

<b>TÜRASAS</b> ESKİŞEHİR REGIONAL DIRECTORATES	TECHNICAL SPECIFICATION	Document No	050.037			
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**T.S. 050.037**  
**TECHNICAL SPECIFICATION FOR BEARINGS**  
**OF TYPE TLM V 185 DIESEL ENGINES**

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## 1. SUBJECT and SCOPE

This technical specification covers the general conditions, requirements and technical specifications, inspection, control, testing, purchasing, packing, warranty conditions and other Conditions regarding the journal bearings used on TLM16V185 type Diesel Engines overhauled at TÜRASAS (Turkish Rail Vehicle Industry Co.Ltd.)

## 2. GENERAL CONDITIONS

- 2.1. The bidding firms in their offer shall fully, definitely and explicitly respond all articles of this technical specification in writing one by one in the same order as in the specification. Any offer, which does not comply with this item, will not be evaluated.
- 2.2. If bidders hesitate on any concerning the total specification, some of its articles, or its attached drawings, they can apply to TÜRASAS for further data at least 7 days before the bid opening day. TÜRASAS will respond within at most 3 days as of the application date. Any application regarding the specification after the receipt of the offers will not be accepted.
- 2.3. The journal bearings to be purchased with this specification will be used for TLM16V185 type Diesel Engines on DE 24000 – DE 18000 type Diesel Electric Main Line Locomotives, so, physically and functionally, they have to work totally compatibly.
- 2.4. The manufacturers shall have ISO 9001 or ISO/TS 16949 Quality Management System and submit the related document proving this in their offer.
- 2.5. The property of the documents taken from TÜRASAS by the bidders against signature belongs to TÜRASAS and those shall not be used for other purposes or given to third parties.
- 2.6. All transportation handling, shipping regarding the journal bearing to be purchased by this tender shall be borne by the contractor.
- 2.7. The responsibility of the journal bearings to be purchased with this tender shall be within the contractor's responsibility until the official acceptance paper is signed. The contractor shall submit the new ones until the delivery time to TÜRASAS within his responsibility.
- 2.8 The conditions not indicated in this specification are explained in the administrative specification.

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### 3. TECHNICAL SPECIFICATIONS and REQUIREMENTS

3.1. The journal bearing materials to be purchased with this tender shall be manufactured and controlled according to the operations indicated in the technical drawings attached to this specification.

#### 3.2. Properties of the Bearing Material:

##### 3.2.1 Material Properties of the Bearing Metal:

###### a) Chemical Composition:

1. The chemical composition indicated in the technical drawings: Pb 25% - Sn 0,5 % - Cu 74,5%

2. Alternative chemical composition: Pb (23-28)%- Sn(1-2 )% - Cu (remaning) %

3. Alternative material: CuPb24Sn or CuPb24Sn4 it shall comply with ISO4383:2000(E)

b) Coating Thickness: It shall be as indicated in the technical drawings.

c) Hardness: According to ISO 4383

##### 3.2.2. Material Properties of Bearing Lead-Tin Coating:

###### a) Chemical Composition:

1. The chemical composition indicated in the technical drawings: Pb(90-96)%Sn(4-10)%

2. Alternative chemical composition: Pb (88-92)%(8-12)%

b) Coating Thickness: It shall be as indicated in the technical drawings.

##### 3.2.3. Material Properties of Bearing Tin Coating:

It shall be as indicated in the technical drawings.

#### 3.3. Material Properties of Bearing Housing:

Dimensions and tolerances of the journal bearings to be purchased with this tender shall comply with the values indicated in the technical drawing attached to this specification.

Low carbon steel (in the range of SAE 1010-SAE1020) material may be used for bearing housing. (According to EN 10088 and EN 10083'e göre C10-C15-C16-C22).

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#### 4. INSPECTION and CONTROLS

##### 4.1. Inspections method, place and quantity of sample

TÜRASAS can perform inspection of the journal bearings to be purchased at its facility or get it performed at the contractor's company or at an official laboratory approved by TÜRASAS. The samples for inspection shall be randomly selected as indicated quantities in the standards, or if there is no standart, the quantities shall be as much as indicated in the articles. Sampling quantities are shown below in the table.

The material quantity to be inspected from The same party.	Sampling quantity
Up to 30 pcs.	1 pc.
Up to 31-80 pcs	2 pcs
Up to 81-150 pcs	3 pcs

##### 4.1.1. Visual Inspection

The journal bearings to be purchased shall %100 visually inspected. There shall be no scratch, fracture, etc or damage, defect on any surface. Bearing coating surfaces shall not have any scratch, gap, air bubble etc. surface void. The surface quality of all surfaces shall have the values indicated in the technical drawings.

##### 4.1.2. Dimension and Tolerance Inspection

All the journal bearings to be purchased shall be %100 inspected for dimension and tolerance according to the related technical drawings.

##### a) On the Crankshaft Bearings

The development length control of the half bearing shall be performed as indicated in the technical drawing avoiding any deformation during the test. The radius value 88,0125(0,100/0,175) mm for ½ bearing form control is the interior radius value of the main bearing itself. It has to be face to face with equal half bearing housing which is equal to 176,025 under 1270 kg-load. Those operations are clearly indicated in the related drawing.

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#### b) On Piston Rod Bearings

The development length control of the half bearing shall be performed as indicated in the technical drawing avoiding any deformation during the test.

The radius value  $r \varnothing 67,5215 (0,075/0,100)$  mm for  $\frac{1}{2}$  bearing form control is the interior radius value of the main bearing itself. It has to be face to face with equal to  $R \varnothing 135,025$  under 800 kg-load. Those operations are clearly indicated in the related drawing.

#### 4.1.3. Chemical Analysis Inspection

The chemical analysis of journal bearings to be purchased shall comply with the values indicated in Article 3.2 of this specification and related technical drawings. Cu, Pb and Sn values for all bearing materials shall be as indicated proportion.

#### 4.1.4. Case Inspection and Bearing Metal – Bearing Housing Combination

The sample is taken by breaking the half bearing from the middle during the case inspection.

The lead has to have homogenous distribution during the microscopic inspection and there shall not be any aggregation, layers or parallel dendrites at locations near the steel housing. Whether the bearing metal touches the bearing housing shall be controlled depending on the geometry and the dimensions of the component by means of ultrasonic method. Moreover, the half bearing shall be rolled out under the press until it is straight. In this situation, Copper-Lead layer shall only show thin cracks; there shall be no fracture, shall not be any separation over bearing housing. The controls of the bearings whose outer diameter can not be measured by ultrasonic method with probe shall be performed as it is explained above upon pressing. During the inspections and tests in **Article 4.1.3 – 4.1.4 – 4.2** of this specification, the samples to be taken shall taken as values indicated in the table in **Article 4.1** of this specification and applied on the same parts.

#### 4.2. Material Hardness Test

Hardness test shall be applied for each lot according to the material hardness values indicated in Article 3.2 of this specification and related technical drawings. The values found have to be within hardness tolerance values the end of the tests performed.

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#### 4.3. Evaluation of Inspection and Test Results

Materials which can not comply with the required values shall be rejected at the end of the all inspection and controls indicated in Article 4 of this technical specification.

If any inspected samples which can not comply with any of Articles 4.1.3 – 4.1.4 – 4.2 all lot inspected shall be rejected. The provisional acceptance of the material shall be at the Contractor's; final acceptance shall be at TÜRASAS.

#### 4.41 Prototype

If it is regarded necessary, TÜRASAS may demand a prototype to test and try all kinds of bearings for one engine on the diesel engine. Besides, TÜRASAS may also demand 2 pcs of all kinds of bearings as prototype to make the controls indicated in the technical specification. If prototype is required, the lead time will be the date after the acceptance of the prototype.

Prototype shall be submitted to TÜRASAS in required conditions within 2 months beginning from the contract signing. Periods at TÜRASAS shall not be included in lead time.

### 5. MARKING

The marking operations indicated below shall performed by the manufacturer on each half bearing to enable recognisability and of assembly during the assembly of the journal bearings to be procured with this tender.

- Symbol of Manufacturer
- Date of production the material and manufacturer serial number
- If the bearing material has stages, stage degree

### 6. PACKAGING

6.1. The journal bearings to be purchased with this tender shall be lubricated with the suitable protective oil, and they shall be packed in such a way that they will not scratch or have surface contact. They shall be grouped and packed in quantities for one engine indicated in the lists in **Annex 1-2**. Each package pack shall have one whole set of bearing material for an engine.

6.2. Further study can be made with TÜRASAS Engine Factory regarding the packaging operations of the journal bearings to be purchased with this tender.

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6.3. TÜRASAS has the right to reject the materials which has unsuitable package.

6.4. If the journal bearings to be purchased with this tender have stages, its stage as I or II shall be indicated in a suitable way on its package.

6.5. After packaging, the journal bearings to be purchased with this tender shall be protected against corrosion, climatic conditions and all external factors. The materials shall be packed in such a way they shall not be scratched, eroded, damaged and affected from climatic conditions during transportation, stocking and handling.

## 7. DELIVERY

7.1. The journal bearings to be purchased with this tender shall be delivered to TÜRASAS Eskişehir Regional Directorates Acceptance and Transfer Division Management.

7.2. When TÜLOMSAŞ technical team reach the conclusion that all materials to be purchased with this tender are complete and damage free and their package is suitable at the end of the inspections, tests, tries, and controls, then, the acceptance paper shall be prepared.

7.3. The lead time for the journal bearings to be purchased and their quantities are indicated in **Annex – 1 -2 Order Lists**.

## 8. WARRANTY

8.1. The journal bearings to be purchased with this tender shall be warranted against defects and failures arising from any manufacturing, workmanship, material and packaging etc. Defects/failures for two years by the bidder.

8.2. Any failure or defects occurring on journal bearings due to manufacturing, workmanship, material etc. Error within warranty period, other than those, which may occur as a result of improper use by TÜRASAS, will be notified to the contractor via a warranty sheet to be arranged by TÜRASAS. In this case the contractor shall be responsible for replacing the rejected journal bearings with new ones free charge within 30 days.

8.3. In case that, the failure/defects of the same type occurs on more than 5% of the total quantity of the journal bearings, such failures/defects will be considered as EPIDEMIC ERROR. For troubleshooting and preventing recurrence, all necessary actions shall be taken by contractor to replace,



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improve journal bearings free of charge 60 calendar days and the contractor shall pay transport cost and any expense that may arise as well.

**8.4.** If failures and defects that can not be determined during inspections, control and delivery of the journal bearings to be purchased with this tender are determined later, the materials shall be replaced with new ones free of charge (all expenses are by the contractor) within 30 days by the contractor in their warranty period.

## 9. OFFER

The bidders shall submit their offer regarding the journal bearings to be purchased with this tender as unit price / piece for each piece.

## 10. OTHER CONDITIONS

**10.1.** TÜRASAS can visit, review and investigate an advance the facilities of the bidders participating in the tender to decide.

**10.2.** The bidders can see and review the journal bearing materials to be purchased with this tender at TÜRASAS.

**10.3.** Regarding the journal bearings to be purchased with this tender, issues may occur after signing of the contract or issues that are not included in this specification, will be settled between TÜRASAS officials and the contractor by a protocol.

## 11. SPECIFICATION ANNEXES

**ANNEX-1 :** Journal bearings order list of TLM V 185 TYPE DIESEL ENGINES (Standart bearings)

**ANNEX-2 :** Journal bearings order list of TLM V 185 TYPE DIESEL ENGINES (Stage bearings)