Bid Number/बोली क्रमांक (बिड संख्या): GEM/2024/B/5522901
Dated/दिनांक : 23-10-2024

Bid Document/ बिड दस्तावेज़

Bid Details/बिड विवरण	
Bid End Date/Time/बिड बंद होने की तारीख/समय	04-11-2024 13:00:00
Bid Opening Date/Time/बिड खुलने की तारीख/समय	04-11-2024 13:30:00
Bid Offer Validity (From End Date)/बिड पेशकश वैधता (बंद होने की तारीख से)	90 (Days)
Ministry/State Name/मंत्रालय/राज्य का नाम	Ministry Of Heavy Industries And Public Enterprises
Department Name/विभाग का नाम	Department Of Heavy Industry
Organisation Name/संगठन का नाम	Bharat Heavy Electricals Limited (bhel)
Office Name/कार्यालय का नाम	10090001-edn Bangalore
Total Quantity/कुल मात्रा	55
Item Category/मद केटेगरी	REED RELAY 3 FORM A CONTACTS (BHEL Material code: CC0695012487) , Climatic Test Charges for Reed Relay (BHEL code: CC0695012495)
GeMARPTS में खोजी गई स्ट्रिंग / Searched Strings used in GeMARPTS	Reed Relay 3 Form A contacts
GeMARPTS में खोजा गया परिणाम / Searched Result generated in GeMARPTS	Category not available on GeM for the text string uploaded by the buyer
अधिसूचना के लिए चयनित प्रासंगिक श्रेणियाँ / Relevant Categories selected for notification	• Relay Module • Voltage Monitor Relay • CONTACTOR RELAY
MSE Exemption for Years of Experience and Turnover/ अनुभव के वर्षों से एमएसई छूट	No
Startup Exemption for Years of Experience and Turnover/ अनुभव के वर्षों से स्टार्टअप छूट	No
Document required from seller/विक्रेता से मांगे गए दस्तावेज़	Additional Doc 1 (Requested in ATC) *In case any bidder is seeking exemption from Experience / Turnover Criteria, the supporting documents to prove his eligibility for exemption must be uploaded for evaluation by the buyer
Do you want to show documents uploaded by bidders to all bidders participated in bid?/	No
Bid to RA enabled/बिड से रिवर्स नीलामी सक्रिय किया	No

Bid Details/बिड विवरण	
ITC available to buyer/क्रेता के लिए उपलब्ध आईटीसी	Yes
Type of Bid/बिड का प्रकार	Two Packet Bid
Primary product category	REED RELAY 3 FORM A CONTACTS (BHEL Material code: CC0695012487)
Time allowed for Technical Clarifications during technical evaluation/तकनीकी मूल्यांकन के दौरान तकनीकी स्पष्टीकरण हेतु अनुमत समय	2 Days
Inspection Required (By Empanelled Inspection Authority / Agencies pre-registered with GeM)	No
Payment Timelines	Payments shall be made to the Seller within **90** days of issue of consignee receipt-cum-acceptance certificate (CRAC) and on-line submission of bills (This is in supersession of 10 days time as provided in clause 12 of GeM GTC)
Evaluation Method/मूल्यांकन पद्धति	Total value wise evaluation
Arbitration Clause	No
Mediation Clause	No

EMD Detail/ईएमडी विवरण

Required/आवश्यकता	No

ePBG Detail/ईपीबीजी विवरण

Required/आवश्यकता	No

MII Purchase Preference/एमआईआई खरीद वरीयता

MII Purchase Preference/एमआईआई खरीद वरीयता	No

MSE Purchase Preference/एमएसई खरीद वरीयता

MSE Purchase Preference/एमएसई खरीद वरीयता	Yes

1. Purchase preference will be given to MSEs having valid Udyam Registration and whose credentials are validated online through Udyam Registration portal as defined in Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012 dated 23.03.2012 issued by Ministry of Micro, Small and Medium Enterprises and its subsequent Orders/Notifications issued by concerned Ministry. If the bidder wants to avail themselves of the Purchase preference, the bidder must be the manufacturer / OEM of the offered product on GeM. Traders are

excluded from the purview of Public Procurement Policy for Micro and Small Enterprises and hence resellers offering products manufactured by some other OEM are not eligible for any purchase preference. In respect of bid for Services, the bidder must be the Service provider of the offered Service. Relevant documentary evidence in this regard shall be uploaded along with the bid in respect of the offered product or service and Buyer will decide eligibility for purchase preference based on documentary evidence submitted, while evaluating the bid. If L-1 is not an MSE and MSE Seller (s) has / have quoted price within L-1+ 15% (Selected by Buyer) of margin of purchase preference /price band defined in relevant policy, such MSE Seller shall be given opportunity to match L-1 price and contract will be awarded for 25% (selected by Buyer) percentage of total quantity. The buyers are advised to refer the OM No. F.1/4/2021-PPD dated 18.05.2023 OM_No.1_4_2021_PPD_dated_18.05.2023 for compliance of Concurrent application of Public Procurement Policy for Micro and Small Enterprises Order, 2012 and Public Procurement (Preference to Make in India) Order, 2017. Benefits of MSE will be allowed only if seller is validated on-line in GeM profile as well as validated and approved by Buyer after evaluation of documents submitted.
2. Estimated Bid Value indicated above is being declared solely for the purpose of guidance on EMD amount and for determining the Eligibility Criteria related to Turn Over, Past Performance and Project / Past Experience etc. This has no relevance or bearing on the price to be quoted by the bidders and is also not going to have any impact on bid participation. Also this is not going to be used as a criteria in determining reasonableness of quoted prices which would be determined by the buyer based on its own assessment of reasonableness and based on competitive prices received in Bid / RA process.

REED RELAY 3 FORM A CONTACTS (BHEL Material Code: CC0695012487) (54 pieces)

Technical Specifications/तकनीकी विशिष्टियाँ

Buyer Specification Document/क्रेता विशिष्टि दस्तावेज़	Download

Input Tax Credit(ITC)/इनपुट कर क्रेडिट(आईटीसी) and/ तथा Reverse Charge(RCM)/रिवर्स प्रभार (आरसीएम) Details

ITC on GST/जीएसटी पर इनपुट कर क्रेडिट	ITC on GST Cess/जीएसटी उपकर कर क्रेडिट
100%	NA

Consignees/Reporting Officer/परेषिती/रिपोर्टिंग अधिकारी and/ तथा Quantity/मात्रा

S.No./क्र. सं.	Consignee Reporting/Officer/ परेषिती/रिपोर्टिंग अधिकारी	Address/पता	Quantity/मात्रा	Delivery Days/डिलीवरी के दिन
1	Dinesh Kumar Bhagat	560026,MANAGER STORES,- GI Bharat Heavy Electricals Limited Electronics Division, Mysore Road, Bangalore - 560026 Karnataka India	54	30

Climatic Test Charges For Reed Relay (BHEL Code: CC0695012495) (1 pieces)

Technical Specifications/तकनीकी विशिष्टियाँ

Buyer Specification Document/क्रेता विशिष्टि दस्तावेज़	Download

Input Tax Credit(ITC)/इनपुट कर क्रेडिट(आईटीसी) and/ तथा Reverse Charge(RCM)/रिवर्स प्रभार (आरसीएम) Details

ITC on GST/जीएसटी पर इनपुट कर क्रेडिट	ITC on GST Cess/जीएसटी उपकर कर क्रेडिट
100%	NA

Consignees/Reporting Officer/परेषिती/रिपोर्टिंग अधिकारी and/ तथा Quantity/मात्रा

S.No./क्र. सं.	Consignee Reporting/Officer/ परेषिती/रिपोर्टिंग अधिकारी	Address/पता	Quantity/मात्रा	Delivery Days/डिलीवरी के दिन
1	Dinesh Kumar Bhagat	560026,MANAGER STORES,- GI Bharat Heavy Electricals Limited Electronics Division, Mysore Road, Bangalore - 560026 Karnataka India	1	30

Buyer Added Bid Specific Terms and Conditions/क्रेता द्वारा जोड़ी गई बिड की विशेष शर्तें

1. **Scope of Supply**

   Scope of supply (Bid price to include all cost components) : Only supply of Goods

2. **Generic**

   OPTION CLAUSE: The Purchaser reserves the right to increase or decrease the quantity to be ordered up to 25 percent of bid quantity at the time of placement of contract. The purchaser also reserves the right to increase the ordered quantity by up to 25% of the contracted quantity during the currency of the contract at the contracted rates. Bidders are bound to accept the orders accordingly.

3. **Generic**

   Data Sheet of the product(s) offered in the bid, are to be uploaded along with the bid documents. Buyers can match and verify the Data Sheet with the product specifications offered. In case of any unexplained mismatch of technical parameters, the bid is liable for rejection.

4. **Generic**

   Bidders are advised to check applicable GST on their own before quoting. Buyer will not take any responsibility in this regards. GST reimbursement will be as per actuals or as per applicable rates (whichever is lower), subject to the maximum of quoted GST %.

5. **Generic**

Supplier shall ensure that the Invoice is raised in the name of Consignee with GSTIN of Consignee only.

6. **Generic**

   While generating invoice in GeM portal, the seller must upload scanned copy of GST invoice and the screenshot of GST portal confirming payment of GST.

7. **Buyer Added Bid Specific ATC**

   Buyer Added text based ATC clauses

   A. Payment Timelines:

Type of Bidder	**Payment Terms (Number of days)**
Micro & Small Enterprises (MSEs)	45 days from CRAC date
Medium Enterprises	60 days from CRAC date
Non MSME	90 days from CRAC date

   B. Contact Details:

Engineering Dept.	**Tender Dept.**
Ms. C M Kavitha/ Sr. Manager	Mr. Dinesh Kumar Bhagat/ Manager
e-mail: kavithacm@bhel.in	e-mail: dkbhagat@bhel.in
Tel: 080 26998196	Tel: 080 26998108

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Disclaimer/अस्वीकरण

The additional terms and conditions have been incorporated by the Buyer after approval of the Competent Authority in Buyer Organization, whereby Buyer organization is solely responsible for the impact of these clauses on the bidding process, its outcome, and consequences thereof including any eccentricity / restriction arising in the bidding process due to these ATCs and due to modification of technical specifications and / or terms and conditions governing the bid. If any clause(s) is / are incorporated by the Buyer regarding following, the bid and resultant contracts shall be treated as null and void and such bids may be cancelled by GeM at any stage of bidding process without any notice:-

1. Definition of Class I and Class II suppliers in the bid not in line with the extant Order / Office Memorandum issued by DPIIT in this regard.
2. Seeking EMD submission from bidder(s), including via Additional Terms & Conditions, in contravention to exemption provided to such sellers under GeM GTC.
3. Publishing Custom / BOQ bids for items for which regular GeM categories are available without any Category item bunched with it.
4. Creating BoQ bid for single item.
5. Mentioning specific Brand or Make or Model or Manufacturer or Dealer name.
6. Mandating submission of documents in physical form as a pre-requisite to qualify bidders.
7. Floating / creation of work contracts as Custom Bids in Services.
8. Seeking sample with bid or approval of samples during bid evaluation process. (However, in bids for attached categories, trials are allowed as per approved procurement policy of the buyer nodal Ministries)
9. Mandating foreign / international certifications even in case of existence of Indian Standards without specifying equivalent Indian Certification / standards.
10. Seeking experience from specific organization / department / institute only or from foreign / export experience.

11. Creating bid for items from irrelevant categories.
12. Incorporating any clause against the MSME policy and Preference to Make in India Policy.
13. Reference of conditions published on any external site or reference to external documents/clauses.
14. Asking for any Tender fee / Bid Participation fee / Auction fee in case of Bids / Forward Auction, as the case may be.

Further, if any seller has any objection/grievance against these additional clauses or otherwise on any aspect of this bid, they can raise their representation against the same by using the Representation window provided in the bid details field in Seller dashboard after logging in as a seller within 4 days of bid publication on GeM. Buyer is duty bound to reply to all such representations and would not be allowed to open bids if he fails to reply to such representations.

This Bid is also governed by the General Terms and Conditions/ यह बिड सामान्य शर्तों के अंतर्गत भी शासित है

In terms of GeM GTC clause 26 regarding Restrictions on procurement from a bidder of a country which shares a land border with India, any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority. While participating in bid, Bidder has to undertake compliance of this and any false declaration and non-compliance of this would be a ground for immediate termination of the contract and further legal action in accordance with the laws./जेम की सामान्य शर्तों के खंड 26 के संदर्भ में भारत के साथ भूमि सीमा साझा करने वाले देश के बिडर से खरीद पर प्रतिबंध के संबंध में भारत के साथ भूमि सीमा साझा करने वाले देश का कोई भी बिडर इस निविदा में बिड देने के लिए तभी पात्र होगा जब वह बिड देने वाला सक्षम प्राधिकारी के पास पंजीकृत हो।बिड में भाग लेते समय बिडर को इसका अनुपालन करना होगा और कोई भी गलत घोषणा किए जाने व इसका अनुपालन न करने पर अनुबंध को तत्काल समाप्त करने और कानून के अनुसार आगे की कानूनी कार्रवाई का आधार होगा।

---Thank You/धन्यवाद---

BHEL Material Code: CC0695012487

Material Description: Reed Relay 3 Form A contacts

Reed Relays (3 Contact of magnetic Reed Type Form-A), 24VDC current sensitive, contact rated at 0.5A, 24VDC with socket OMRON PL11. Reed Relay

Spec as per NPCIL Spec No. PC-E-585.

NPCIL approved QAP to be followed and sample QAP as per BHEL Purchase Spec No-PS/3.2.5.3/471/36.

A copy of test procedures, datasheets and test certificates to be furnished to BHEL for NPCIL approval.

Qty Break Up: 52 Nos + 1 No for Climatic test + 1 No type test as per QAP.

PURCHASE SPECIFICATION

FOR

Current Sensitive Reed Relays

For

KAPP-3 and KAPP-4

Of

Nuclear Power Corporation of India Limited

Revision:00	APPROVED BY : S K RANGANATH		
	PREPARED D.V.V.R	ISSUED ENGG	DATE 05-08-2013

REVISION HISTORY SHEET

Rev No.	DATE	Nature of change	REASON	PREPARED BY	APPROVED BY
00	05-08-2013	First Issue	As per NPCIL specification.	DVVR	SKR

Revision:00 Date:05-08-2013	APPROVED BY : S K RANGANATH		
	PREPARED D.V.V.R	ISSUED ENGG	DATE 05-08-2013

TABLE OF CONTENTS/ATTACHMENTS

S. No	DESCRIPTION	PAGE NO.
1	Purchase Requisition	4 of 10
2	Bill Of Quantities	8 of 10
3	Applicable Specifications & Drawings	
3.1	List of Technical Specification (Enclosed)	9 of 10
3.2	List of Tender Drawings(Not Applicable)	-
3.3	Addendum/Corrigendum, Changes/Modifications in Specifications(Enclosed)	10 of 10
3.4	Acceptable Deviations (Not Applicable)	-

1.0 INTRODUCTION

Nuclear Power Corporation of India Limited (a Govt. of India Enterprises) is setting up a 2x700MWe Power Project at Karakarpar in Gujurat and Rawatbhata in Rajasthan. BHEL-EDn is executing the Control Centre Instrumentation Package(CCIP) of KAPP-3 &4 and RAPP-7&8 projects.

2.0 INTENT OF PURCHASE SPECIFICATION

This purchase specification is intended to specify the requirements of Design, Engineering and Manufacture, Quality Assurance, Type, Routine and Acceptance Testing at Manufacture's Works/Third Party Inspection, Supply, Packing & Forwarding, Transportation and Safe Delivery of Current Sensitive Reed Relays at BHEL-EDn, conforming to NPCIL Specifications, drawing and guarantee of offered items as a part of this project.

The vendor has to confirm in writing his complete compliance with this MR and associated technical specification. If the vendor has any queries regarding specifications, it is his responsibility to get the same clarified from the purchaser before submitting the offer. If during approval stage any deficiency is found in the equipment offered, vendor has to provide the additional required component (if any) or make necessary modifications to comply with the specifications, without any cost and time implications to us.

Vendors shall be fully responsible for the supplied item. The compliance to this specification does not absolve the vendor of his responsibility towards contractual obligations with regards to completeness, proper selection, satisfactory operation and maintenance.

Item supplied shall be of proven quality both with respect to design and materials. Prototype item of an experimental nature shall not be offered or supplied. The system shall have well proved system records.

In the event of any conflict with the specifications, datasheets, related standards, codes etc. the vendor shall refer the matter to the purchaser for the clarification and only after obtaining the approval/concurrence from the Purchaser vendor should proceed with the

manufacture/engineering of the item in question.

Item shall be offered for inspection at respective manufacturer's works to Purchaser/its authorized agency as per the QAP Enclosed and the Type Test Specified in the Specifications.

3.0 SCOPE OF VENDOR

The scope of work shall include but not necessarily be limited to :

- Engineering, Manufacture and Supply of C&I items
- Testing and inspection of the items at manufacturer's work.
- Supply of the material to site.

A detailed scope and other technical parameters are listed in the technical requirement attached with this document ,same to be referred in conjunction with this document.

4.0 DESIGN CODES AND STANDARDS

Item shall comply with the requirements the latest edition specification prior to the date of purchaser's enquiry of relevant standards and suitable for the area where the equipment will be installed

The standards shall be followed, as per the attached applicable Specification indicated elsewhere in the document. Other applicable Indian/International standards for any component part, even if not covered in the listed standards shall be followed.

5.0 VENDOR DATA REQUIREMENT SCHEDULE:

5.1 BIDDING STAGE

a. Vendor shall provide the following information along with their offer.

- BOQ with unit rates
- Compliance to terms and conditions

- QAP
- Sub Vendor List
- Technical Data sheets and documents as specified in the check list.
- List of deviations, if any, from purchaser's specification clause number-wise with reasons thereof, wherever applicable should be clearly brought out.

b. Bids without detailed and point wise compliance statement will be rejected.

5.2 AFTER AWARD OF CONTRACT

Vendor shall submit following drawings/documents to purchaser after finalisation for approval in Hardcopies (2 sets) & Soft Copy (2 set):

- Item Data Sheet.
- QAP
- Test procedure wherever applicable.
- Any other data, document not specifically mentioned, but required for the satisfactory completion.
- Detailed technical manuals.

Vendor shall furnish all documents in A4 size(210mm x 297mm) paper or folded in A4 size unless otherwise specified. All drawings and sketches shall be in multiples of A4 size like A3(297mm x 420mm) or A2(420mm x 594mm) etc. But folded to A4 size. Final Documentation shall be submitted in bound volumes. All documentation should be done in English language only.

c. Drawing and data Matrix :

SL. NO	PARTICULARS	HARD COPIES	SOFT COPIES (CD)	REMARKS
1	Drawings for information	2sets	2 No's	
2	Drawings for approval	2sets	2No's	One hardcopy shall be returned to vendor with approval or comments
3	Approved drawings	2sets	2No's	
4	As-built document	2sets	2No's	
5	Inspection History Docket	2sets	2No's	
6	Commissioning and O&M Manuals(Approved)	2sets	2No's	

d. The vendor shall provide additional drawings as found necessary to check conformity with the standards mentioned in the specification. Vendor shall examine this list and include all particulars as he finds necessary.

6.0 QA/QC REQUIREMENTS

The QA/QC requirements shall be as per the QAP provided in the NPCIL spec PC-E-585 Annexure-I.

7.0 Bill of Quantities:

Sl No.	Description	Quantity for KAPP-3	Mandatory Spares for KAPP-3	Contingency Spares for KAPP-3	Total Quantity for KAPP-3	Contingency Spares for KAPP-4	Total Quantity for KAPP-4	Grand Total Quantity	BHEL CODE
1	Current Sensitive Reed Relays(3Contact of magnetic reed Type Form-A)	48	24	5	77	5	53	130	CC0695012487
2	Climatic Test Charges for Reed Relay	-	-	-	1	-	-	1	CC0695012495
3	Seismic Test Charges for Reed Relay	-	-	-	1	-	-	1	CC0695012509

8.0 List of Technical Specifications

Sl No	Specification	Rev No	Date of Issue	Description	No of Sheets /pages	Remarks
1.	PC-E-585	00	Nov-2010	Technical Specification on Current Sensitive Reed Relays	14	
2.	PP-E-2061	01	July-2010	Technical Specification for requirements of components/equipment for instrumentation items	37	

9.0 Addendum/Corrigendum, Changes/Modifications in Specifications

Sl No	Specification	Rev No	Date of Issue	Description	No of Sheets	Remarks
--	---	---	---	----	--	-

ANNEXURE- I

QUALITY ASSURANCE PLAN (SAMPLE)

SN	Components & operation	Charac-teristics	Types of check	Classifi-cation	Quantum of check	Reference documents	Acceptance norms	Format of record	Test Agency			Remark
									P	*W*	*V*	
1	**MATERIAL**											
1.1 1.2	Relay Sockets	Visual	Defects	Minor	100%	Mfr's Catalogue	No visible defects	Internal Quality Control Records	2	2	1	
2	**ELECTRICAL TEST**											
2.1	Relay with socket	Routine Test	As per NPCIL approved procedure	Major	As per NPCIL Spec	As per EIP approved by NPCIL	As per NPCIL Spec.	Test reports	2	2/ 1	1	
3	**TYPE TESTS**											
3.1	Climatic Test	Functional	As per NPCIL approved procedure	Major	As per Sampli -ng Plan	As per EIP approved by NPCIL	Meeting NPCIL Spec.	Test reports	2	2/ 1	1	The relay subject-ed to climatic tests shall be used for seismic test
3.2	Seismic Test (Simulating actual mounting position)	Functional		Major								
3.3	Rated coil current test	Functional		Major								
3.4	Max coil current withstand capacity test	Functional		Major								
4	**PACKING**											
4.1	Packing and Tagging	Visual	To ensure safe transport and storage	Major	100%	As per EIP approved by NPCIL	Meeting NPCIL Spec.	Test reports	2	2/ 1	1	

Legend :

P - Performed by
W - Witnessed by
V - Verified by
IQC - Internal Quality Control
EIP - Equipment Inspection Procedure
1. NPCIL QS
2. Manufacturer
3. Third Party

NUCLEAR POWER CORPORATION OF INDIA LIMITED
(A Government of India Enterprise)

SPECIFICATION NO. : PC-E/585

TECHNICAL SPECIFICATION ON CURRENT SENSITIVE REED RELAYS

REF. USI No. : 63700

REVISION NO. :	**0**			
DATE OF ISSUE (MONTH/YEAR) :	**NOVEMBER, 2010**			
TOTAL NO OF PAGES (Including Cover Sheets) :	**14**			

ORIGINAL

PREPARED BY :	**AMARESH D. PRASAD** (EE)	25/11/2010
CHECKED BY :	**NITA SINGH** (ACE)	25/11/2010
	A. V. UGHADE (ACE)	3/12/2010.
REVIEWED BY :	**S. ROY** (ACE)	06/12/2010.
APPROVED BY :	**M. G. KELKAR** (ACE)	06/12/2010
	(Name & Designation)	**(Signature)** **(Date)**

(For Revision, see Revision Control Sheet)

File Name : PC-E-585-R0.doc

NUCLEAR POWER CORPORATION OF INDIA LIMITED
(A Government of India Enterprise)

SPECIFICATION NO. : PC-E/585

TECHNICAL SPECIFICATION ON CURRENT SENSITIVE REED RELAYS

REF. USI No. : 63700

REVISION NO.	**:**	**0**			
DATE OF ISSUE (MONTH/YEAR)	**:**	**NOVEMBER, 2010**			
TOTAL NO OF PAGES (Including Cover Sheets)	**:**	**14**			

ORIGINAL

PREPARED BY : **AMARESH D. PRASAD**
(EE)

CHECKED BY : **NITA SINGH**
(ACE)

A. V. UGHADE
(ACE)

REVIEWED BY : **S. ROY**
(ACE)

APPROVED BY : **M. G. KELKAR**
(ACE)

(Name & Designation) **(Signature)** **(Date)**

(For Revision, see Revision Control Sheet)

File Name : PC-E-585-R0.doc

REVISION CONTROL SHEET

DOCUMENT TYPE : TECHNICAL SPECIFICATION

DOCUMENT No. : PC-E/585/Rev. No. 0

TITLE : TECHNICAL SPECIFICATION ON

CURRENT SENSITIVE REED RELAYS

REV. NO. & DATE	DESCRIPTION OF REVISION	REVISED BY NAME & SIGNATURE	CHECKED BY NAME & SIGNATURE	REVIEWED BY NAME & SIGNATURE	APPROVED BY NAME & SIGNATURE

1.0 SCOPE

This Specification establishes the technical requirements for the design, manufacture, inspection, testing & supply of Current Sensitive magnetic Reed relays having magnetic reed type contacts to be used in various reactor safety and safety related systems. Henceforth, for simplicity, the Current Sensitive magnetic Reed Relays shall be simply referred as Relays in this document.

2.0 CONTENTS

Description	Section
APPLICABLE SPECFICATIONS, STANDARDS AND DRAWINGS	3
MATERIALS, PROCESSES AND WORKMANSHIP	4
GENERAL FUNCTION AND DESCRIPTION	5
REQUIREMENTS	6
INSPECTION, TEST AND REPORT	7
IDENTIFICATION	8
PACKING AND SHIPPING	9
QUALITY ASSURANCE PLAN (SAMPLE)	ANNEXURE-I

3. 0 APPLICABLE SPECFICATIONS, STANDARDS AND DRAWINGS

The specifications and standards to which the relays are manufactured shall be submitted by the supplier for approval and same shall form part of the requirement of this specification. The standards listed below constitute a part of this specification to the extent defined in subsequent sections. In case of any conflict, the requirement of this specification shall prevail over the requirements of these standards.

SPECIFICATIONS:

PP-E-2061 : Technical specification for requirements of Components / Equipment for Instrumentation items

STANDARDS:

IS-5051 : Specification for Relays for Electronics and Telecommunication equipment

IS - 9000 : Basic environmental testing procedure for electrical and electronics items.

IS-2071 : Methods of high voltage testing

IS-7204 : Specification for stabilized power supplies, DC output (To be referred for IR Test)

4.0 MATERIALS, PROCESSES AND WORKMANSHIP

4.1 Materials

Materials shall conform to applicable national/international standards. The evaluation of components shall preferably be done by an independent agency. All components used shall be 'Type approved' or shall have gone through satisfactory quality assurance test program and shall be in the currently produced list of products. Components shall be adequately de-rated.

4.2 Processes and Workmanship

The process shall be backed by evaluation reports. The workmanship shall be in accordance with high-grade commercial practice adequate to ensure satisfactory operation for 40 years of plant life.

5.0 GENERAL FUNCTION AND DESCRIPTION

The relays are required for use in safety system 2 out of 3 voting logic for its health monitoring and final actuating device status monitoring. They form part of actuator control relays / safety actuators circuits which are designed to initiate various reactor safety and safety related systems. The relays should be highly reliable.

6.0 REQUIREMENTS

6.1 General

The relays are mounted on various panels. The relays shall be mounted on suitable base sockets. The materials/components used in the manufacturing of relays and sockets shall be from reputed manufacturers with high reliability.

6.2 Type of Relays:

Relays required are of various types depending on their current sensitivity ranges. They will be classified as Type-A & Type-B relays with two configurations in each type.

6.2.1 Type-A Relays: Pickup current – 160 mA & 500 mA

Each relay shall be fabricated such that it can be connected in two configurations.

6.2.1.1 Configuration-1:

In this configuration the coil pickup current shall be $\leq$ 160 mA. These relays can be used in circuits which have load greater than 160 mA.

6.2.1.2 Configuration-2:

If the relay is connected in configuration-2 the coil pickup current shall be $\leq$ 500 mA. These relays can be used in circuits which have load greater than 500 mA.

6.2.2 Type-B Relays: Pickup current – 750 mA & 1.5 A

Each relay shall be fabricated such that it can be connected in two configurations.

6.2.2.1 Configuration-1:

In this configuration the coil pickup current shall be $\leq$ 750 mA. These relays can be used in circuits which have load greater than 750 mA.

6.2.2.2 Configuration-2:

If the relay is connected in configuration-2 the coil pickup current shall be $\leq$ 1.5 A. These relays can be used in circuits which have load greater than 1.5 A.

6.2.3 The above configurations can be achieved by selecting different input terminals for different configuration.

6.2.4 The relays will have magnetic reed type contacts. The contacts will be of Form A. Each relay will have 3 such contacts.

6.3 **Requirements:**

6.3.1 **Requirements for Type-A relays:**

6.3.1.1 Pickup Current:

a) Connected in configuration-1: $\leq$ 160 mA

b) Connected in configuration-2: $\leq$ 500 mA

6.3.1.2 Dropout Current:

The hysteresis of the magnetic reeds used shall be such that the dropout current

shall be $\geq$ 10% of pickup current for all configurations.

6.3.1.3 Rated Coil Current: 1.2 A for full coil i.e. relay connected in configuration-1

6.3.1.4 Coil Resistance:

a) Connected in configuration-1:

Cold resistance - $\leq$ 1.1 Ω

Hot Resistance - $\leq$ 1.5Ω

b) Connected in configuration-2:

Cold resistance - $\leq$ 0.3 Ω

Hot Resistance - $\leq$ 0.5 Ω

6.3.1.5 Maximum Coil current withstanding capacity: 10 A for 2 Sec for full coil i.e. relay connected in configuration-1

6.3.1.6 No. of contacts: 3 Form A

6.3.1.7 Contact rating: 0.5 A at 24V DC (resistive)

6.3.1.8 Static Contact Resistance: < 400 mΩ

6.3.2 **Requirements for Type-B relays:**

6.3.2.1 Pickup Current:

a) Connected in configuration-1: < 750 mA

b) Connected in configuration-2: < 1.5 A

6.3.2.2 Dropout Current:

The hysteresis of the magnetic reeds used shall be such that the dropout current shall be $\geq$ 10% of pickup current for all configurations.

6.3.2.3 Rated Coil Current: 3.5 A for full coil i.e. relay connected in configuration-1

6.3.2.4 Coil Resistance:

a) Connected in configuration-1:

Cold resistance - $\leq$ 0.1 Ω

Hot Resistance - $\leq$ 0.4 Ω

b) Connected in configuration-2:

Cold resistance - $\leq$ 0.05 Ω

Hot Resistance - $\leq$ 0.2 Ω

6.3.2.5 Maximum Coil current withstanding capacity: 25 A for 2 Sec for full coil i.e. relay connected in configuration-1

6.3.2.6 No. of contacts: 3 Form A

6.3.2.7 Contact rating: 0.5 A at 24V DC (resistive)

6.3.2.8 Static Contact Resistance: < 400 mΩ

6.3.3 **Requirements common to both Type-A & Type-B relays**

6.3.3.1 Shielding:

All relays shall be provided with electromagnetic and static shielding.

6.3.3.2 Mounting:

The relays shall be suitable for mounting in base socket Type PL-11 (Make-Omron) or equivalent round / square / rectangle. Base socket shall be provided with each relay. Relays with base sockets shall be suitable for horizontal and vertical panel mounting. The type of base socket shall be conveyed along with the bid.

6.3.3.3 Cooling: Free convection

6.3.3.4 Contact Resistance: < 50 mΩ

6.3.3.5 Contact Bounce: $\leq$ 1 mSec

6.3.3.6 Contact Material:

Ruthenium, Rhodium, Palladium etc. as suitable for various application requirements.

6.3.3.7 Mechanical Life: $\geq$1000000 operations with $\geq$1000 operations/hr

6.3.3.8 Electrical Life: $\geq$ 100,000 operations at rated load with $\geq$ 1000 operations/hr

6.3.3.9 Enclosure

Relay enclosure shall be of fire retardant hard plastic material, dust proof and washable.

6.3.3.10 Insulation resistance:

Insulation resistance (IR) shall be better than 100 M-Ohm at 500V DC.

6.3.3.11 High Voltage Withstanding Capacity:

The test will be carried out for 1 minute for the following configurations:

6.3.3.11.1 1200V AC, 50 Hz between coil and contacts shorted and body.

6.3.3.11.2 1200V AC, 50 Hz between coil and all contacts shorted.

6.3.3.11.3 1200V AC, 50 Hz between each of 3 contacts. Each contact should be shorted.

6.3.3.11.4 200V DC across contacts.

6.3.3.12 Environmental Conditions:

The relays will be subjected to following environmental conditions:

Normal operating Conditions:

Temperature : 8°C to 45°C
Relative Humidity : Up to 90% non-condensing

Off-normal/storage conditions:

Temperature : 5°C to 55°C
Relative Humidity : Up to 95% non-condensing

6.3.3.13 Seismic Conditions

Safe Shutdown Earthquake (SSE) – The acceleration value will depend on floor response spectrum of the building where the relay will be mounted. This acceleration value will be provided later along with the bid. Relay will be tested with this acceleration in vertical axis and two horizontal orthogonal axes in the frequency range of 1 Hz to 50 Hz.

7.0 INSPECTION, TEST AND REPORT

7.1 General

The supplier shall be responsible for and shall perform all tests and inspections mentioned in this specification and any other tests which may be necessary to assess the required performance of the product as per the detailed test procedure prepared by manufacturer and approved by the purchaser. The performance of the relays shall conform to this specification. The tests shall be witnessed by representative of NPCIL.

The supplier shall provide all the necessary facilities, equipment and access to manufacturer's premises at all reasonable times to carry out the inspection or tests necessary for purchaser's quality surveillance.

Failure to meet the inspection or test requirements specified here in shall be reported to the purchaser and shall be considered as sufficient cause for rejection of the particular relay.

7.2 Inspection and test

7.2.1 Inspection

Relays and relay sockets shall be checked for mechanical and electrical requirements during incoming inspection stage.

7. 2.2 Test

7.2.2.1 Routine Test

7.2.2.1.1 Functional Test

Functional tests shall be carried out under prevalent ambient conditions to check that relays conform to the requirements as given in Section 6. Functional tests shall be done with relays mounted on their sockets.

i) Contact operation of each relay (to be assured by energising and de-energising relay electrically)

ii) Pickup and dropout current of relays.

iii) Measurement of hot and cold resistance of coil.

The above tests shall be performed for each relay.

7.2.2.1.2 Insulation Resistance Test

The insulation resistance of each relay shall be measured with the relay not connected to its supply source. A dc voltage of 500V is applied between all its input/output leads shorted and chassis and the measurement is carried out after 1 minute. The testing shall be carried out as specified in Section 26 of IS - 7204 (Part IV)-1980. The IR measured shall be better than 100 MΩ.

7.2.2.1.3 Insulation Voltage Withstand Test

The test voltage shall be applied for 1 minute between

(a) coil/contact shorted and chassis (body)
(b) coil and contacts shorted
(c) each of 3 contacts with each contact shorted
(d) each contacts

The rms value of the test voltage shall be 1200V AC, 50 Hz for (a), (b) & (c). The value of the test voltage shall be 200V DC for (d). The test voltage shall be applied gradually to each relay, starting at 50% and increasing to full value in not less than 10 seconds. There shall not be any flash over or insulation breaks down.

7.2.2.1.4 Burn-in Test

The relays selected randomly (as per sampling plan) from the lot shall be subjected to Burn-in Test. The relays shall be kept ON under prevalent ambient conditions, for a continuous duration of 100 hours for burn-in test with a load of twice that of pickup current for each configuration. The performance of the relay shall be checked for functional requirements before and after the burn-in test. There shall be no deviation from the requirements specified in this specification.

7.2.2.2 Type Test

7.2.2.2.1 Seismic Test

The relays selected randomly (as per sampling plan) from the lot shall be subjected to seismic test to demonstrate conformance to seismic conditions in Section 6.3.

Relays along with mounting sockets shall be mounted on a plate called as relay modules. The relay modules shall be qualified for safe shutdown earthquakes as per the floor response spectrum of the building where they are mounted. The floor response spectrums will be issued to the successful bidder. There can be some variation in floor response spectrum.

Seismic test shall be conducted at each test frequency. The seismic test shall be done at frequencies spaced at an interval of 1/3rd octave starting from 1 Hz

to 50 Hz. The type of motion at each frequency shall be sinusoidal. Test shall be conducted for each of the three axis for 30 seconds at each of the test frequencies.

The performance of the relays shall be checked for functional requirement before and after seismic test. Tests shall be also done during seismic vibration to check the following:

i) Observe for contact failure

ii) Physical changes in the relay (damage etc).

iii) During vibration tests, 50% of relays shall be maintained in de-energised state and observation shall be recorded.

7.2.2.2.2 Climatic Test

The relays tested for seismic condition shall be subjected to climatic testing.

The relays selected randomly (as per sampling plan) from lot shall be subjected to climatic testing. The relays shall be tested for dry heat test and damp heat cyclic test as per the standard IS-9000. The condition for testing shall be as follows:

(a) Dry heat (as per part III, section-5 of IS-9000 for heat dissipating items)

Temperature : 55°C ± 2°C
Relative Humidity : 50%

Duration : 4 Hrs with no forced air circulation

(b) Damp Heat Cycle (as per part V, section-2 and variant-1 of IS-9000)

Upper temperature : 40°C ± 2°C
Relative Humidity : 90% (minimum)

Lower temperature : 25°C ± 3°C
Relative Humidity : 95% (minimum)

No. of cycles : 2

The recovery shall be under prevalent ambient conditions for 2 hrs.

Performance of the relays shall be checked for functional requirements before and after the climatic tests. There shall be no deviation from the requirements specified in this specification. The relays tested for seismic and climatic requirement shall be tagged separately and shall be in addition to the quantities required.

7.2.2.2.3 Rated coil current test:

The relay shall be connected in configuration-1. The relay shall be energised by passing 1.5 A/3.5A (depending on the type of relay) for two hours or till the current gets stabilised. Coil temperature built-up shall be noted at regular intervals by measuring the coil current. Coil temperature built-up should not lead to the body temperature becoming greater than 65^{o} C under normal operating conditions. The relay shall be tested for functional requirement after this test and should satisfy all functional requirements.

7.2.2.2.4 Maximum coil current withstand capacity test

Single relay from a batch shall be tested for maximum coil current withstand capacity test. The coil of the relay shall be energised by passing 15 A for 2 secs. After this test the relay shall be tested for its functional and Insulation resistance requirements.

7.3 Acceptance Criteria

Acceptance of the equipment shall be subject to its meeting the specification and fulfilment of various requirements covered by this specification. The relays shall be shipped or used in fabrication for various jobs as covered in separate purchase orders only after a shipping release is issued by an authorised representative of NPCIL.

7.4 REPORTS AND DOCUMENTATION

The supplier shall furnish the details of the tests conducted in accordance with and mentioned in this specification. Five copies of all the test reports, signed by a responsible technical representative of the supplier, shall be submitted to the purchaser.

The procedure shall be sent to NPCIL in triplicate for approval. The relay catalogues shall be a part of the Maintenance & Instruction Manual (MI) of respective application system panels wherever these relays are used. However, 5 copies of MI shall be provided. Wherever applicable, soft copies in CDs shall be provided - test results, MI, etc. All documents shall be in English language.

8.0 IDENTIFICATION

The relays shall be used as per types and tag nos. as specified in each application system for various fabrication orders for logic equipment panels.

9.0 PACKING AND SHIPPING

The relays shall be packed and protected to avoid damage or deterioration during shipment and storage at site. Packing method shall be adequate to withstand a

period in transit for more than two months and storage at site under a tropical climate for minimum period of one year without suffering any damage or deterioration. Packing procedure shall be subject to the approval of the purchaser. Contractor shall not ship the material without the prior approval of the purchaser or his authorised representative and subsequent instruction to do so.All the packages shall be clearly and legibly marked in a suitable permanent manner with the following information.

a) Purchase order/Requisition number
b) USI number
c) No of items in the box
d) Description of the items

Type tested relays shall be separately tagged.

ANNEXURE- I

QUALITY ASSURANCE PLAN (SAMPLE)

SN	Components & operation	Charac-teristics	Types of check	Classifi-cation	Quantum of check	Reference documents	Acceptance norms	Format of record	Test Agency			Remark
									P	*W*	*V*	
1	**MATERIAL**											
1.1 1.2	Relay Sockets	Visual	Defects	Minor	100%	Mfr's Catalogue	No visible defects	Internal Quality Control Records	2	2	1	
2	**ELECTRICAL TEST**											
2.1	Relay with socket	Routine Test	As per NPCIL approved procedure	Major	As per NPCIL Spec	As per EIP approved by NPCIL	As per NPCIL Spec.	Test reports	2	2/ 1	1	
3	**TYPE TESTS**											
3.1	Climatic Test	Functional	As per NPCIL approved procedure	Major	As per Sampli -ng Plan	As per EIP approved by NPCIL	Meeting NPCIL Spec.	Test reports	2	2/ 1	1	The relay subject-ed to climatic tests shall be used for seismic test
3.2	Seismic Test (Simulating actual mounting position)	Functional		Major								
3.3	Rated coil current test	Functional		Major								
3.4	Max coil current withstand capacity test	Functional		Major								
4	**PACKING**											
4.1	Packing and Tagging	Visual	To ensure safe transport and storage	Major	100%	As per EIP approved by NPCIL	Meeting NPCIL Spec.	Test reports	2	2/ 1	1	

Legend :

P - Performed by
W - Witnessed by
V - Verified by
IQC - Internal Quality Control
EIP - Equipment Inspection Procedure
1. NPCIL QS
2. Manufacturer
3. Third Party

BHEL Material Code: CC0695012495

Material Description: Climatic Test Charges for Reed Relay

Climatic Test Charges for Reed Relays (3 Contact of magnetic reed Type Form-A).

Tests as per clause 7.2.2.2.2 of NPCIL spec No. PC-E-585. QAP as per BHEL Purchase Spec No.PS/3.2.5.3/471/36.

Four copies of test certificates and test reports to be submitted to BHEL for NPCIL approval.

As per NPCIL BOQ No:3.2.5.3 and 3.3.4.3 for KAPP-3&4. NPCIL PO No for KAPP-3&4 is CMM/EIC/23-60-3-3089/PO/6108 dated 07/09/2012.

PURCHASE SPECIFICATION

FOR

Current Sensitive Reed Relays

For

KAPP-3 and KAPP-4

Of

Nuclear Power Corporation of India Limited

Revision:00	APPROVED BY : S K RANGANATH		
	PREPARED D.V.V.R	ISSUED ENGG	DATE 05-08-2013

REVISION HISTORY SHEET

Rev No.	DATE	Nature of change	REASON	PREPARED BY	APPROVED BY
00	05-08-2013	First Issue	As per NPCIL specification.	DVVR	SKR

Revision:00 Date:05-08-2013	APPROVED BY : S K RANGANATH		
	PREPARED D.V.V.R	ISSUED ENGG	DATE 05-08-2013

TABLE OF CONTENTS/ATTACHMENTS

S. No	DESCRIPTION	PAGE NO.
1	Purchase Requisition	4 of 10
2	Bill Of Quantities	8 of 10
3	Applicable Specifications & Drawings	
3.1	List of Technical Specification (Enclosed)	9 of 10
3.2	List of Tender Drawings(Not Applicable)	-
3.3	Addendum/Corrigendum, Changes/Modifications in Specifications(Enclosed)	10 of 10
3.4	Acceptable Deviations (Not Applicable)	-

1.0 INTRODUCTION

Nuclear Power Corporation of India Limited (a Govt. of India Enterprises) is setting up a 2x700MWe Power Project at Karakarpar in Gujurat and Rawatbhata in Rajasthan. BHEL-EDn is executing the Control Centre Instrumentation Package(CCIP) of KAPP-3 &4 and RAPP-7&8 projects.

2.0 INTENT OF PURCHASE SPECIFICATION

This purchase specification is intended to specify the requirements of Design, Engineering and Manufacture, Quality Assurance, Type, Routine and Acceptance Testing at Manufacture's Works/Third Party Inspection, Supply, Packing & Forwarding, Transportation and Safe Delivery of Current Sensitive Reed Relays at BHEL-EDn, conforming to NPCIL Specifications, drawing and guarantee of offered items as a part of this project.

The vendor has to confirm in writing his complete compliance with this MR and associated technical specification. If the vendor has any queries regarding specifications, it is his responsibility to get the same clarified from the purchaser before submitting the offer. If during approval stage any deficiency is found in the equipment offered, vendor has to provide the additional required component (if any) or make necessary modifications to comply with the specifications, without any cost and time implications to us.

Vendors shall be fully responsible for the supplied item. The compliance to this specification does not absolve the vendor of his responsibility towards contractual obligations with regards to completeness, proper selection, satisfactory operation and maintenance.

Item supplied shall be of proven quality both with respect to design and materials. Prototype item of an experimental nature shall not be offered or supplied. The system shall have well proved system records.

In the event of any conflict with the specifications, datasheets, related standards, codes etc. the vendor shall refer the matter to the purchaser for the clarification and only after obtaining the approval/concurrence from the Purchaser vendor should proceed with the

manufacture/engineering of the item in question.

Item shall be offered for inspection at respective manufacturer's works to Purchaser/its authorized agency as per the QAP Enclosed and the Type Test Specified in the Specifications.

3.0 SCOPE OF VENDOR

The scope of work shall include but not necessarily be limited to :

- Engineering, Manufacture and Supply of C&I items
- Testing and inspection of the items at manufacturer's work.
- Supply of the material to site.

A detailed scope and other technical parameters are listed in the technical requirement attached with this document ,same to be referred in conjunction with this document.

4.0 DESIGN CODES AND STANDARDS

Item shall comply with the requirements the latest edition specification prior to the date of purchaser's enquiry of relevant standards and suitable for the area where the equipment will be installed

The standards shall be followed, as per the attached applicable Specification indicated elsewhere in the document. Other applicable Indian/International standards for any component part, even if not covered in the listed standards shall be followed.

5.0 VENDOR DATA REQUIREMENT SCHEDULE:

5.1 BIDDING STAGE

a. Vendor shall provide the following information along with their offer.

- BOQ with unit rates
- Compliance to terms and conditions

- QAP
- Sub Vendor List
- Technical Data sheets and documents as specified in the check list.
- List of deviations, if any, from purchaser's specification clause number-wise with reasons thereof, wherever applicable should be clearly brought out.

b. Bids without detailed and point wise compliance statement will be rejected.

5.2 AFTER AWARD OF CONTRACT

Vendor shall submit following drawings/documents to purchaser after finalisation for approval in Hardcopies (2 sets) & Soft Copy (2 set):

- Item Data Sheet.
- QAP
- Test procedure wherever applicable.
- Any other data, document not specifically mentioned, but required for the satisfactory completion.
- Detailed technical manuals.

Vendor shall furnish all documents in A4 size(210mm x 297mm) paper or folded in A4 size unless otherwise specified. All drawings and sketches shall be in multiples of A4 size like A3(297mm x 420mm) or A2(420mm x 594mm) etc. But folded to A4 size. Final Documentation shall be submitted in bound volumes. All documentation should be done in English language only.

c. Drawing and data Matrix :

SL. NO	PARTICULARS	HARD COPIES	SOFT COPIES (CD)	REMARKS
1	Drawings for information	2sets	2 No's	
2	Drawings for approval	2sets	2No's	One hardcopy shall be returned to vendor with approval or comments
3	Approved drawings	2sets	2No's	
4	As-built document	2sets	2No's	
5	Inspection History Docket	2sets	2No's	
6	Commissioning and O&M Manuals(Approved)	2sets	2No's	

d. The vendor shall provide additional drawings as found necessary to check conformity with the standards mentioned in the specification. Vendor shall examine this list and include all particulars as he finds necessary.

6.0 QA/QC REQUIREMENTS

The QA/QC requirements shall be as per the QAP provided in the NPCIL spec PC-E-585 Annexure-I.

7.0 Bill of Quantities:

Sl No.	Description	Quantity for KAPP-3	Mandatory Spares for KAPP-3	Contingency Spares for KAPP-3	Total Quantity for KAPP-3	Contingency Spares for KAPP-4	Total Quantity for KAPP-4	Grand Total Quantity	BHEL CODE
1	Current Sensitive Reed Relays(3Contact of magnetic reed Type Form-A)	48	24	5	77	5	53	130	CC0695012487
2	Climatic Test Charges for Reed Relay	-	-	-	1	-	-	1	CC0695012495
3	Seismic Test Charges for Reed Relay	-	-	-	1	-	-	1	CC0695012509

8.0 List of Technical Specifications

Sl No	Specification	Rev No	Date of Issue	Description	No of Sheets /pages	Remarks
1.	PC-E-585	00	Nov-2010	Technical Specification on Current Sensitive Reed Relays	14	
2.	PP-E-2061	01	July-2010	Technical Specification for requirements of components/equipment for instrumentation items	37	

9.0 Addendum/Corrigendum, Changes/Modifications in Specifications

Sl No	Specification	Rev No	Date of Issue	Description	No of Sheets	Remarks
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ANNEXURE- I

QUALITY ASSURANCE PLAN (SAMPLE)

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4.1	Packing and Tagging	Visual	To ensure safe transport and storage	Major	100%	As per EIP approved by NPCIL	Meeting NPCIL Spec.	Test reports	2	2/ 1	1	

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NUCLEAR POWER CORPORATION OF INDIA LIMITED
(A Government of India Enterprise)

SPECIFICATION NO. : PC-E/585

TECHNICAL SPECIFICATION ON CURRENT SENSITIVE REED RELAYS

REF. USI No. : 63700

REVISION NO. :	**0**			
DATE OF ISSUE (MONTH/YEAR) :	**NOVEMBER, 2010**			
TOTAL NO OF PAGES (Including Cover Sheets) :	**14**			

ORIGINAL

PREPARED BY :	**AMARESH D. PRASAD** (EE)	25/11/2010
CHECKED BY :	**NITA SINGH** (ACE)	25/11/2010
	A. V. UGHADE (ACE)	3/12/2010.
REVIEWED BY :	**S. ROY** (ACE)	06/12/2010.
APPROVED BY :	**M. G. KELKAR** (ACE)	06/12/2010
	(Name & Designation)	**(Signature)** **(Date)**

(For Revision, see Revision Control Sheet)

File Name : PC-E-585-R0.doc

NUCLEAR POWER CORPORATION OF INDIA LIMITED
(A Government of India Enterprise)

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REVIEWED BY : **S. ROY**
(ACE)

APPROVED BY : **M. G. KELKAR**
(ACE)

(Name & Designation) **(Signature)** **(Date)**

(For Revision, see Revision Control Sheet)

File Name : PC-E-585-R0.doc

REVISION CONTROL SHEET

DOCUMENT TYPE : TECHNICAL SPECIFICATION

DOCUMENT No. : PC-E/585/Rev. No. 0

TITLE : TECHNICAL SPECIFICATION ON

CURRENT SENSITIVE REED RELAYS

REV. NO. & DATE	DESCRIPTION OF REVISION	REVISED BY NAME & SIGNATURE	CHECKED BY NAME & SIGNATURE	REVIEWED BY NAME & SIGNATURE	APPROVED BY NAME & SIGNATURE

1.0 SCOPE

This Specification establishes the technical requirements for the design, manufacture, inspection, testing & supply of Current Sensitive magnetic Reed relays having magnetic reed type contacts to be used in various reactor safety and safety related systems. Henceforth, for simplicity, the Current Sensitive magnetic Reed Relays shall be simply referred as Relays in this document.

2.0 CONTENTS

Description	Section
APPLICABLE SPECFICATIONS, STANDARDS AND DRAWINGS	3
MATERIALS, PROCESSES AND WORKMANSHIP	4
GENERAL FUNCTION AND DESCRIPTION	5
REQUIREMENTS	6
INSPECTION, TEST AND REPORT	7
IDENTIFICATION	8
PACKING AND SHIPPING	9
QUALITY ASSURANCE PLAN (SAMPLE)	ANNEXURE-I

3. 0 APPLICABLE SPECFICATIONS, STANDARDS AND DRAWINGS

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IS - 9000 : Basic environmental testing procedure for electrical and electronics items.

IS-2071 : Methods of high voltage testing

IS-7204 : Specification for stabilized power supplies, DC output (To be referred for IR Test)

4.0 MATERIALS, PROCESSES AND WORKMANSHIP

4.1 Materials

Materials shall conform to applicable national/international standards. The evaluation of components shall preferably be done by an independent agency. All components used shall be 'Type approved' or shall have gone through satisfactory quality assurance test program and shall be in the currently produced list of products. Components shall be adequately de-rated.

4.2 Processes and Workmanship

The process shall be backed by evaluation reports. The workmanship shall be in accordance with high-grade commercial practice adequate to ensure satisfactory operation for 40 years of plant life.

5.0 GENERAL FUNCTION AND DESCRIPTION

The relays are required for use in safety system 2 out of 3 voting logic for its health monitoring and final actuating device status monitoring. They form part of actuator control relays / safety actuators circuits which are designed to initiate various reactor safety and safety related systems. The relays should be highly reliable.

6.0 REQUIREMENTS

6.1 General

The relays are mounted on various panels. The relays shall be mounted on suitable base sockets. The materials/components used in the manufacturing of relays and sockets shall be from reputed manufacturers with high reliability.

6.2 Type of Relays:

Relays required are of various types depending on their current sensitivity ranges. They will be classified as Type-A & Type-B relays with two configurations in each type.

6.2.1 Type-A Relays: Pickup current – 160 mA & 500 mA

Each relay shall be fabricated such that it can be connected in two configurations.

6.2.1.1 Configuration-1:

In this configuration the coil pickup current shall be $\leq$ 160 mA. These relays can be used in circuits which have load greater than 160 mA.

6.2.1.2 Configuration-2:

If the relay is connected in configuration-2 the coil pickup current shall be $\leq$ 500 mA. These relays can be used in circuits which have load greater than 500 mA.

6.2.2 Type-B Relays: Pickup current – 750 mA & 1.5 A

Each relay shall be fabricated such that it can be connected in two configurations.

6.2.2.1 Configuration-1:

In this configuration the coil pickup current shall be $\leq$ 750 mA. These relays can be used in circuits which have load greater than 750 mA.

6.2.2.2 Configuration-2:

If the relay is connected in configuration-2 the coil pickup current shall be $\leq$ 1.5 A. These relays can be used in circuits which have load greater than 1.5 A.

6.2.3 The above configurations can be achieved by selecting different input terminals for different configuration.

6.2.4 The relays will have magnetic reed type contacts. The contacts will be of Form A. Each relay will have 3 such contacts.

6.3 **Requirements:**

6.3.1 **Requirements for Type-A relays:**

6.3.1.1 Pickup Current:

a) Connected in configuration-1: $\leq$ 160 mA

b) Connected in configuration-2: $\leq$ 500 mA

6.3.1.2 Dropout Current:

The hysteresis of the magnetic reeds used shall be such that the dropout current

shall be $\geq$ 10% of pickup current for all configurations.

6.3.1.3 Rated Coil Current: 1.2 A for full coil i.e. relay connected in configuration-1

6.3.1.4 Coil Resistance:

a) Connected in configuration-1:

Cold resistance - $\leq$ 1.1 Ω

Hot Resistance - $\leq$ 1.5Ω

b) Connected in configuration-2:

Cold resistance - $\leq$ 0.3 Ω

Hot Resistance - $\leq$ 0.5 Ω

6.3.1.5 Maximum Coil current withstanding capacity: 10 A for 2 Sec for full coil i.e. relay connected in configuration-1

6.3.1.6 No. of contacts: 3 Form A

6.3.1.7 Contact rating: 0.5 A at 24V DC (resistive)

6.3.1.8 Static Contact Resistance: < 400 mΩ

6.3.2 **Requirements for Type-B relays:**

6.3.2.1 Pickup Current:

a) Connected in configuration-1: < 750 mA

b) Connected in configuration-2: < 1.5 A

6.3.2.2 Dropout Current:

The hysteresis of the magnetic reeds used shall be such that the dropout current shall be $\geq$ 10% of pickup current for all configurations.

6.3.2.3 Rated Coil Current: 3.5 A for full coil i.e. relay connected in configuration-1

6.3.2.4 Coil Resistance:

a) Connected in configuration-1:

Cold resistance - $\leq$ 0.1 Ω

Hot Resistance - $\leq$ 0.4 Ω

b) Connected in configuration-2:

Cold resistance - $\leq$ 0.05 Ω

Hot Resistance - $\leq$ 0.2 Ω

6.3.2.5 Maximum Coil current withstanding capacity: 25 A for 2 Sec for full coil i.e. relay connected in configuration-1

6.3.2.6 No. of contacts: 3 Form A

6.3.2.7 Contact rating: 0.5 A at 24V DC (resistive)

6.3.2.8 Static Contact Resistance: < 400 mΩ

6.3.3 **Requirements common to both Type-A & Type-B relays**

6.3.3.1 Shielding:

All relays shall be provided with electromagnetic and static shielding.

6.3.3.2 Mounting:

The relays shall be suitable for mounting in base socket Type PL-11 (Make-Omron) or equivalent round / square / rectangle. Base socket shall be provided with each relay. Relays with base sockets shall be suitable for horizontal and vertical panel mounting. The type of base socket shall be conveyed along with the bid.

6.3.3.3 Cooling: Free convection

6.3.3.4 Contact Resistance: < 50 mΩ

6.3.3.5 Contact Bounce: $\leq$ 1 mSec

6.3.3.6 Contact Material:

Ruthenium, Rhodium, Palladium etc. as suitable for various application requirements.

6.3.3.7 Mechanical Life: $\geq$1000000 operations with $\geq$1000 operations/hr

6.3.3.8 Electrical Life: $\geq$ 100,000 operations at rated load with $\geq$ 1000 operations/hr

6.3.3.9 Enclosure

Relay enclosure shall be of fire retardant hard plastic material, dust proof and washable.

6.3.3.10 Insulation resistance:

Insulation resistance (IR) shall be better than 100 M-Ohm at 500V DC.

6.3.3.11 High Voltage Withstanding Capacity:

The test will be carried out for 1 minute for the following configurations:

6.3.3.11.1 1200V AC, 50 Hz between coil and contacts shorted and body.

6.3.3.11.2 1200V AC, 50 Hz between coil and all contacts shorted.

6.3.3.11.3 1200V AC, 50 Hz between each of 3 contacts. Each contact should be shorted.

6.3.3.11.4 200V DC across contacts.

6.3.3.12 Environmental Conditions:

The relays will be subjected to following environmental conditions:

Normal operating Conditions:

Temperature : 8°C to 45°C
Relative Humidity : Up to 90% non-condensing

Off-normal/storage conditions:

Temperature : 5°C to 55°C
Relative Humidity : Up to 95% non-condensing

6.3.3.13 Seismic Conditions

Safe Shutdown Earthquake (SSE) – The acceleration value will depend on floor response spectrum of the building where the relay will be mounted. This acceleration value will be provided later along with the bid. Relay will be tested with this acceleration in vertical axis and two horizontal orthogonal axes in the frequency range of 1 Hz to 50 Hz.

7.0 INSPECTION, TEST AND REPORT

7.1 General

The supplier shall be responsible for and shall perform all tests and inspections mentioned in this specification and any other tests which may be necessary to assess the required performance of the product as per the detailed test procedure prepared by manufacturer and approved by the purchaser. The performance of the relays shall conform to this specification. The tests shall be witnessed by representative of NPCIL.

The supplier shall provide all the necessary facilities, equipment and access to manufacturer's premises at all reasonable times to carry out the inspection or tests necessary for purchaser's quality surveillance.

Failure to meet the inspection or test requirements specified here in shall be reported to the purchaser and shall be considered as sufficient cause for rejection of the particular relay.

7.2 Inspection and test

7.2.1 Inspection

Relays and relay sockets shall be checked for mechanical and electrical requirements during incoming inspection stage.

7. 2.2 Test

7.2.2.1 Routine Test

7.2.2.1.1 Functional Test

Functional tests shall be carried out under prevalent ambient conditions to check that relays conform to the requirements as given in Section 6. Functional tests shall be done with relays mounted on their sockets.

i) Contact operation of each relay (to be assured by energising and de-energising relay electrically)

ii) Pickup and dropout current of relays.

iii) Measurement of hot and cold resistance of coil.

The above tests shall be performed for each relay.

7.2.2.1.2 Insulation Resistance Test

The insulation resistance of each relay shall be measured with the relay not connected to its supply source. A dc voltage of 500V is applied between all its input/output leads shorted and chassis and the measurement is carried out after 1 minute. The testing shall be carried out as specified in Section 26 of IS - 7204 (Part IV)-1980. The IR measured shall be better than 100 MΩ.

7.2.2.1.3 Insulation Voltage Withstand Test

The test voltage shall be applied for 1 minute between

(a) coil/contact shorted and chassis (body)
(b) coil and contacts shorted
(c) each of 3 contacts with each contact shorted
(d) each contacts

The rms value of the test voltage shall be 1200V AC, 50 Hz for (a), (b) & (c). The value of the test voltage shall be 200V DC for (d). The test voltage shall be applied gradually to each relay, starting at 50% and increasing to full value in not less than 10 seconds. There shall not be any flash over or insulation breaks down.

7.2.2.1.4 Burn-in Test

The relays selected randomly (as per sampling plan) from the lot shall be subjected to Burn-in Test. The relays shall be kept ON under prevalent ambient conditions, for a continuous duration of 100 hours for burn-in test with a load of twice that of pickup current for each configuration. The performance of the relay shall be checked for functional requirements before and after the burn-in test. There shall be no deviation from the requirements specified in this specification.

7.2.2.2 Type Test

7.2.2.2.1 Seismic Test

The relays selected randomly (as per sampling plan) from the lot shall be subjected to seismic test to demonstrate conformance to seismic conditions in Section 6.3.

Relays along with mounting sockets shall be mounted on a plate called as relay modules. The relay modules shall be qualified for safe shutdown earthquakes as per the floor response spectrum of the building where they are mounted. The floor response spectrums will be issued to the successful bidder. There can be some variation in floor response spectrum.

Seismic test shall be conducted at each test frequency. The seismic test shall be done at frequencies spaced at an interval of 1/3rd octave starting from 1 Hz

to 50 Hz. The type of motion at each frequency shall be sinusoidal. Test shall be conducted for each of the three axis for 30 seconds at each of the test frequencies.

The performance of the relays shall be checked for functional requirement before and after seismic test. Tests shall be also done during seismic vibration to check the following:

i) Observe for contact failure

ii) Physical changes in the relay (damage etc).

iii) During vibration tests, 50% of relays shall be maintained in de-energised state and observation shall be recorded.

7.2.2.2.2 Climatic Test

The relays tested for seismic condition shall be subjected to climatic testing.

The relays selected randomly (as per sampling plan) from lot shall be subjected to climatic testing. The relays shall be tested for dry heat test and damp heat cyclic test as per the standard IS-9000. The condition for testing shall be as follows:

(a) Dry heat (as per part III, section-5 of IS-9000 for heat dissipating items)

Temperature : 55°C ± 2°C
Relative Humidity : 50%

Duration : 4 Hrs with no forced air circulation

(b) Damp Heat Cycle (as per part V, section-2 and variant-1 of IS-9000)

Upper temperature : 40°C ± 2°C
Relative Humidity : 90% (minimum)

Lower temperature : 25°C ± 3°C
Relative Humidity : 95% (minimum)

No. of cycles : 2

The recovery shall be under prevalent ambient conditions for 2 hrs.

Performance of the relays shall be checked for functional requirements before and after the climatic tests. There shall be no deviation from the requirements specified in this specification. The relays tested for seismic and climatic requirement shall be tagged separately and shall be in addition to the quantities required.

7.2.2.2.3 Rated coil current test:

The relay shall be connected in configuration-1. The relay shall be energised by passing 1.5 A/3.5A (depending on the type of relay) for two hours or till the current gets stabilised. Coil temperature built-up shall be noted at regular intervals by measuring the coil current. Coil temperature built-up should not lead to the body temperature becoming greater than 65^{o} C under normal operating conditions. The relay shall be tested for functional requirement after this test and should satisfy all functional requirements.

7.2.2.2.4 Maximum coil current withstand capacity test

Single relay from a batch shall be tested for maximum coil current withstand capacity test. The coil of the relay shall be energised by passing 15 A for 2 secs. After this test the relay shall be tested for its functional and Insulation resistance requirements.

7.3 Acceptance Criteria

Acceptance of the equipment shall be subject to its meeting the specification and fulfilment of various requirements covered by this specification. The relays shall be shipped or used in fabrication for various jobs as covered in separate purchase orders only after a shipping release is issued by an authorised representative of NPCIL.

7.4 REPORTS AND DOCUMENTATION

The supplier shall furnish the details of the tests conducted in accordance with and mentioned in this specification. Five copies of all the test reports, signed by a responsible technical representative of the supplier, shall be submitted to the purchaser.

The procedure shall be sent to NPCIL in triplicate for approval. The relay catalogues shall be a part of the Maintenance & Instruction Manual (MI) of respective application system panels wherever these relays are used. However, 5 copies of MI shall be provided. Wherever applicable, soft copies in CDs shall be provided - test results, MI, etc. All documents shall be in English language.

8.0 IDENTIFICATION

The relays shall be used as per types and tag nos. as specified in each application system for various fabrication orders for logic equipment panels.

9.0 PACKING AND SHIPPING

The relays shall be packed and protected to avoid damage or deterioration during shipment and storage at site. Packing method shall be adequate to withstand a

period in transit for more than two months and storage at site under a tropical climate for minimum period of one year without suffering any damage or deterioration. Packing procedure shall be subject to the approval of the purchaser. Contractor shall not ship the material without the prior approval of the purchaser or his authorised representative and subsequent instruction to do so.All the packages shall be clearly and legibly marked in a suitable permanent manner with the following information.

a) Purchase order/Requisition number
b) USI number
c) No of items in the box
d) Description of the items

Type tested relays shall be separately tagged.

ANNEXURE- I

QUALITY ASSURANCE PLAN (SAMPLE)

SN	Components & operation	Charac-teristics	Types of check	Classifi-cation	Quantum of check	Reference documents	Acceptance norms	Format of record	Test Agency			Remark
									P	*W*	*V*	
1	**MATERIAL**											
1.1 1.2	Relay Sockets	Visual	Defects	Minor	100%	Mfr's Catalogue	No visible defects	Internal Quality Control Records	2	2	1	
2	**ELECTRICAL TEST**											
2.1	Relay with socket	Routine Test	As per NPCIL approved procedure	Major	As per NPCIL Spec	As per EIP approved by NPCIL	As per NPCIL Spec.	Test reports	2	2/ 1	1	
3	**TYPE TESTS**											
3.1	Climatic Test	Functional	As per NPCIL approved procedure	Major	As per Sampli -ng Plan	As per EIP approved by NPCIL	Meeting NPCIL Spec.	Test reports	2	2/ 1	1	The relay subject-ed to climatic tests shall be used for seismic test
3.2	Seismic Test (Simulating actual mounting position)	Functional		Major								
3.3	Rated coil current test	Functional		Major								
3.4	Max coil current withstand capacity test	Functional		Major								
4	**PACKING**											
4.1	Packing and Tagging	Visual	To ensure safe transport and storage	Major	100%	As per EIP approved by NPCIL	Meeting NPCIL Spec.	Test reports	2	2/ 1	1	

Legend :

P - Performed by
W - Witnessed by
V - Verified by
IQC - Internal Quality Control
EIP - Equipment Inspection Procedure
1. NPCIL QS
2. Manufacturer
3. Third Party