

The finished bellow will be subjected to 100,000 bellowing operations stretching the bellow from 200 mm to 360 mm for Alco leather & rubber bellow and 280 to 360 mm for HHP leather bellow. The number of cycles per minute shall be 45±5 for the first 50,000 operations and 100±6 cycles per minute for rest of the operations. After the trials the bellow will be inspected for any cracks of collapse of the bellows.

2. SITE CONDITIONS IN WHICH THE BELLOWS HAVE TO WORK

2.1 The bellows shall be suitable for service in ambient temperature of up to 55°C, with
maximum relative humidity of 100% at altitude of up to 1000 meters above MSL, under dusty atmospheric conditions.

2.2 The outside of the bellows are likely to be exposed to different types of lubricating oils apart from metallic dust and sparks from cast iron brake blocks. A certain amount of oil and exhaust fumes from the compressor/exhauster will be found in the vicinity.

2.3 The bellows have to convey 2600 cfm air (max) at about 47°C without leakage and with the minimum pressure drop across the bellows. The pressure difference between the air inside the bellows and the ambient pressure outside will be about 250 mm WG (max).

3. FUNCTIONAL REQUIREMENT SPECIFICATION FOR MATERIAL, CONSTRUCTION AND TESTING PARAMETERS:

3.1 DEVELOPMENT OF NEW DESIGN TM BELLOWS (META-ARAMIDE FABRIC WITH SILICON RUBBER COATING ON BOTH SIDES OR EQUIVALENT):

Recently, both type of TM bellows i.e. leather and moulded rubber type are used on ALCo locomotives as well as EMD locomotives. To improve reliability and enhancing life to 8 years for ALCo locos & 9 years for EMD locos, superior quality of material (meta-aramide fabric with silicon rubber coating on both sides or equivalent) is to be developed. The new design meta-aramide fabric type bellows will have following likely benefits over existing bellows:

- Will have enhanced life due to minimum wear as compared to existing bellows.
- Will perform effectively as per loco movement according to track profile
- Will perform at intense temperature range (-50 °C to +180 °C)
- Will have burning behaviour fulfilling international standards.
- Will have homogeneous connection to counterpart
- Will have minimum dimensions and material usage
- Will comply fire and smoke protection standards
- Will have maximum movement at minimum product wear.

3.2 MATERIAL AND CONSTRUCTION:

The material of the bellows shall be "meta-aramide fabric with silicon rubber coating on both sides or equivalent" to meet the existing design. The material of the bellows shall be free on both sides from pinholes/cuts/any open surface blemishes likely to cause leakage of air. The bellows material shall be oil resistant, spark-proof, halogen free and remain flexible for longer periods. The dimensions and tolerance of the bellows shall conform to the relevant drawing.

3.3 BELLOWS MATERIAL (META-ARAMIDE FABRIC WITH SILICON RUBBER COATING ON BOTH SIDES OR EQUIVALENT) STANDARDS:

The tests shall be carried out in two parts – first on samples of raw material and second on the finished bellows.

3.3.1 Tests for Raw Materials:

a) Tests for Silicon rubber or equivalent used shall be done on prepared test slabs of approximately same degree of vulcanization (if applicable) and using the same compound as that to be used for manufacture of the bellows. Silicon Rubber shall be suitably compounded so as to confirm to the following requirements:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Property</th>
<th>Accepted value</th>
<th>Test procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Hardness (Shore 'A')</td>
<td>60 ± 5</td>
<td>DIN 53505</td>
</tr>
<tr>
<td>2.</td>
<td>Tensile strength (MPa), min.</td>
<td>7</td>
<td>DIN 53504</td>
</tr>
<tr>
<td>3.</td>
<td>Tensile elongation , %, min.</td>
<td>300</td>
<td>DIN 53504</td>
</tr>
<tr>
<td>4.</td>
<td>Density, gm/cm²</td>
<td>1.34</td>
<td>DIN 53479</td>
</tr>
<tr>
<td>5.</td>
<td>Low temp. stability</td>
<td>-50°C</td>
<td>EN 1876-2</td>
</tr>
<tr>
<td>6.</td>
<td>Cold break temp.</td>
<td>-60°C</td>
<td>EN 1876-2</td>
</tr>
<tr>
<td>7.</td>
<td>Max. temp. (Cont.)</td>
<td>+180°C</td>
<td>EN 1876-2</td>
</tr>
</tbody>
</table>
b) Tests for meta-aramide fabric or equivalent material shall be done as per applicable Indian or International standards.

c) Silicon rubber with meta-aramide fabric shall confirm to following physical properties:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Property</th>
<th>Accepted value</th>
<th>Test procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Thickness, mm</td>
<td>1.2</td>
<td>DIN 53855</td>
</tr>
<tr>
<td>2.</td>
<td>Total Wt., gm/m²</td>
<td>1400</td>
<td>DIN 53854</td>
</tr>
<tr>
<td>3.</td>
<td>Tensile strength, wrap/weft, daN/5cm</td>
<td>&gt;80/65</td>
<td>DIN 53857</td>
</tr>
<tr>
<td>4.</td>
<td>Tensile elongation, wrap/weft, %</td>
<td>&gt;25/40</td>
<td>DIN 53857</td>
</tr>
<tr>
<td>5.</td>
<td>Burning behaviour</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(i) Burning class</td>
<td>S-4</td>
<td>DIN 5510</td>
</tr>
<tr>
<td></td>
<td>(ii) Smoke Class</td>
<td>SR-2</td>
<td>DIN 5510</td>
</tr>
<tr>
<td></td>
<td>(iii) Dripping class</td>
<td>ST-2</td>
<td>DIN 5510</td>
</tr>
<tr>
<td>6.</td>
<td>Toxicity</td>
<td>FED&lt;0.01</td>
<td>DIN 5510</td>
</tr>
</tbody>
</table>

3.3.2 TESTS FOR FINISHED BELLOWS OF META-ARAMIDE FABRIC:

The tests performed on rubber & leather type existing bellows as mentioned in Clause 1.2.4 will also be performed on bellows manufactured using meta-aramide fabric. However, the tenderer may offer comments regarding the applicability of additional tests for testing the quality of meta-aramide type bellows or non-applicability of any tests mentioned in Cl. 1.2.4 above.

4. TESTING & INSPECTION:

4.1 Preliminary Testing / Internal Testing: These comprise of tests to be carried out by tenderer as per locomotive operating conditions at firm’s premises during design development.

4.2 Prototype Testing: These comprise of tests to be carried out by IR at firm’s premises during design development as required.

4.3 Reliability Verification Testing (Testing on Locomotive i.e. Field Trial): The details regarding field trials are mentioned in Clause 9 below.

4.4 Quality Acceptance / Routine tests / Any Other Tests: Details shall be decided after successful completion of the work as mentioned in Clause 9 below.

5. INFRASTRUCTURE DETAILS:

Machinery & Plants (M&P) installed in the tenderer’s works for manufacture and testing of the bellows with equipment along with drawing / testing facilities available shall be listed out and submitted in the offer. Apart from the above, successful tenderer’s shall submit all other information considered relevant by IR for successful execution of the contract. The format for such information shall be decided mutually between IR and the successful tenderer.

6. DESIGN/DRAWING DETAILS:

The tenderer’s shall submit design/ drawing, manufacturing details and QAP to RDSO before taking up actual production.

7. DEVIATION:

Any deviation, proposed as an improvement over the existing specification, by a tenderer may be considered by RDSO, provided that all technical details thereof are submitted with such a proposal.

8. FIELD TRIAL:

After successful type test, the tendered firm shall supply 6 nos. of bellows to IR without any charge for conducting and verification of following tests on the locomotives:
No physical damages or deterioration to be seen before fitment.
Correct fitment of bellow and proper tightness of bolts/nuts to be verified after fitment on the locomotive.
No mechanical damage to be seen after fitment.
No leakage of air to be seen either from the bellows or joints with the engine running on top notch.

Verification of all above tests shall be carried out in presence of Railway representative. After that these bellows will be subjected to a further field trial of up to 6 months on a single locomotive. Clearance for supply of the tendered quantity shall be given after successful field trial detailed above.

9. QUALIFICATION REQUIRED FOR APPROVAL:

After successful testing and field performance trials, the firm shall qualify for approval.

10. WARRANTY:

The successful tenderer shall offer warranty against any manufacturing defects noticed on the insulating scheme offered for a period not less than 24 months from the date of Overhauling or 30 months from the date of supply, whichever is earlier. Any damage or unsatisfactory performance on the bellow due to design or manufacturing inadequacies noticed during the above field trials or during the warranty period shall be rectified /replaced by the firm free of cost.

11. LITERATURE AND MAINTENANCE INSTRUCTIONS:

The approved supplier shall supply sufficient copies of manuals for Traction Motor bellows maintenance & overhaul.

12. MARKING:

The bellows shall be clearly embossed with the name of the manufacturer, month & year of manufacture and the letter IR in the location shown in the drawing.

13. PACKING:

The bellows shall be packed separately in polythene bag with preventive measure against during transit and storage. Each and every polythene bag containing the bellow should be placed in suitable box.