



**TECHNICAL SPECIFICATION FOR SELF LUBRICATING TUBE FOR BEARING/BUSH (IN COMPOSITE MATERIAL)  
FOR BUTTERFLY VALVES APPLICATION**

**SCOPE**

This specification covers the requirement for self-lubricating sleeve type bearing/bush in composite material construction suitable for rotating steel/stainless steel shaft of Butterfly valves (Quarter turn operation) to be used in thermal power plants.

**QUALIFICATION CRITERIA**

The bid is open for participation to those bidders who satisfy the following technical requirements –

1. Bidder shall be the OEM from the point of view of design, engineering, manufacture and testing of self-lubricating tubes in composite material construction. Bids through agents/promoters /liaison shall not be considered.
2. Bidders, if having technical collaboration, have to provide certification from their principal along with a letter regarding their relationship with the bidder and their involvement in assuring the quality of bidder's product.
3. Bidder shall have completed the entire testing in respect of his claims against chemical, physical, mechanical and other property data for complete manufacturing range as per BHEL's requirement. BHEL can ask the test certificates for verification of data during evaluation.
4. Bidder shall provide the reference for supplies in India for similar application where such bearing/bush are installed and are in trouble free operation for not less than 5 years. Bidder is to enclose credential from their customers in this regard.
5. Bidder shall provide documentary evidences in support of his claim for having experience in design, engineering, manufacture, testing and supply and meeting the requirement as per this specification with the bid submission.
6. BHEL reserves the right to assess the capabilities and capacity of bidder to perform the contract if such assessment is needed for evaluation of offer/facts submitted by bidder.
7. The following information shall be submitted by bidder about customers in India where similar bearing/bush has been supplied. This is required from all bidders for qualification of their offer:
  - a. Name of customer with purchase specification & application
  - b. Complete contact details of the customer
  - c. Month and year of supply and commissioning of equipment by the end user/customer.
  - d. Products inspected by the customer/Third party Inspection – (Yes/No); if inspected by third party, indicate the name of inspection agency.
  - e. Furnish catalogue and applicable test certificates
  - f. Performance certificates from the customer/end user.

In addition to above, BHEL can ask from bidder for any other relevant document which may be felt necessary during bid evaluation.

BHEL reserves the right to reject any or all bids or cancel/withdraw the bids without assigning any reason whatsoever and in such case no bidder/intending bidder shall have any claim arising out of such action.

## TECHNICAL REQUIREMENTS

The material for sleeve type self-lubricating bearing/bush in composite construction shall be suitable for water application. The material shall have following properties as minimum requirement –

PROPERTY	UNIT	VALUE
Compressive Strength (Min.)	MPa	250
Normal Working Strength (Min.)	MPa	50
Operating Temperature (upto)	°C	100
Coefficient of Friction	-	0.04-0.10
Surface Finish	μ	3.2

**Material Shall also be suitable for sea water application in addition to normal water application.**

- Filled in Annexure-II to be attached along with the offer.

## CHARACTERISTICS

The self-lubricating material shall have following characteristics –  
Material shall –

1. be non-metallic and not have harmful effect on water and rubber
2. be suitable for sea water application in addition to normal water application
3. have good machinability and can be machined easily to desired tolerances without any deformation with single point cutting tool
4. have good dimensional stability at operating temperature
5. have dry running capability for initial startup condition
6. have low water swelling
7. have low coefficient of friction at startup & when run at maximum bearing pressure
8. have low shaft wear characteristics
9. be free from asbestos and dust hazards
10. have high compression strength and low coefficient of thermal expansion
11. be durable and environment friendly
12. have high wear resistance and electrically non-conducting

## FITTING

Procedure for installation and removal of bearing/bush cut out of self-lubricating tube shall be easy and convenient. Fitting method/procedure shall be provided by the bidder. Interference fitting /press fit shall be preferred. Fitting by means of adhesive and/or mechanical joint is not acceptable.

## OTHERS

Catalogue/Leaflet introducing material, manufacturing & fitting method, chemical, physical and mechanical properties and test certificates in support of properties shall be submitted along with the offer. Technical requirements, i.e., L/D ratio, wall thickness etc. and calculation of tolerances on ID/OD & length as per manufacturer's recommendation shall be specifically mentioned along with the offer.

Self-lubricating bearing/bush will be cut in suitable lengths from the supplied tubes and will be machined at BHEL works to suit ID/OD as per BHEL's requirement. Accordingly, Bidder to note that tubes shall be supplied in rough machined condition with machining allowance to get the required functional size of bearing/bush. Size wise total requirement is given in meter in Annexure-I. Tubes may be supplied in lengths of 0.9 m to 1.2 m to meet the total requirement. Permissible variation in quantity shall be (+) 10% in total length for each size.

Bidder is to furnish finish dimensions with tolerance at ID & OD of the tubes cut in suitable pieces to suit the given shaft and housing dimensions as per Annexure-III.

Filled in checklist as per Annexure-IV is to be enclosed with the offer.

**INSPECTION & TESTING**

Inspection and testing shall be carried out in presence of BHEL-Bhopal/BHEL appointed third party. The bidder, after receipt of order, shall furnish the inspection and testing procedure, QAP/ datasheets for due approval from BHEL. Bidder is to furnish all above required documents along with the bid/offer for review and evaluation.

**PACKING**

Items shall be supplied in suitable packed condition to avoid any physical damage during transit. Special precaution notations such as Fragile, weight, Owner's particulars, purchase number etc. shall be clearly marked on the package together with other details as per purchase order. The packing should be suitable such that equipment may be stored in a covered shed for long periods before installation.

**ANNUAL ESTIMATED REQUIREMENT**

Annual estimated requirement covering the sleeve type self-lubricating tube for various sizes of butterfly valves listed in Annexure-I, which can be clubbed as below –

Annual Estimated Requirement (Quantity wise) – 150 meter

Annual Estimated Requirement (Value Wise) – 6-8 Lakhs

Above figures are tentative and showing the bulk requirement which can vary at later stage before finalization of ordering. Bulk requirement may not be ordered at once as ordering can be need based.

## Annexure-I

Following are the sizes and quantity (in meters) required for sleeve type self-lubricating tubes in length of 0.9 m to 1.2 m to meet the below mentioned item wise total requirement-

S.No.	Description		Quantity (in meter)
	ID (in mm)	OD (in mm)	
1	235	285	4
2	215	255	8
3	190	240	6
4	185	225	4
5	155	195	18
6	140	180	6
7	125	160	2
8	105	145	4
9	85	120	8
10	75	110	8
11	65	95	30
12	55	85	4
13	50	80	18
14	40	75	30

Note –

- Permissible variation in quantity shall be (+) 10% in total length for each size.
- Tubes are to be supplied in rough machined condition.
- Comments on adequacy of wall thickness of offered material w.r.t as mentioned above & functional dimensions in Annexure-III.
- Quarter turn operation of BF valve (fully open to fully close & vice-versa) takes : 20-60 seconds

(For BHEL's Enquiry ref. \_\_\_\_\_ dated \_\_\_\_\_ due on \_\_\_\_\_)

Authorized Signature \_\_\_\_\_

Date \_\_\_\_\_

Name & Address of Bidder \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(Stamp of Supplier)

## Annexure-II

Filled in property datasheet as mentioned below shall be submitted along with the offer for the offered self-lubricating bearing/bush material. Test certificates in support of filled in data are to be compulsorily enclosed.

PROPERTY	UNIT	VALUE
Compressive Strength (Min)	Mpa	
Normal Working Strength (Min)	Mpa	
Compressive Yield (Max)	%	
Compressive Strength at Yield	Mpa	
Tensile Strength	Mpa	
Shear Strength	Mpa	
Density	g/cm <sup>3</sup>	
Brinell hardness	BHN	
Water Swell	@Operating temperature	
Coefficient of friction	In dry/wet condition	
Max. Operating Temperature	°C	
Coefficient of thermal Expansion	/°C	
Weight per meter	Kg per meter	
Any other property felt necessary by bidder		

(For BHEL's Enquiry ref. \_\_\_\_\_ dated \_\_\_\_\_ due on \_\_\_\_\_)

Authorized Signature \_\_\_\_\_

Date \_\_\_\_\_

Name & Address of Bidder \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(Stamp of Supplier)

**Annexure-III**

Filled in dimensions as required below are to be mentioned by bidder with offer-

S No	Housing		Shaft		Length of Bush	Machining Dimension of Bush**			
	Dia	Tolerance	Dia	Tolerance		OD	Tolerance	ID	Tolerance
1	280	+0.07 +0.00	250	-0.04 -0.08	180				
2	250	+0.05 +0.00	220	-0.04 -0.08	160				
3	230	+0.07 +0.00	200	-0.04 -0.08	145				
4	280	+0.05 +0.00	250	-0.04 -0.08	100				
5	218	+0.07 +0.00	190	-0.05 -0.1	135				
6	190	+0.04 +0.00	160	-0.04 -0.08	120				
7	175	+0.07 +0.00	145	-0.04 -0.07	90				
8	155	+0.05 +0.00	130	-0.04 -0.08	100				
9	141	+0.04 +0.00	96	-0.04 -0.08	75				
10	130	+0.04 +0.00	110	-0.04 -0.08	50				
11	112	+0.04 +0.00	92	-0.03 -0.07	70				
12	104	+0.04 +0.00	84	-0.03 -0.07	60				
13	86	+0.03 +0.00	71	-0.03 -0.06	50				
14	90	+0.04 +0.00	76	-0.03 -0.06	48				
16	85	+0.04 +0.00	71	-0.03 -0.06	40				
17	71	+0.03 +0.00	56	-0.03 -0.06	40				
18	65	+0.03 +0.00	50	-0.02 -0.05	35				
19	77	+0.03 +0.00	62	-0.03 -0.06	40				

\*All Dimensions are in mm.

\*\* To be filled in by bidder

(For BHEL's Enquiry ref. \_\_\_\_\_ dated \_\_\_\_\_ due on \_\_\_\_\_)

Authorized Signature \_\_\_\_\_

Date \_\_\_\_\_

(Stamp of Supplier)

**CHECKLIST**

(To be filled in &amp; enclosed with the offer)

Ref.: BHEL Enquiry No. \_\_\_\_\_ dated \_\_\_\_\_ due on \_\_\_\_\_

Date \_\_\_\_\_

S.No.	Description	STATUS/CHECK	
		YES	NO
1	Bidder is OEM and attached relevant documents		
2	Documents w.r.t. qualification criteria enclosed		
3	Material as per enquiry and the specification		
4	Dimensions as per enquiry and the specification		
5	TCs for self-lubricating tubes called in enquiry furnished		
6	Descriptive Literature & Catalogue giving properties enclosed		
7	Ref. list for successful operation of offered material in India for similar application for 5 years enclosed		
8	Recommendation/Method for bush fitting enclosed		
9	Bush tolerance calculation method/procedure enclosed with sample calculation for Annexure-III		
10	Comments on adequacy of wall thickness of offered material w.r.t wall thickness as mentioned in Annexure-I & III enclosed		
11	Filled in Annexure-II,III & IV enclosed		
12	Deviation w.r.t. this specification clearly listed in separate sheet		

Authorized Signature \_\_\_\_\_

Date \_\_\_\_\_

Name &amp; Address of Bidder \_\_\_\_\_

\_\_\_\_\_

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(Stamp of Supplier)

Ref. No. of Bidder's Quotation \_\_\_\_\_

Date \_\_\_\_\_