

IDENT

ENG. DEPT -[]

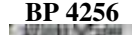
WRIPT-UP-ON -* FUNCTION - [] * IMPORT-JUSTIFICATION [N]

DOCUMENT ENCLOSED

*** EMERGENCY INDENT JUSTIFICATION[N] * C.D.C. PROFORMA[N]**

3062791	DEPT	421
SHRI SINGIREN E. KANDULNA	PH NO	2772

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<div>BP 4256</div> <div></div>	<div>BHARAT HEAVY ELECTRICALS LIMITED</div> <div>BHOPAL</div> <div><div>Fresh Indent</div><div>FOR ENQUIRY</div></div>	INDENT		BUY SEC	ORG DATE IF AMD
		NO 242150095	DATE 06/08/25	75	

2	1	3	259300	NO	35.000	06/01/27		1.00	0	0	3
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TR4632447005			800KV,1600A RIP BUSHING	800KV,1600A RIP BUSHING AS PER TECH. SPEC. NO. BCE/PS/800/58
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2	1	4	259300	NO	10.000	06/01/27		1.00	0	0	3
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2	1	4	259300	NO	10.000	06/01/27		1.00	0	0	3
TR4632397016						420KV,2500A RIP BUSHING	420KV,2500A RIP BUSHING AS PER TECH. SPEC. NO. BCE/PS/420/59				

3	1	1	W	64222A52001	1	15.000	212	06012027	*****		XXXXXXXX	0.00
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POWER GRID CORP												
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3	1	2	W	64218A52001	1	15.000	212	06012027	*****		XXXXXXXX	0.00
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PGCIL 765 KV TR												
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3	1	3	W	63237A52001	1	35.000	212	06012027	*****		XXXXXXXX	0.00
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NTTPP 3X800 MW												
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3	1	4	W	63237A47301	1	10.000	212	06012027	*****		XXXXXXXX	0.00
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NTTPP 3X800 MW												
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REMARKS: .												
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EXISTING PO												
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**** R2 (0000002000 TO 0000020000) Values Rs. in Lacs

ENG. DEPT -[]

WRIPT-UP-ON - * FUNCTION - [] * IMPORT-JUSTIFICATION [N] * EMERGENCY INDENT JUSTIFICATION[N] * C.D.C. PROFORMA[N]

DOCUMENT ENCLOSED

PREPARED BY												
3062791				DEPT	421							
SHRI SINGIREN E. KANDULNA				PH NO	2772							

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RPT-5



BHARAT HEAVY ELECTRICAL LIMITED, BHOPAL

SPECIFICATION CUM COMPLIANCE CERTIFICATE OF 800 kV RIP/RIS CONDENSER BUSHING

NAME & ADDRESS OF THE SUPPLIER :			
SCOPE: SUPPLY OF 800 kV, 2500A, CTL - 600mm RIP/RIS BUSHINGS WITH COMPOSITE POLYMER INSULATOR COMPLYING WITH THE SPECIFICATIONS AS BELOW :			
		Spec No. : BCE/PS/800/56, Rev00	
		Date : 21-12-2024	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
1.0	WORKPIECE MATERIAL		
1.1	Item :		
	Resin Impregnated Paper (RIP) / Resin Impregnated Synthetic (RIS) Condenser Bushing with composite polymer insulator suitable for operating in Seismic Zone I-III in India as per IS 1893 (Part-1).	Vendor to confirm	
2.0	SPECIFICATION :		
2.1.1	The electrical and mechanical characteristics of bushings shall be in accordance with IEC: 60137:2017 /DIN 42530	Vendor to confirm	
2.1.2	Bushings shall be robust and designed for adequate cantilever strength to meet the requirement of seismic condition, substation layout and movement along with the spare transformer with bushing erected and provided with proper support from one foundation to another foundation within the substation area.	Vendor to confirm	
2.2	Valid type test reports as per IEC:60137 (2017) for similar 800 kV RIP/RIS bushings , conducted within last 7(seven) years prior to the date of bid opening shall be submitted alongwith the bid.	Vendor to confirm and submit the test reports alongwith the bid	

		Spec No. : BCE/PS/800/56, Rev00 Date : 21-12-2024	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.2.1	The type tests conducted earlier should have either been conducted in an accredited laboratory (accredited based on ISO/ IEC Guide 25/ 17025 or EN 45001 by the national accreditation body of the country where laboratory is located) or witnessed by client / third party.	Vendor to confirm	
2.2.2	Type Tests reports should include Seismic and Snap Back Test.	Vendor to confirm	
2.2.3	In case valid type test report as mentioned under Sr. Nos. 2.2,2.2.1 & 2.2.2 above is not available, then vendor has to conduct type test in presence of BHEL / Customer representative before delivery of first lot , at no extra cost.	Vendor to confirm	
2.3	The bidder may to offer composite silicon rubber insulator, conforming to IEC-61462.	Vendor to confirm	
2.3.1	The hollow silicone composite insulators shall comply with the requirements of the IEC publications IEC 61462 and the relevant parts of IEC 62217.	Vendor to confirm	
2.3.2	The design of the composite insulators shall be tested and verified according to IEC 61462 (Type & Routine test).	Vendor to confirm	
2.3.3	Polymer / composite insulator shall be seamless sheath of a silicone rubber compound.	Vendor to confirm	
2.3.4	The housing & weather sheds should have silicon content of minimum 30% by weight.	Vendor to confirm	

		Spec No. : BCE/PS/800/56, Rev00 Date : 21-12-2024	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.3.5	It should protect the bushing against environmental influences, external pollution and humidity.	Vendor to confirm	
2.3.6	It shall be extruded or directly moulded on the core.	Vendor to confirm	
2.3.7	The interface between the housing and the core must be uniform and without voids.	Vendor to confirm	
2.3.8	The strength of the bond shall be greater than the tearing strength of the polymer.	Vendor to confirm	
2.3.9	The manufacturer shall follow non-destructive technique (N.D.T.) to check the quality of jointing of the housing interface with the core.	Vendor to confirm	
2.3.10	The weather sheds of the insulators shall be of alternate shed profile as per IS/ IEC 60815-3 The weather sheds shall be vulcanized to the sheath (extrusion process) or moulded as part of the sheath (injection moulding process) and free from imperfections.	Vendor to confirm	
2.3.11	The vulcanization for extrusion process shall be at high temperature and for injection moulding shall be at high temperature & high pressure.	Vendor to confirm	
2.3.12	Any seams / burrs protruding axially along the insulator, resulting from the injection moulding process shall be removed completely without causing any damage to the housing.	Vendor to confirm	

		Spec No. : BCE/PS/800/56, Rev00 Date : 21-12-2024	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.3.13	The track resistance of housing and shed material shall be class 1A4.5 according to IEC 60587.	Vendor to confirm	
2.3.14	The strength of the weather shed to sheath interface shall be greater than the tearing strength of the polymer.	Vendor to confirm	
2.3.15	The composite insulator shall be capable of high pressure washing.	Vendor to confirm	
2.4	When operating at normal rated voltage there shall be no electric discharge between the conductors and bushing which would cause corrosion or injury to conductors, insulators or supports by the formation of substances produced by chemical action.	Vendor to confirm	
2.5	No radio interference shall be caused by the bushings when operating at the normal rated voltage. All surfaces of the metal parts shall be perfectly smooth with the projecting points or irregularities which may cause corona.	Vendor to confirm	
2.6	End fittings shall be free from cracks, seams, shrinks, air holes and rough edges.	Vendor to confirm	
2.7	End fittings should be effectively, sealed to prevent moisture ingress, effectiveness of sealing system must be supported by test documents.	Vendor to confirm	
2.8	All load bearing surfaces shall be smooth and uniform so as to distribute the loading stresses uniformly.	Vendor to confirm	
2.9	Clamps and fittings shall be of hot dip galvanised/stainless steel.	Vendor to confirm	

		Spec No. : BCE/PS/800/56, Rev00 Date : 21-12-2024	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.10	Each bushing should be supplied with bushing handling and lifting tools.	Vendor to confirm. List to submitted with offer.	
2.11	Bushings of identical current and voltage ratings must be interchangeable.	Vendor to confirm	
2.12	Oil End dimensions to match as per drg. no. <u>BCE-4-1491</u> attached at <u>Annexure-I.</u>	Vendor to confirm	
2.13	Supplier to submit their Quality Plan for review by BHEL.	Vendor to confirm	
2.14	Corona Shield shall be provided at 800KV Bushing terminal (Air End) to minimise corona.	Vendor to confirm	
2.15	Bushing shall be specially packed to avoid any damage during transit and suitable for long storage, with non-returnable packing wooden boxes with hinged type cover. Without any gap between wooden planks. Packing Box opening cover with nails/screws type packing arrangement shall not be acceptable.	Vendor to Confirm	
2.16	Detail method for storage of bushing including accessories shall be brought out in the instruction manual.	Vendor to Confirm	
2.17	Tan delta measurement at variable frequency (in the range of 20 Hz to 350 Hz in the multiple of 17Hz with applied voltage 2KV-5KV) shall be carried out on each bushing at bushing manufacturing works as routine test before dispatch and the result shall be compared at site during commissioning to verify the healthiness of the bushing. No temperature correction factor shall be applicable for tan delta.	Vendor to Confirm	

			Spec No. : BCE/PS/800/56, Rev00	
			Date : 21-12-2024	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT		SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.18	Tan delta value of RIP/RIS condenser bushing shall be 0.004 (max) measured at ambient temperature. The measured tan delta value at site of in service bushing should not exceed by 0.001 w.r.t factory results during warranty period.		Vendor to Confirm	
2.19	If within the warrantee period the bushing Tan delta goes beyond 0.004 or increase is more than 0.001 in case of in service bushing at site, the supplier shall arrange to replace the defective bushing by new one free of cost.		Vendor to Confirm	
3.0	Technical Parameters			
3.1	Rated Voltage	800 kV	Vendor to Confirm	
3.2	Rated Current (Min.)	2500 A	Vendor to Confirm	
3.3	Lightning impulse withstand voltage	2100 kVp	Vendor to Confirm	
3.4	Switching impulse withstand voltage	1550 kVp	Vendor to Confirm	
3.5	One minute power frequency withstand voltage	970 kVrms	Vendor to Confirm	
3.6	Minimum total creepage distances	31 mm/kV	Vendor to Confirm	
3.7	Tan delta of bushings	≤ 0.004	Vendor to Confirm	
3.8	Max partial discharge level at Um	$< 10 \text{ pC}$	Vendor to Confirm	
3.9	Test tap voltage withstand level	2 kVrms	Vendor to Confirm	
3.10	Corona Extinction Voltage	508 kV rms	Vendor to Confirm	
3.11	Oil end length excluding bottom terminal & shield (mm)	1955mm	Vendor to Confirm	
3.12	Air EndTerminal dia. & Length (mm)	Dia = 60mm, Length = 125mm	Vendor to Confirm	

			Spec No. : BCE/PS/800/56, Rev00	
			Date : 21-12-2024	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT		SPECIFIED / TO BE CONFIRMED BY	REMARKS
3.13	Oil End max. dia. (mm)	528 mm	Vendor to Confirm	
3.14	Flange, PCD	12 holes,dia. 32 mm equally spaced on PCD 711 mm. Diameter 780mm	Vendor to Confirm	
3.15	CT space min.	600 mm	Vendor to Confirm	
3.16	Type of Lead	Solid Stem.Bottom connected	Vendor to Confirm	
3.17	No of holes,depth of bolt & hole diameter for oil end terminal	6 nos, depth = 20mm, hole dia = 12mm	Vendor to Confirm	
3.18	Oil End Shield diameter(max)	420mm	Vendor to Confirm	
3.19	Fixing hardware for transformer lead	Matching with the bushing bottom connector	Vendor to Confirm & Supply	
4.0	DOCUMENTATION : Following documents in English language should be submitted along with the bid for our evaluation.		Vendor to Confirm	
4.1	OGA Drawing		Vendor to submit	
4.2	Type test reports		Vendor to submit	
4.3	Instruction manual		Vendor to submit	
4.4	Quality Plan		Vendor to submit	
5.0	ROUTINE TEST INSPECTION:		Vendor to confirm	

		Spec No. : BCE/PS/800/56, Rev00	
		Date : 21-12-2024	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
5.1	Routine tests to be conducted on all bushings as per IEC 60137:2017. The routine tests may be witnessed by BHEL/customer/TPIA at supplier's works.	Vendor to confirm	



Prepared By:
Singiren.E.Kandulna
Manager (BCE)



Approved By:
Mahendra Kurre
AGM (BCE & MRX)

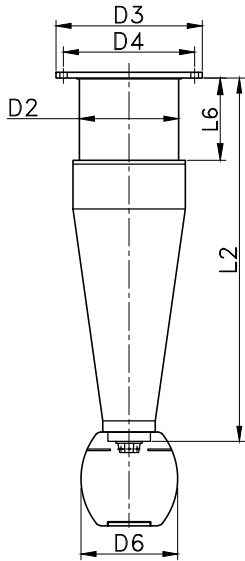
THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED.
IT MUST NOT TO BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

REF. DRG. NO. -

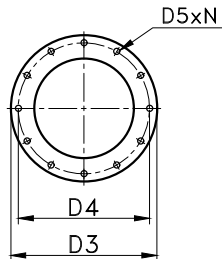
SING. AND DATE -

INVENTORY NO. -

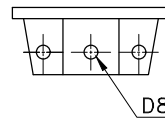
OIL END DETAILS



MOUNTING FLANGE DETAILS



BOTTOM CONNECTION DETAILS



DESCRIPTION	420kV	800kV
BIL kVp	1425 1550(for GT)	2100
Creepage Distance (mm) (min.)	13020	24800
Current Rating (A)	2500	2500
Type of lead	Solid Stem(SS)	Solid Stem(SS)

DIMENSION DETAILS:-

SYMBOL	DESCRIPTION	420kV	800kV
L2±5	Length between bottom seat of flange & bottom of the oil end shield/stress relieving electrode /oil end terminal whichever is the longest.	1335	1955
L6(min)	Length for accommodating bushing current transformer (BCT)	600	600
D2(max)	Maximum diameter of oil immersed end	350	528
D3±2	Outside diameter of fixing flange	480	780
D4±1(PCD)	Pitch circle diameter of fixing holes of flange	430	711
D5xN	Diameter of fixing hole & Number of fixing holes	20x8	32x12
D6(max)	Maximum diameter of oil end shield/stress relieving electrode	350	420
D8	Diameter of hole for oil end terminal	Ø12	Ø12
No. of holes and depth of bolt for Oil End Terminal		6,20	6,20
Diameter of Air End Terminal		Ø60	Ø60
Length of Air End Terminal		125	125

NOTES:- 1. ALL DIMENSION ARE IN M.M.
2. NO POSITIVE TOL. WHERE MAX. DIMENSION SPECIFIED
AND NO NEG. TOL. WHERE MIN. DIMENSION IS SPECIFIED.



BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SING.	DATE	NO.OF VAR.
DRN.	PRADEEP	Sd/-	10.08.22	-
CKD.	BRM/SEK	Sd/-	10.08.22	
APPD.	M.KURRE	Sd/-	10.08.22	

DEPT. BCE	CODE OF TOL. DIM. C/M/F		SCALE NTS	WEIGHT (KG) -	REF. TO ASSY. DRG. --	ITEM NO. -	NO.OF ITEMS -
CODE 421							
TITLE					DRAWING NO.	REV.	
STD. DIMN. FOR 420kV-2500A & 800kV-2500A OIP CONDENSER BUSHINGS (LOWER PORTION)					BCE-4-1491	00	
					SHEET NO. 01	NO. OF SHEETS 01	



BHARAT HEAVY ELECTRICAL LIMITED, BHOPAL

SPECIFICATION CUM COMPLIANCE CERTIFICATE OF 800 kV RIP/RIS CONDENSER BUSHING

NAME & ADDRESS OF THE SUPPLIER :			
SCOPE: SUPPLY OF 800 kV, 2000A, CTL - 600mm RIP/RIS BUSHINGS WITH COMPOSITE POLYMER INSULATOR COMPLYING WITH THE SPECIFICATIONS AS BELOW :			
		Spec No. : BCE/PS/800/57, Rev00 Date : 01-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
1.0	WORKPIECE MATERIAL		
1.1	Item :		
	Resin Impregnated Paper (RIP) / Resin Impregnated Synthetic (RIS) Condenser Bushing with composite polymer insulator suitable for operating in Seismic Zone I-III in India as per IS 1893 (Part-1).	Vendor to confirm	
2.0	SPECIFICATION :		
2.1.1	The electrical and mechanical characteristics of bushings shall be in accordance with IEC: 60137:2017 /DIN 42530	Vendor to confirm	
2.1.2	Bushings shall be robust and designed for adequate cantilever strength to meet the requirement of seismic condition, substation layout and movement along with the spare transformer with bushing erected and provided with proper support from one foundation to another foundation within the substation area.	Vendor to confirm	
2.2	Valid type test reports as per IEC:60137 (2017) for similar 800 kV RIP/RIS bushings , conducted within last 7(seven) years prior to the date of bid opening shall be submitted alongwith the bid.	Vendor to confirm and submit the test reports alongwith the bid	

		Spec No. : BCE/PS/800/57, Rev00 Date : 01-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.2.1	The type tests conducted earlier should have either been conducted in an accredited laboratory (accredited based on ISO/ IEC Guide 25/ 17025 or EN 45001 by the national accreditation body of the country where laboratory is located) or witnessed by client / third party.	Vendor to confirm	
2.2.2	Type Tests reports should include Seismic and Snap Back Test.	Vendor to confirm	
2.2.3	In case valid type test report as mentioned under Sr. Nos. 2.2,2.2.1 & 2.2.2 above is not available, then vendor has to conduct type test in presence of BHEL / Customer representative before delivery of first lot , at no extra cost.	Vendor to confirm	
2.3	The bidder may to offer composite silicon rubber insulator, conforming to IEC-61462.	Vendor to confirm	
2.3.1	The hollow silicone composite insulators shall comply with the requirements of the IEC publications IEC 61462 and the relevant parts of IEC 62217.	Vendor to confirm	
2.3.2	The design of the composite insulators shall be tested and verified according to IEC 61462 (Type & Routine test).	Vendor to confirm	
2.3.3	Polymer / composite insulator shall be seamless sheath of a silicone rubber compound.	Vendor to confirm	
2.3.4	The housing & weather sheds should have silicon content of minimum 30% by weight.	Vendor to confirm	

		Spec No. : BCE/PS/800/57, Rev00 Date : 01-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.3.5	It should protect the bushing against environmental influences, external pollution and humidity.	Vendor to confirm	
2.3.6	It shall be extruded or directly moulded on the core.	Vendor to confirm	
2.3.7	The interface between the housing and the core must be uniform and without voids.	Vendor to confirm	
2.3.8	The strength of the bond shall be greater than the tearing strength of the polymer.	Vendor to confirm	
2.3.9	The manufacturer shall follow non-destructive technique (N.D.T.) to check the quality of jointing of the housing interface with the core.	Vendor to confirm	
2.3.10	The weather sheds of the insulators shall be of alternate shed profile as per IS/ IEC 60815-3 The weather sheds shall be vulcanized to the sheath (extrusion process) or moulded as part of the sheath (injection moulding process) and free from imperfections.	Vendor to confirm	
2.3.11	The vulcanization for extrusion process shall be at high temperature and for injection moulding shall be at high temperature & high pressure.	Vendor to confirm	
2.3.12	Any seams / burrs protruding axially along the insulator, resulting from the injection moulding process shall be removed completely without causing any damage to the housing.	Vendor to confirm	

		Spec No. : BCE/PS/800/57, Rev00 Date : 01-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.3.13	The track resistance of housing and shed material shall be class 1A4.5 according to IEC 60587.	Vendor to confirm	
2.3.14	The strength of the weather shed to sheath interface shall be greater than the tearing strength of the polymer.	Vendor to confirm	
2.3.15	The composite insulator shall be capable of high pressure washing.	Vendor to confirm	
2.4	When operating at normal rated voltage there shall be no electric discharge between the conductors and bushing which would cause corrosion or injury to conductors, insulators or supports by the formation of substances produced by chemical action.	Vendor to confirm	
2.5	No radio interference shall be caused by the bushings when operating at the normal rated voltage. All surfaces of the metal parts shall be perfectly smooth with the projecting points or irregularities which may cause corona.	Vendor to confirm	
2.6	End fittings shall be free from cracks, seams, shrinks, air holes and rough edges.	Vendor to confirm	
2.7	End fittings should be effectively, sealed to prevent moisture ingress, effectiveness of sealing system must be supported by test documents.	Vendor to confirm	
2.8	All load bearing surfaces shall be smooth and uniform so as to distribute the loading stresses uniformly.	Vendor to confirm	
2.9	Clamps and fittings shall be of hot dip galvanised/stainless steel.	Vendor to confirm	

		Spec No. : BCE/PS/800/57, Rev00 Date : 01-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.10	Each bushing should be supplied with bushing handling and lifting tools.	Vendor to confirm. List to submitted with offer.	
2.11	Bushings of identical current and voltage ratings must be interchangeable.	Vendor to confirm	
2.12	Oil End dimensions to match as per drg. no. <u>BCE-4-1491</u> attached at <u>Annexure-I.</u>	Vendor to confirm	
2.13	Supplier to submit their Quality Plan for review by BHEL.	Vendor to confirm	
2.14	Corona Shield shall be provided at 800KV Bushing terminal (Air End) to minimise corona.	Vendor to confirm	
2.15	Bushing shall be specially packed to avoid any damage during transit and suitable for long storage, with non-returnable packing wooden boxes with hinged type cover. Without any gap between wooden planks. Packing Box opening cover with nails/screws type packing arrangement shall not be acceptable.	Vendor to Confirm	
2.16	Detail method for storage of bushing including accessories shall be brought out in the instruction manual.	Vendor to Confirm	
2.17	Tan delta measurement at variable frequency (in the range of 20 Hz to 350 Hz in the multiple of 17Hz with applied voltage 2KV-5KV) shall be carried out on each bushing at bushing manufacturing works as routine test before dispatch and the result shall be compared at site during commissioning to verify the healthiness of the bushing. No temperature correction factor shall be applicable for tan delta.	Vendor to Confirm	

			Spec No. : BCE/PS/800/57, Rev00	
			Date : 01-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT		SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.18	Tan delta value of RIP/RIS condenser bushing shall be 0.004 (max) measured at ambient temperature. The measured tan delta value at site of in service bushing should not exceed by 0.001 w.r.t factory results during warranty period.		Vendor to Confirm	
2.19	If within the warrantee period the bushing Tan delta goes beyond 0.004 or increase is more than 0.001 in case of in service bushing at site, the supplier shall arrange to replace the defective bushing by new one free of cost.		Vendor to Confirm	
3.0	Technical Parameters			
3.1	Rated Voltage	800 kV	Vendor to Confirm	
3.2	Rated Current (Min.)	2000 A	Vendor to Confirm	
3.3	Lightning impulse withstand voltage	2100 kVp	Vendor to Confirm	
3.4	Switching impulse withstand voltage	1550 kVp	Vendor to Confirm	
3.5	One minute power frequency withstand voltage	970 kVrms	Vendor to Confirm	
3.6	Minimum total creepage distances	31 mm/kV	Vendor to Confirm	
3.7	Tan delta of bushings	≤ 0.004	Vendor to Confirm	
3.8	Max partial discharge level at Um	$< 10 \text{ pC}$	Vendor to Confirm	
3.9	Test tap voltage withstand level	2 kVrms	Vendor to Confirm	
3.10	Corona Extinction Voltage	508 kV rms	Vendor to Confirm	
3.11	Oil end length excluding bottom terminal & shield (mm)	1955mm	Vendor to Confirm	
3.12	Air EndTerminal dia. & Length (mm)	Dia = 60mm, Length = 125mm	Vendor to Confirm	

			Spec No. : BCE/PS/800/57, Rev00	
			Date : 01-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT		SPECIFIED / TO BE CONFIRMED BY	REMARKS
3.13	Oil End max. dia. (mm)	528 mm	Vendor to Confirm	
3.14	Flange, PCD	12 holes,dia. 32 mm equally spaced on PCD 711 mm. Diameter 780mm	Vendor to Confirm	
3.15	CT space min.	600 mm	Vendor to Confirm	
3.16	Type of Lead	Solid Stem.Bottom connected	Vendor to Confirm	
3.17	No of holes,depth of bolt & hole diameter for oil end terminal	6 nos, depth = 20mm, hole dia = 12mm	Vendor to Confirm	
3.18	Oil End Shield diameter(max)	420mm	Vendor to Confirm	
3.19	Fixing hardware for transformer lead	Matching with the bushing bottom connector	Vendor to Confirm & Supply	
4.0	DOCUMENTATION : Following documents in English language should be submitted along with the bid for our evaluation.		Vendor to Confirm	
4.1	OGA Drawing		Vendor to submit	
4.2	Type test reports		Vendor to submit	
4.3	Instruction manual		Vendor to submit	
4.4	Quality Plan		Vendor to submit	
5.0	ROUTINE TEST INSPECTION:		Vendor to confirm	

		Spec No. : BCE/PS/800/57, Rev00 Date : 01-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
5.1	Routine tests to be conducted on all bushings as per IEC 60137:2017. The routine tests may be witnessed by BHEL/customer/TPIA at supplier's works.	Vendor to confirm	



Prepared By:
Singiren.E.Kandulna
Manager (BCE)



Approved By:
Mahendra Kurre
AGM (BCE & MRX)

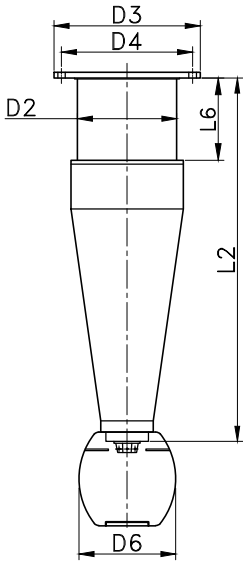
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IT MUST NOT TO BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

REF. DRG. NO. -

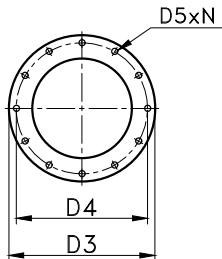
SING. AND DATE -

INVENTORY NO. -

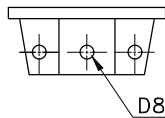
OIL END DETAILS



MOUNTING FLANGE DETAILS



BOTTOM CONNECTION DETAILS



DESCRIPTION	420kV	800kV
BIL kVp	1425 1550(for GT)	2100
Creepage Distance (mm) (min.)	13020	24800
Current Rating (A)	2500	2500
Type of lead	Solid Stem(SS)	Solid Stem(SS)

DIMENSION DETAILS:-

SYMBOL	DESCRIPTION	420kV	800kV
L2±5	Length between bottom seat of flange & bottom of the oil end shield/stress relieving electrode /oil end terminal whichever is the longest.	1335	1955
L6(min)	Length for accommodating bushing current transformer (BCT)	600	600
D2(max)	Maximum diameter of oil immersed end	350	528
D3±2	Outside diameter of fixing flange	480	780
D4±1(PCD)	Pitch circle diameter of fixing holes of flange	430	711
D5xN	Diameter of fixing hole & Number of fixing holes	20x8	32x12
D6(max)	Maximum diameter of oil end shield/stress relieving electrode	350	420
D8	Diameter of hole for oil end terminal	Ø12	Ø12
No. of holes and depth of bolt for Oil End Terminal		6,20	6,20
Diameter of Air End Terminal		Ø60	Ø60
Length of Air End Terminal		125	125

NOTES:- 1. ALL DIMENSION ARE IN M.M.
2. NO POSITIVE TOL. WHERE MAX. DIMENSION SPECIFIED
AND NO NEG. TOL. WHERE MIN. DIMENSION IS SPECIFIED.



BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SING.	DATE	NO.OF VAR.
DRN.	PRADEEP	Sd/-	10.08.22	-
CKD.	BRM/SEK	Sd/-	10.08.22	
APPD.	M.KURRE	Sd/-	10.08.22	

DEPT. BCE	CODE OF TOL. DIM. C/M/F		SCALE NTS	WEIGHT (KG) -	REF. TO ASSY. DRG. --	ITEM NO. -	NO.OF ITEMS -
CODE 421							
TITLE					DRAWING NO.	REV.	
STD. DIMN. FOR 420kV-2500A & 800kV-2500A OIP CONDENSER BUSHINGS (LOWER PORTION)					BCE-4-1491	00	
					SHEET NO. 01	NO. OF SHEETS 01	



BHARAT HEAVY ELECTRICAL LIMITED, BHOPAL

SPECIFICATION CUM COMPLIANCE CERTIFICATE OF 800 kV RIP CONDENSER BUSHING

NAME & ADDRESS OF THE SUPPLIER :			
SCOPE: SUPPLY OF 800 kV, 1600A, CTL - 600mm RIP BUSHINGS WITH COMPOSITE POLYMER INSULATOR COMPLYING WITH THE SPECIFICATIONS AS BELOW :			
		Spec No. : BCE/PS/800/58, Rev00	
		Date : 06-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
1.0	WORKPIECE MATERIAL		
1.1	Item :		
	Resin Impregnated Paper (RIP) Condenser Bushing with composite polymer insulator as per IEC 60137 (2017).	Vendor to confirm	
2.0	SPECIFICATION :		
2.1.1	The electrical and mechanical characteristics of bushings shall be in accordance with IEC: 60137:2017 /DIN 42530	Vendor to confirm	
2.1.2	Bushings shall be robust and designed for adequate cantilever strength to meet the requirement of seismic condition, substation layout and movement along with the spare transformer with bushing erected and provided with proper support from one foundation to another foundation within the substation area.	Vendor to confirm	
2.2	Valid type test reports as per IEC:60137 (2017) for similar 800 kV RIP bushings , conducted within last 7(seven) years prior to the date of bid opening shall be submitted alongwith the bid.	Vendor to confirm and submit the test reports alongwith the bid	

		Spec No. : BCE/PS/800/58, Rev00 Date : 06-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.2.1	The type tests conducted earlier should have either been conducted in an accredited laboratory (accredited based on ISO/ IEC Guide 25/ 17025 or EN 45001 by the national accreditation body of the country where laboratory is located) or witnessed by client / third party.	Vendor to confirm	
2.2.2	In case valid type test report as mentioned under Sr. Nos. 2.2 & 2.2.1 above is not available, then vendor has to conduct type test in presence of BHEL / Customer representative before delivery of first lot , at no extra cost.	Vendor to confirm	
2.3	The bidder may to offer composite silicon rubber insulator, conforming to IEC-61462.	Vendor to confirm	
2.3.1	The hollow silicone composite insulators shall comply with the requirements of the IEC publications IEC 61462 and the relevant parts of IEC 62217.	Vendor to confirm	
2.3.2	The design of the composite insulators shall be tested and verified according to IEC 61462 (Type & Routine test).	Vendor to confirm	
2.3.3	Polymer / composite insulator shall be seamless sheath of a silicone rubber compound.	Vendor to confirm	
2.3.4	The housing & weather sheds should have silicon content of minimum 30% by weight.	Vendor to confirm	
2.3.5	It should protect the bushing against environmental influences, external pollution and humidity.	Vendor to confirm	

		Spec No. : BCE/PS/800/58, Rev00 Date : 06-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.3.6	It shall be extruded or directly moulded on the core.	Vendor to confirm	
2.3.7	The interface between the housing and the core must be uniform and without voids.	Vendor to confirm	
2.3.8	The strength of the bond shall be greater than the tearing strength of the polymer.	Vendor to confirm	
2.3.9	The manufacturer shall follow non-destructive technique (N.D.T.) to check the quality of jointing of the housing interface with the core.	Vendor to confirm	
2.3.10	The weather sheds of the insulators shall be of alternate shed profile as per IS/ IEC 60815-3 The weather sheds shall be vulcanized to the sheath (extrusion process) or moulded as part of the sheath (injection moulding process) and free from imperfections.	Vendor to confirm	
2.3.11	The vulcanization for extrusion process shall be at high temperature and for injection moulding shall be at high temperature & high pressure.	Vendor to confirm	
2.3.12	Any seams / burrs protruding axially along the insulator, resulting from the injection moulding process shall be removed completely without causing any damage to the housing.	Vendor to confirm	
2.3.13	The track resistance of housing and shed material shall be class 1A4.5 according to IEC 60587.	Vendor to confirm	

		Spec No. : BCE/PS/800/58, Rev00 Date : 06-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.3.14	The strength of the weather shed to sheath interface shall be greater than the tearing strength of the polymer.	Vendor to confirm	
2.3.15	The composite insulator shall be capable of high pressure washing.	Vendor to confirm	
2.4	When operating at normal rated voltage there shall be no electric discharge between the conductors and bushing which would cause corrosion or injury to conductors, insulators or supports by the formation of substances produced by chemical action.	Vendor to confirm	
2.5	No radio interference shall be caused by the bushings when operating at the normal rated voltage. All surfaces of the metal parts shall be perfectly smooth with the projecting points or irregularities which may cause corona.	Vendor to confirm	
2.6	End fittings shall be free from cracks, seams, shrinks, air holes and rough edges.	Vendor to confirm	
2.7	End fittings should be effectively, sealed to prevent moisture ingress, effectiveness of sealing system must be supported by test documents.	Vendor to confirm	
2.8	All load bearing surfaces shall be smooth and uniform so as to distribute the loading stresses uniformly.	Vendor to confirm	
2.9	Clamps and fittings shall be of hot dip galvanised/stainless steel.	Vendor to confirm	
2.10	Each bushing should be supplied with bushing handling and lifting tools.	Vendor to confirm. List to submitted with offer.	

		Spec No. : BCE/PS/800/58, Rev00 Date : 06-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.11	Bushings of identical current and voltage ratings must be interchangeable.	Vendor to confirm	
2.12	Oil End dimensions to match as per drg. no. <u>BCE-4-1491</u> attached at <u>Annexure-I.</u>	Vendor to confirm	
2.13	Supplier to submit their Quality Plan for review by BHEL.	Vendor to confirm	
2.14	Corona Shield shall be provided at 800KV Bushing terminal (Air End) to minimise corona.	Vendor to confirm	
2.15	Bushing shall be specially packed to avoid any damage during transit and suitable for long storage, with non-returnable packing wooden boxes with hinged type cover. Without any gap between wooden planks. Packing Box opening cover with nails/screws type packing arrangement shall not be acceptable.	Vendor to Confirm	
2.16	Detail method for storage of bushing including accessories shall be brought out in the instruction manual.	Vendor to Confirm	
2.17	Tan delta measurement at variable frequency (in the range of 20 Hz to 350 Hz in the multiple of 17Hz with applied voltage 2KV-5KV) shall be carried out on each bushing at bushing manufacturing works as routine test before dispatch and the result shall be compared at site during commissioning to verify the healthiness of the bushing. No temperature correction factor shall be applicable for tan delta.	Vendor to Confirm	

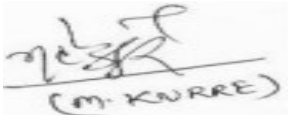
			Spec No. : BCE/PS/800/58, Rev00	
			Date : 06-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT		SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.18	Tan delta value of RIP condenser bushing shall be 0.004 (max) measured at ambient temperature. The measured tan delta value at site of in service bushing should not exceed by 0.001 w.r.t factory results during warranty period.		Vendor to Confirm	
2.19	If within the warrantee period the bushing Tan delta goes beyond 0.004 or increase is more than 0.001 in case of in service bushing at site, the supplier shall arrange to replace the defective bushing by new one free of cost.		Vendor to Confirm	
3.0	Technical Parameters			
3.1	Rated Voltage	800 kV	Vendor to Confirm	
3.2	Rated Current (Min.)	1600 A	Vendor to Confirm	
3.3	Lightning impulse withstand voltage	2100 kVp	Vendor to Confirm	
3.4	Switching impulse withstand voltage	1550 kVp	Vendor to Confirm	
3.5	One minute power frequency withstand voltage	970 kVrms	Vendor to Confirm	
3.6	Minimum total creepage distances	31 mm/kV	Vendor to Confirm	
3.7	Tan delta of bushings	≤ 0.004	Vendor to Confirm	
3.8	Max partial discharge level at Um	$< 10 \text{ pC}$	Vendor to Confirm	
3.9	Test tap voltage withstand level	2 kVrms	Vendor to Confirm	
3.10	Corona Extinction Voltage	508 kV rms	Vendor to Confirm	
3.11	Oil end length excluding bottom terminal & shield (mm)	1955mm	Vendor to Confirm	
3.12	Air EndTerminal dia. & Length (mm)	Dia = 60mm, Length = 125mm	Vendor to Confirm	

			Spec No. : BCE/PS/800/58, Rev00	
			Date : 06-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT		SPECIFIED / TO BE CONFIRMED BY	REMARKS
3.13	Oil End max. dia. (mm)	528 mm	Vendor to Confirm	
3.14	Flange, PCD	12 holes,dia. 32 mm equally spaced on PCD 711 mm. Diameter 780mm	Vendor to Confirm	
3.15	CT space min.	600 mm	Vendor to Confirm	
3.16	Type of Lead	Solid Stem.Bottom connected	Vendor to Confirm	
3.17	No of holes,depth of bolt & hole diameter for oil end terminal	6 nos, depth = 20mm, hole dia = 12mm	Vendor to Confirm	
3.18	Oil End Shield diameter(max)	420mm	Vendor to Confirm	
3.19	Fixing hardware for transformer lead	Matching with the bushing bottom connector	Vendor to Confirm & Supply	
3.20	Short time current withstand rating	63kA for 1 sec	Vendor to Confirm & Supply	
4.0	DOCUMENTATION : Following documents in English language should be submitted along with the bid for our evaluation.		Vendor to Confirm	
4.1	OGA Drawing		Vendor to submit	
4.2	Type test reports		Vendor to submit	
4.3	Instruction manual		Vendor to submit	
4.4	Quality Plan		Vendor to submit	

		Spec No. : BCE/PS/800/58, Rev00 Date : 06-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
5.0	ROUTINE TEST INSPECTION:	Vendor to confirm	
5.1	Routine tests to be conducted on all bushings as per IEC 60137:2017. The routine tests may be witnessed by BHEL/customer/TPIA at supplier's works.	Vendor to confirm	



Prepared By:
Singiren.E.Kandulna
Manager (BCE)



Approved By:
Mahendra Kurre
AGM (BCE & MRX)

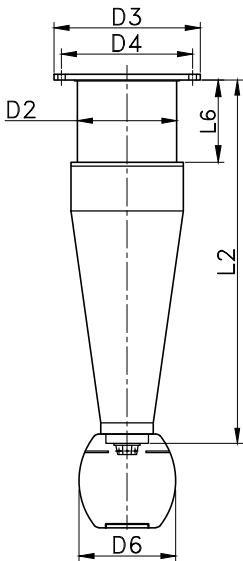
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REF. DRG. NO. -

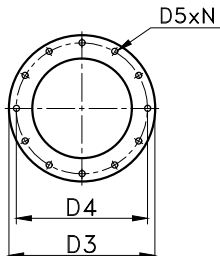
SING. AND DATE -

INVENTORY NO. -

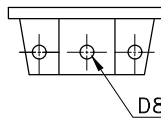
OIL END DETAILS



MOUNTING FLANGE DETAILS



BOTTOM CONNECTION DETAILS



DESCRIPTION	420kV	800kV
BIL kVp	1425 1550(for GT)	2100
Creepage Distance (mm) (min.)	13020	24800
Current Rating (A)	2500	2500
Type of lead	Solid Stem(SS)	Solid Stem(SS)

DIMENSION DETAILS:-

SYMBOL	DESCRIPTION	420kV	800kV
L2±5	Length between bottom seat of flange & bottom of the oil end shield/stress relieving electrode /oil end terminal whichever is the longest.	1335	1955
L6(min)	Length for accommodating bushing current transformer (BCT)	600	600
D2(max)	Maximum diameter of oil immersed end	350	528
D3±2	Outside diameter of fixing flange	480	780
D4±1(PCD)	Pitch circle diameter of fixing holes of flange	430	711
D5xN	Diameter of fixing hole & Number of fixing holes	20x8	32x12
D6(max)	Maximum diameter of oil end shield/stress relieving electrode	350	420
D8	Diameter of hole for oil end terminal	Ø12	Ø12
No. of holes and depth of bolt for Oil End Terminal		6,20	6,20
Diameter of Air End Terminal		Ø60	Ø60
Length of Air End Terminal		125	125

NOTES:- 1. ALL DIMENSION ARE IN M.M.
2. NO POSITIVE TOL. WHERE MAX. DIMENSION SPECIFIED
AND NO NEG. TOL. WHERE MIN. DIMENSION IS SPECIFIED.



BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SING.	DATE	NO.OF VAR.
DRN.	PRADEEP	Sd/-	10.08.22	-
CKD.	BRM/SEK	Sd/-	10.08.22	
APPD.	M.KURRE	Sd/-	10.08.22	

DEPT. BCE	CODE OF TOL. DIM. C/M/F		SCALE NTS	WEIGHT (KG) -	REF. TO ASSY. DRG. --	ITEM NO. -	NO.OF ITEMS -
CODE 421							
TITLE					DRAWING NO.	REV.	
STD. DIMN. FOR 420kV-2500A & 800kV-2500A OIP CONDENSER BUSHINGS (LOWER PORTION)					BCE-4-1491	00	
					SHEET NO. 01	NO. OF SHEETS 01	



BHARAT HEAVY ELECTRICAL LIMITED, BHOPAL

SPECIFICATION CUM COMPLIANCE CERTIFICATE OF 420 kV RIP CONDENSER BUSHING

NAME & ADDRESS OF THE SUPPLIER :

SCOPE: SUPPLY OF 420 kV, 2500A, CTL - 600mm RIP CONDENSER BUSHINGS COMPLYING WITH THE SPECIFICATIONS AS BELOW :			
		Spec No. : BCE/PS/420/59, Rev00 Date : 06-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
1.0	WORKPIECE MATERIAL		
1.1	Item :		
	Resin Impregnated Paper (RIP) Condenser Bushing with composite polymer housing as per IEC 60137 (2017).	Vendor to note	
2.0	SPECIFICATION :		
2.1.1	The electrical and mechanical characteristics of bushings shall be in accordance with IEC: 60137:2017 /DIN 42530	Vendor to confirm	
2.1.2	Bushings shall be robust and designed for adequate cantilever strength to meet the requirement of seismic condition, substation layout and movement along with the spare transformer with bushing erected and provided with proper support from one foundation to another foundation within the substation area.		
2.2	Valid type test reports as per IEC:60137 (2017) for similar 420 kV RIP bushings , conducted within last 7(seven) years prior to the date of bid opening shall be submitted alongwith the bid.	Vendor to confirm and submit the test reports alongwith the bid	

		Spec No. : BCE/PS/420/59, Rev00 Date : 06-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.2.1	The type tests conducted earlier should have either been conducted in an accredited laboratory (accredited based on ISO/ IEC Guide 25/ 17025 or EN 45001 by the national accreditation body of the country where laboratory is located) or witnessed by client / third party.	Vendor to confirm	
2.2.2	In case valid type test report as mentioned under Sr. Nos. 2.2 & 2.2.1 above is not available, then vendor has to conduct type test in presence of BHEL / Customer representative before delivery of first lot , at no extra cost to BHEL.	Vendor to confirm	
2.3	The bidder may also offer composite silicon rubber insulator, conforming to IEC- 61462.	Vendor to confirm	
2.3.1	The hollow silicone composite insulators shall comply with the requirements of the IEC publications IEC 61462 and the relevant parts of IEC 62217.	Vendor to confirm	
2.3.2	The design of the composite insulators shall be tested and verified according to IEC 61462 (Type & Routine test).	Vendor to confirm	
2.3.3	Polymer / composite insulator shall be seamless sheath of a silicone rubber compound.	Vendor to confirm	
2.3.4	The housing & weather sheds should have silicon content of minimum 30% by weight.	Vendor to confirm	
2.3.5	It should protect the bushing against environmental influences, external pollution and humidity.	Vendor to confirm	

		Spec No. : BCE/PS/420/59, Rev00 Date : 06-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.3.6	It shall be extruded or directly moulded on the core.	Vendor to confirm	
2.3.7	The interface between the housing and the core must be uniform and without voids.	Vendor to confirm	
2.3.8	The strength of the bond shall be greater than the tearing strength of the polymer.	Vendor to confirm	
2.3.9	The manufacturer shall follow non-destructive technique (N.D.T.) to check the quality of jointing of the housing interface with the core.	Vendor to confirm	
2.3.10	The weather sheds of the insulators shall be of alternate shed profile as per IS/ IEC 60815-3 The weather sheds shall be vulcanized to the sheath (extrusion process) or moulded as part of the sheath (injection moulding process) and free from imperfections.	Vendor to confirm	
2.3.11	The vulcanization for extrusion process shall be at high temperature and for injection moulding shall be at high temperature & high pressure.	Vendor to confirm	
2.3.12	Any seams / burrs protruding axially along the insulator, resulting from the injection moulding process shall be removed completely without causing any damage to the housing.	Vendor to confirm	
2.3.13	The track resistance of housing and shed material shall be class 1A4.5 according to IEC 60587.	Vendor to confirm	

		Spec No. : BCE/PS/420/59, Rev00 Date : 06-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.3.14	The strength of the weather shed to sheath interface shall be greater than the tearing strength of the polymer.	Vendor to confirm	
2.3.15	The composite insulator shall be capable of high pressure washing.	Vendor to confirm	
2.4	When operating at normal rated voltage there shall be no electric discharge between the conductors and bushing which would cause corrosion or injury to conductors, insulators or supports by the formation of substances produced by chemical action.	Vendor to confirm	
2.5	No radio interference shall be caused by the bushings when operating at the normal rated voltage. All surfaces of the metal parts shall be perfectly smooth with the projecting points or irregularities which may cause corona.	Vendor to confirm	
2.6	End fittings shall be free from cracks, seams, shrinks, air holes and rough edges.	Vendor to confirm	
2.7	End fittings should be effectively, sealed to prevent moisture ingress, effectiveness of sealing system must be supported by test documents.	Vendor to confirm	
2.8	All load bearing surfaces shall be smooth and uniform so as to distribute the loading stresses uniformly.	Vendor to confirm	
2.9	Clamps and fittings shall be of hot dip galvanised/stainless steel.	Vendor to confirm	
2.10	Each bushing should be supplied with bushing handling and lifting tools.	Vendor to confirm and submit list with offer.	

		Spec No. : BCE/PS/420/59, Rev00 Date : 06-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.11	Bushings of identical current and voltage ratings must be interchangeable.	Vendor to confirm	
2.12	Oil end dimensions to match as per drg. no. <u>BCE-4-1491</u> attached at <u>Annexure-I.</u>	Vendor to confirm	
2.13	Supplier to submit their Quality Plan for review by BHEL.	Vendor to confirm	
2.14	Bushing shall be specially packed to avoid any damage during transit and suitable for long storage, with non-returnable packing wooden boxes with hinged type cover. Without any gap between wooden planks. Packing Box opening cover with nails/screws type packing arrangement shall not be acceptable.	Vendor to Confirm	
2.15	Detail method for storage of bushing including accessories shall be brought out in the instruction manual.	Vendor to Confirm	
2.16	Tan delta measurement at variable frequency (in the range of 20 Hz to 350 Hz in the multiple of 17Hz with applied voltage 2KV-5KV) shall be carried out on each bushing at bushing manufacturing works as routine test before dispatch and the result shall be compared at site during commissioning to verify the healthiness of the bushing. No temperature correction factor shall be applicable for tan delta.	Vendor to Confirm	

			Spec No. : BCE/PS/420/59, Rev00	
			Date : 06-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT		SPECIFIED / TO BE CONFIRMED BY	REMARKS
2.17	Tan delta value of RIP condenser bushing shall be 0.004 (max) measured at ambient temperature. The measured tan delta value at site of in service bushing should not exceed by 0.001 w.r.t factory results during warranty period.		Vendor to Confirm	
2.18	If within the warrantee period the bushing Tan delta goes beyond 0.004 or increase is more than 0.001 in case of in service bushing at site, the supplier shall arrange to replace the defective bushing by new one free of cost.		Vendor to Confirm	
3.0	Technical Parameters			
3.1	Rated Voltage	420 kV	Vendor to Confirm	
3.2	Rated Current (Min.)	2500 A	Vendor to Confirm	
3.3	Lightning impulse withstand voltage	1425 kVp	Vendor to Confirm	
3.4	Switching impulse withstand voltage	1050 kVp	Vendor to Confirm	
3.5	One minute power frequency withstand voltage	695 kVrms	Vendor to Confirm	
3.6	Minimum total creepage distances	13020 mm (31 mm/kV)	Vendor to Confirm	
3.7	Tan delta of bushings	≤ 0.004	Vendor to Confirm	
3.8	Max partial discharge level at Um	$< 10 \text{ pC}$	Vendor to Confirm	
3.9	Test tap voltage withstand level	2 kVrms	Vendor to Confirm	
3.10	Corona Extinction Voltage	508 kV rms	Vendor to Confirm	
3.11	Oil end length excluding bottom terminal & shield (mm)	1335mm	Vendor to Confirm	
3.12	Air EndTerminal dia. & Length (mm)	Dia = 60mm, Length = 125mm	Vendor to Confirm	

			Spec No. : BCE/PS/420/59, Rev00	
			Date : 06-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT		SPECIFIED / TO BE CONFIRMED BY	REMARKS
3.13	Oil End max. dia. (mm)	350 mm	Vendor to Confirm	
3.14	Flange, PCD	8 holes,dia. 20 mm equally spaced on PCD 430 mm. Diameter 480mm	Vendor to Confirm	
3.15	CT space min.	600 mm	Vendor to Confirm	
3.16	Type of Lead	Solid Stem.Bottom connected	Vendor to Confirm	
3.17	No of holes,depth of bolt & hole diameter for oil end terminal	6 nos, depth = 20mm, hole dia = 12mm	Vendor to Confirm & Supply	
3.18	Oil End Shield diameter(max)	350mm	Vendor to Confirm & Supply	
3.19	Fixing hardware for transformer lead	Matching with the bushing bottom connector	Vendor to Confirm & Supply	
3.20	Short time current withstand rating	63kA for 1 sec	Vendor to Confirm & Supply	
4.0	DOCUMENTATION : Following documents in English language should be submitted along with the bid for our evaluation.		Vendor to Confirm	
4.1	OGA Drawing		Vendor to submit	
4.2	Type test reports		Vendor to submit	
4.3	Instruction manual		Vendor to submit	
4.4	Quality Plan		Vendor to submit	

		Spec No. : BCE/PS/420/59, Rev00 Date : 06-08-2025	
S.NO.	DESCRIPTION OF BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	REMARKS
5.0	ROUTINE TEST INSPECTION:	Vendor to confirm	
5.1	Routine tests to be conducted on all bushings as per IEC 60137:2017. The routine tests may be witnessed by BHEL/customer/TPIA at supplier's works.	Vendor to confirm	



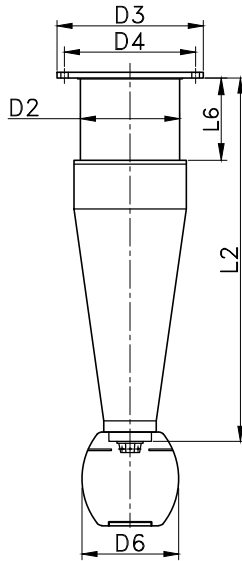
Prepared By:
Singiren.E.Kandulna
Manager (BCE)



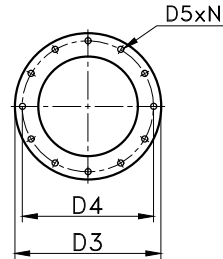
Approved By:
Mahendra Kurre
AGM (BCE & MRX)

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED.
IT MUST NOT TO BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

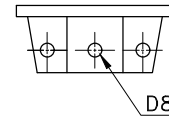
OIL END DETAILS



MOUNTING FLANGE DETAILS



BOTTOM CONNECTION DETAILS



DESCRIPTION	420kV	800kV
BIL kVp	1425 1550(for GT)	2100
Creepage Distance (mm) (min.)	13020	24800
Current Rating (A)	2500	2500
Type of lead	Solid Stem(SS)	Solid Stem(SS)

DIMENSION DETAILS:-

SYMBOL	DESCRIPTION	420kV	800kV
L2±5	Length between bottom seat of flange & bottom of the oil end shield/stress relieving electrode /oil end terminal whichever is the longest.	1335	1955
L6(min)	Length for accommodating bushing current transformer (BCT)	600	600
D2(max)	Maximum diameter of oil immersed end	350	528
D3±2	Outside diameter of fixing flange	480	780
D4±1(PCD)	Pitch circle diameter of fixing holes of flange	430	711
D5xN	Diameter of fixing hole & Number of fixing holes	20x8	32x12
D6(max)	Maximum diameter of oil end shield/stress relieving electrode	350	420
D8	Diameter of hole for oil end terminal	Ø12	Ø12
No. of holes and depth of bolt for Oil End Terminal		6,20	6,20
Diameter of Air End Terminal		Ø60	Ø60
Length of Air End Terminal		125	125

NOTES:- 1. ALL DIMENSION ARE IN M.M.
2. NO POSITIVE TOL. WHERE MAX. DIMENSION SPECIFIED
AND NO NEG. TOL. WHERE MIN. DIMENSION IS SPECIFIED.



BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SING.	DATE	NO.OF VAR.
DRN.	PRADEEP	Sd/-	10.08.22	
CKD.	BRM/SEK	Sd/-	10.08.22	-
APPD.	M.KURRE	Sd/-	10.08.22	

DEPT.	CODE OF TOL. DIM. C/M/F	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
BCE		NTS	-	--	-	-
CODE	421					
TITLE				DRAWING NO.		REV.
STD. DIMN. FOR 420kV-2500A & 800kV-2500A OIP CONDENSER BUSHINGS (LOWER PORTION)				BCE-4-1491		00
				SHEET NO.	01	NO. OF SHEETS 01

CHECKLIST FOR Purchase Indent

MMTCB:PI/CL Rev 03 DT. 26/10/2021

PI No: 242150095**Page 1 of 6**

Sl. No.	Check Point	Remarks (Yes / No / NA / Value / Percentage) / Strike off whichever is not applicable.
1.	Technical Specification:	
	a. Technical Specification & Latest revision of Drawing is enclosed. Please mention Drawing No./Specification No. If main drawing calls for some child drawing/specification, same also to be mentioned in checklist and submitted alongwith indent.	Yes
2	Delivery Requirement	
	a. Recommended delivery schedule in terms of number of days from PO. Lot-wise schedule also to be provided, if applicable. (Indentor must be careful in giving delivery schedule as offers giving deviation in delivery are bound to be rejected)	ITEM 1 & 2: 8 months from PO. ITEM 3 & 4: 18 months from PO.
3.	Quantity justification	
	a. In case of stock item – following details to be provided: (i) Annual requirement as per production plan (ii) Available stock including that on shop floor (iii) Pending supplies against already placed POs (iv) Quantity in running enquiry, if any	NA
	b. In case of WO specific item – following details to be provided: (i) Details of actual project requirement with respect to quantity already received. (ii) Planned delivery of job and planned cash collection	(i) Actual requirement As per PI Qty recd. = NIL (ii) ITEM 1 & 2: Q1: FY26-27 ITEM 3 & 4: Q1: FY27-28
	c. Do you wish to keep the NIT clause for ordering of quantity within $\pm 25\%$ of indented quantity (option given in GeM)	NA
	d. Tolerance applicable in supply of ordered quantity (if any)	NA
4.	Documents enclosed as per Nature of PI:	
	a. Emergency Certificate in designated format enclosed? (duly approved by HOD)	NA
	b. Single Tender Certificate in designated format enclosed? (duly approved by HOD)	NA
	c. Import Justification in designated format enclosed? (duly approved by HOD)	NA

CHECKLIST FOR Purchase Indent

MMTCB:PI/CL Rev 03 DT. 26/10/2021

PI No: 242150095**Page 2 of 6**

Sl. No.	Check Point	Remarks (Yes / No / NA / Value / Percentage) / Strike off whichever is not applicable.
	d. Customs duty applicability format enclosed?	NA
	e. Developmental/Trial PI: Supporting documents regarding justification for development of vendor Or MOM of MISCC meeting including details of quantity to be indented to be attached.	NA
	f. In case material falls within product profile of sister unit and the same is proposed to be procured from Non-BHEL source, HOU approval to be attached with indent.	NA
5.	Vendor List:	
	a. Correct PMD No. & Material Category indicated in PI?	YES
	b. Enquiry to be issued to all PMD vendors? – Not applicable in case of GEM tenders.	Open tender
	c. Any additional known sources, in addition to those in PMD, to be informed about NIT in case of GeM/open tender. Supplier name and Email ids to be mentioned.	NA
	d. Is customer's vendor list applicable? In case BHEL PMD vendor list has additional vendors other than those in Customer approved list, effort taken to include BHEL PMD vendors may please be recorded through supporting document/correspondence.	NA
	e. Customer approved vendor list is enclosed?	NA
	f. Is splitting of quantity among more than one vendor required? If so, ratio to be specified.	NA
	g. Is the quantity divisible among two or more vendors in case Make In India or MSE Purchase preference is to be applied? (Clause No 3A (b) and (c) of MII-PPO No. P-45021/2/2017-PP (BE-II) Dt. 4/7/2020 can be referred)	AS PER GOI GUIDELINES
	h. Is the offer to be accepted only from OEMs	NA
6.	Inspection Requirements:	
	a. No specific requirement. Inspection after receipt of material at BHEL?	NA
	b. Source Inspection by BHEL required?	NA
	c. Source inspection by TPIA required. If yes, QAP to be mandatorily enclosed. QAP No. may please be mentioned.	NA

CHECKLIST FOR Purchase Indent

MMTCB:PI/CL Rev 03 DT. 26/10/2021

PI No: 242150095***Page 3 of 6***

Sl. No.	Check Point	Remarks (Yes / No / NA / Value / Percentage) / Strike off whichever is not applicable.
	d. Joint Inspection by BHEL & Customer required?	Inspection by BHEL/Customer at Supplier's Works
	e. Joint inspection by Customer and TPIA required?	NA
	f. Customer approved QA plan is applicable? If yes, copy to be enclosed.	NA
	g. Any specific inspection requirement for Import items, to be clearly listed.	NA
7.	Documents required from Vendor: Documents required from vendor, along with offer, after PO placement and at the time of supply, to be clearly listed and indicated in PI (e.g. Test Certificates / Guarantee Certificate / QA Plan / Drawing / Information Booklet etc.)	
		<u>ALONGWITH OFFER:</u> • DRG + DATASHEET • LETTER OF CONFIRMATION FOR TOTAL COMPLIANCE TO TECHNICAL SPEC. WITHOUT ANY DEVIATION <u>AFTER PO:</u> • TEST CERTIFICATES • O&M MANUAL
8.	Basis of Estimation: Basis of PI Estimation given? (Previous PO of identical or similar item / Budgetary quote / Estimate calculations / First principle) – Please note – all estimates to be made based on FOR Destination and should mention GST component also.	
		Calculation from LPP of similar item.
	Reason for considering Budgetary offer for estimate preparation	
9.	Price Basis for PO a. Firm Price / PVC?	
		Firm
	b. In case of PVC, whether PVC formula / PVC factor base rate mentioned? <i>PVC formula and ratio can be mentioned here also. Also mention % content of all materials falling under PVC.</i>	NA
	c. PO to be placed on overall L1 basis Or Individual item L1 basis?	Individual
10.	Commissioning of Equipment / Payment Break-up: a. Whether Installation Commissioning And Testing by vendor is required?	
		NA
	b. If yes, please indicate the payment break-up below:	NA
	i) Payment to be done upon supply (%):	NA
	ii) Payment to be done after commissioning (%):	NA

CHECKLIST FOR Purchase Indent

MMTCB:PI/CL Rev 03 DT. 26/10/2021

PI No: 242150095**Page 4 of 6**

Sl. No.	Check Point	Remarks (Yes / No / NA / Value / Percentage) / Strike off whichever is not applicable.
	iii) Time frame for commissioning of equipment, after supply? (Balance payment will be released after this period)	NA
	c. Performance Bank Guarantee required?	NA
11.	Guarantee/Warranty Requirements:	
	Guarantee/Warranty requirements and period clearly specified – As per GeM STC / BHEL GTC / any other	As per BHEL GTC
12.	Delivery Destination	
	a. Material to site (GSOS)?	NA
	b. In case of GSOS, whether PI issued in 3 series?	NA
	c. Full consignee details and address given for all project sites?	NA
13.	Information with respect to Global Tender Enquiry restriction	
	Please provide date of submission of bid by TRS for the work order against which the item is proposed to be procured.	Submitted
	Is the item essentially with MII content of <20%	As per BHEL / Govt of India Policies
14.	GeM related information:	
	GeMAR & PTS report attached with indent (If availability report is submitted, same shall be procured through specific category available on GeM, otherwise custom bid to be adopted). If category does not exist, LIB number to be specified in the indent, In case exact category does not exist then can existing broad category be used with additional parameters	Submitted
15.	Additional Terms and Conditions for GEM – These are based on some standard templates available on GeM at https://gem.gov.in/additional-terms-and-conditions. Some or all of these criterion can be selected. Other ATCs may also be referred on GeM website and can be mentioned here for selection by Purchase Officer during preparation of NIT. Indentor may also provide their own PQR, if desired. Comments under check point column is only for guidance.	
	a. Bidder Annual Turn Over • Not Applicable - If customer approved Vendor List is applicable • Not Applicable – for small value items • Applicable for high value items. (As per GeM drop-down menu, bidder annual turnover is restricted to maximum 50% of bid estimation value. Indentor may choose any value between 0% to 50%)	Separate PQR attached.
	b. Average Annual Turn Over Of OEM • Not Applicable - If customer approved Vendor List is applicable	Separate PQR attached.

CHECKLIST FOR Purchase Indent

MMTCB:PI/CL Rev 03 DT. 26/10/2021

PI No: 242150095***Page 5 of 6***

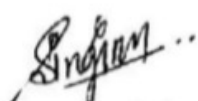
Sl. No.	Check Point	Remarks (Yes / No / NA / Value / Percentage) / Strike off whichever is not applicable.										
	<ul style="list-style-type: none"> • Not Applicable – for small value items • Applicable for high value items- PQR to be made as per Vigilance circular guidelines <p>This should be selected if item is to be necessarily procured through OEM only. (As per GeM drop-down menu, bidder annual turnover is restricted to maximum 400% of bid estimation value. Indentor may choose any value between 0% to 400%)</p>											
c.	Years of Past Experience required <ul style="list-style-type: none"> • Not Applicable - If customer approved Vendor List is applicable • 2 years or as per customer requirement 	Separate PQR attached.										
d.	Past Performance (% supply made to central/ state utilities/ PSUs/Public listed companies in the last 3 years) <ul style="list-style-type: none"> • Not Applicable - If customer approved Vendor List is applicable • For other cases <table border="1"> <thead> <tr> <th>Item Qty.</th><th>% Supply</th></tr> </thead> <tbody> <tr> <td>1 - 2</td><td>80%</td></tr> <tr> <td>3 - 4</td><td>50%</td></tr> <tr> <td>5 - 50</td><td>20%</td></tr> <tr> <td>>50</td><td>10%</td></tr> </tbody> </table>	Item Qty.	% Supply	1 - 2	80%	3 - 4	50%	5 - 50	20%	>50	10%	Separate PQR attached.
Item Qty.	% Supply											
1 - 2	80%											
3 - 4	50%											
5 - 50	20%											
>50	10%											
e.	Document required from seller - <ul style="list-style-type: none"> i) Experience Criteria - Yes/ No depending on point number 15.c) above, ii) Past Performance - Yes/ No depending on point number 15.d) above iii) Bidder Turnover - Yes/ No depending on point number 15. a & b above iv) Any other Certificate (As requested in ATC) - Yes/No, as per special conditions of Enquiry, if any v) OEM Authorization Certificate - Yes, if applicable vi) OEM Annual Turnover - Yes/ No depending on point number 15. a & b above 	Separate PQR attached.										
f.	Do You Want Comprehensive Maintenance Contract For This Bid?	No										
g.	Do You Want Annual Maintenance Contract For This Bid?	No										
h.	Material safety datasheet whether required or not	No										

CHECKLIST FOR Purchase Indent

MMTCB:PI/CL Rev 03 DT. 26/10/2021

PI No: 242150095***Page 6 of 6***

Sl. No.	Check Point	Remarks (Yes / No / NA / Value / Percentage) / Strike off whichever is not applicable.
i.	Any additional PQR to be added in ATC	Separate PQR attached.
j	Any relaxation in PQR to be provided under MII startup or MSE vendors.	No


Indent Initiator

Singiren .E. Kandulna
Sr. Manager / BCE

Sr. Manager / BCE


Indent Approver


Singiren Kandulna

PRE-QUALIFYING REQUIREMENT
(800KV 2500A/2000A RIP/RIS BUSHING)


DOC No -242150095/1&2

Sl. No.	Description	SUPPLIER REMARKS (Y/N)
1	The supplier should be either manufacturer of RIP/RIS bushings as per BHEL Enquiry OR their authorized representative. Authorized representative to submit authorization letter from the manufacturer as a documentary proof.	
2	Supplier should have supplied at least 5 nos. 800KV or higher voltage rating RIP/RIS Bushings within last 5 years from bid opening date. Supplier to submit copies of Purchase Order/Invoice in support of the same.	

Prepared by :


 (Singiren.E.Kandulna)
 Sr.Manager/BCE
 BHEL Bhopal

Approved by :


 (Kulamani Naik)
 SDGM / BCE
 BHEL Bhopal

PRE-QUALIFYING REQUIREMENT**(800KV 1600A RIP BUSHING)**

Doc No - 242150095/3

Sl. No.	Description	SUPPLIER REMARKS (Y/N)
1	The supplier should be either manufacturer of RIP bushings as per BHEL Enquiry <u>OR</u> their authorized representative. Authorized representative to submit authorization letter from the manufacturer as a documentary proof.	
2	Supplier should have supplied at least 5 nos. 800KV or higher voltage rating RIP Bushings within last 5 years from bid opening date. Supplier to submit copies of Purchase Order/Invoice in support of the same.	

Prepared by :



(Singiren.E.Kandulna)
Sr.Manager/BCE
BHEL Bhopal

Approved by :




(Kulamani Naik)
SDGM / BCE
BHEL Bhopal

PRE-QUALIFYING REQUIREMENT**(420KV 2500A RIP BUSHING)**


Doc No - 242150095 /4

Sl. No.	Description	SUPPLIER REMARKS (Y/N)
1	The supplier should be either manufacturer of RIP bushings as per BHEL Enquiry OR their authorized representative. Authorized representative to submit authorization letter from the manufacturer as a documentary proof.	
2	Supplier should have supplied at least 5 nos. 420KV,2500A or higher voltage/current rating RIP Bushings within last 5 years from bid opening date. Supplier to submit copies of Purchase Order/Invoice in support of the same.	

Prepared by :


 (Singiren.E.Kandulna)
 Sr.Manager/BCE
 BHEL Bhopal

Approved by :


 (Kulamani Naik)
 SDGM / BCE
 BHEL Bhopal



Report ID: GEM/GARPTS/07082025/NSZEBY6AQ79R

Report Name: 800KV RIP BUSHING

Generated By: Singiren Emmanuel Kandulna , Department of Heavy Industry , Ministry of Heavy Industries and Public Enterprises

Generated On: 07/08/2025

Valid till: 06/09/2025

GeM Availability Report and Past Transaction Summary

GeM Availability Report and past transaction summary report is generated based on the specifications searched by the Buyer. The specification may be modified appropriately for searching relevant categories on GeM. Buyer may navigate to GeM category page by clicking on the category link to view category specifications and products/services available in the category.

Order Count and Order Value displayed is on a cumulative basis since GeM inception.

1. Search String: 800KV RIP BUSHING

Search type: Product

1. There are categories available on GeM matching your requirements (as listed here). You can create a bid on GeM with a product closest matching your required specifications and add additional parameters in specifications through Corrigendum using RMS functionality.
2. If you feel that category TP needs updating you can submit category updating request also through RMS.
3. If you do not want to use any of the above option and want to proceed for procurement outside GeM, please suggest the specifications of the required product for creation of new category on GeM for future procurement.

Search Result: Category available/suggested on GeM but marked as "not matching requirements" by the buyer with undertaking as under:

It is certified that I have thoroughly checked all probable categories suggested by GeM and I am satisfied that the product required is not covered / does not fall in any of the suggested categories and can not be procured under any of these categories even after inclusion of List of Values(LOV) wherever possible in category specifications of suggested categories. It is also certified that the technical specification requirement are such that these can not be covered even by adding specification parameters using ATC in any of the GeM suggested categories. This is a one-time requirement hence new category creation is not proposed / or requirement is recurring but request for new category creation will be submitted separately post generation of GeMARPTS.

Category Name	Catalog Count	Order Count			Order Value (in Lakhs)		
		Direct Purchase	Reverse Auction	Bid	Direct Purchase	Reverse Auction	Bid
Carbon Bush	8	534	0	0	19	0	0
Commercial CPVC Pipe Fittings	2,941	51,388	845	1,231	1,846	67	356
Seam ripper	12	293	0	0	4	0	0
XLPE Cables for Working Voltages From 3.3 KV up to and Including 33 KV as per IS 7098 (Part 2)	1,943	1,596	133	634	3,275	4,792	15,861
domestic knives	115	2,136	2	20	84	0	4
Distribution Transformer, 3 Phase, 11 kV > 200 KVA up to and Including 2500 KVA	994	133	40	148	562	750	2,875

Category Name	Catalog Count	Order Count			Order Value (in Lakhs)		
		Direct Purchase	Reverse Auction	Bid	Direct Purchase	Reverse Auction	Bid
Xlpe Cables, Category C2 - FR - LSH, for Working Voltages From 3.3 KV up to and Including 33 KV as per IS 7098 (Part 2)	491	111	11	67	143	309	1,900
Ultra low temperature laboratory deep freezer	20,526	2,711	73	278	7,540	644	3,455
Squeegee Washer Wiper Mopper (V2)	16,051	65,565	359	1,206	5,618	178	229
LED Display System	3,074	2,408	162	274	5,336	4,820	7,907



Report ID: GEM/GARPTS/07082025/X17ODSU4BQLJ

Report Name: 420KV RIP BUSHING

Generated By: Singiren Emmanuel Kandulna , Department of Heavy Industry , Ministry of Heavy Industries and Public Enterprises

Generated On: 07/08/2025

Valid till: 06/09/2025

GeM Availability Report and Past Transaction Summary

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Search type: Product

1. There are categories available on GeM matching your requirements (as listed here). You can create a bid on GeM with a product closest matching your required specifications and add additional parameters in specifications through Corrigendum using RMS functionality.
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Category Name	Catalog Count	Order Count			Order Value (in Lakhs)		
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Carbon Bush	8	534	0	0	19	0	0
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Commercial CPVC Pipe Fittings	2,941	51,388	845	1,231	1,846	67	356
Seam ripper	12	293	0	0	4	0	0
domestic knives	115	2,136	2	20	84	0	4

Category Name	Catalog Count	Order Count			Order Value (in Lakhs)		
		Direct Purchase	Reverse Auction	Bid	Direct Purchase	Reverse Auction	Bid
Distribution Transformer, 3 Phase, 11 kV > 200 KVA up to and Including 2500 KVA	994	133	40	148	562	750	2,875
XLPE Cables, Category C2 - FR - LSH, for Working Voltages From 3.3 KV up to and Including 33 KV as per IS 7098 (Part 2)	491	111	11	67	143	309	1,900
Non-Contact High Voltage Detector	317	161	11	87	115	12	119
Porcelain Insulators for Overhead Power Lines with A Nominal Voltage Greater than 1000 V as per IS 731	378	826	10	120	631	14	180
XLPE Cables, Category C1 - FR, for Working Voltages from 3.3 KV up to and Including 33 KV as per IS 7098 (Part 2)	177	63	5	39	96	66	584