

(37)



PRODUCT STANDARD SWITCHGEAR ENGINEERING DIVISION

SG12761
Rev00

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PURCHASE SPECIFICATION FOR PROCUREMENT OF VACUUM INTERRUPTERS FOR MV SWITCHGEAR APPLICATIONS

1. General:

This specification governs the Inspection, packing and supply of Vacuum Interrupter for MV switchgears. It is the intent of this specification to describe primary features, materials design & performance requirements and to establish minimum standards. The specification is not intended to specify the complete details of various practices of manufacturers / bidders, but to specify the requirements with regard to performance, durability and satisfactory operation in VCB under the specified condition for intended application.

BHEL seeks manufacturers for supply of following Vacuum Interrupters for Medium Voltage Switchgears.

Table-1

Sl. No.	Rated Voltage	Rated Current	Fault Current	Expected quantity for RC (in numbers)
1	12kV	4000A	50kA	4500
2	12kV	3150A	40kA	6000
3	12kV	2000A	25kA	3600
4	12kV	1250A	25kA	12000
5	36kV	2500A	25kA	3000
6	36kV	2000A	25kA	12000
7	25kV	2000A	20kA	600
8	36kV	2500A	31.5kA	2000
9	36kV	2500A	40kA	2000

The above requirement is tentative, PO shall be placed based on the orders received by BHEL. The validity of the Rate Contract (RC) shall be for 2 years from the date of placement of rate contract.

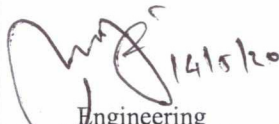
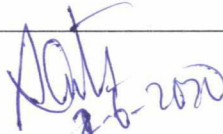
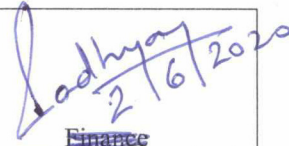
Each Vacuum Interrupter shall be evaluated and ordered separately. The RC will be finalized with two suppliers in 65:35 ratio. The process of distribution is as below.

L1 HESG (FOR Bhopal price) equivalent rate will be counter offered to L2 till H1 bidder, one by one and in order from lowest to highest bidder, for 35% quantities. RC for 35% quantities will be finalized on acceptance to this counter offer.

If none of L2 till H1 bidder accepts L1 HESG equivalent rate, then 100% quantity will be contracted with L1 bidder. For more details refer commercial terms and condition.

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2. Pre-Qualification Requirements (PQR): Vendor to confirm and submit supportive document.

SNO	Description of requirement	Bidder to furnish/ specify/ Confirm	Offered Parameters	Deviations	Remarks
i	Prospective supplier should be OEM and have experience of minimum 5 years in manufacturing and supply of vacuum interrupters for MV switchgear applications.	Bidder to provide Reference list of supply of Vacuum Interrupters during last 5 years. Bidders to provide details of manufacturing facilities.			
ii	Turnover of not less than INR 20 Crores for each of the year – 2016-17, 2017 – 18, 2018–19. 19-20	Bidder to provide Audited financial reports as documentary evidence or Chartered Accountant's certificate for years of Turn Over			
iii	a) Vendor should have supplied a minimum of 15000 Vacuum Interrupter in last 3 years (up to 31.03.2020). ✓	Bidder to provide unpriced PO copies in support.			
iv	Maximum limiting dimensions	Bidder to confirm meeting dimensions of each type of offered Vacuum Interrupter as per Table-2. (Vendor to submit GA Drawing).			
v	Confirmation to be given by bidder for conducting & for bearing 100% Type test expenses for following Type Tests (as per IEC) with BHEL breakers. a. Short-time withstand current and peak withstand current tests. b. Short-circuit current making and breaking tests. Type Test will be conducted at CPRI India (for sl no 1 to 8 of Table 1) Type Test will be conducted at	Vacuum Interrupters already type tested with BHEL Breakers, and have valid type test reports available with BHEL or Supplier, need not to be tested. The details of available Type Test reports will be shared with vendors for the ratings. Bidder to confirm to conduct the test on their letter head, if not already done as above.			

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KEMA, CESI or KERI laboratory. (For sl no 9 of table 1) as the Testing facility is not available with CPRI.

For Type testing, Prototype manufacturing and transportation is in BHEL Scope.

3. Rating and details: :

Ratings: The ratings of vacuum Interrupters are as per table below, dimensional & technical details are given in attached reference drawing. Vendor is required to submit separate quote of each rating.

Table-2

Sl. no.	Rated Voltage	Rated Current (in Amps)	BHEL Reference drawing no.	Fault Current	PF(kV)/ Impulse (kVp)	Maximum limiting dimensions
1	12kV	Up to 4000	35210005506 SH01	50kA	35kV/75kVp	400 mm(H)
2	12kV	Up to 3150	35210005506 SH02	40kA	35kV/75kVp	400 mm(H)
3	12kV	Up to 2000	35210005506 SH03	26.3kA	28kV/75kVp	250 mm(H)
4	12kV	Up to 1250	35210005506 SH04	26.3kA	28kV/75kVp	220 mm (H) & 90 mm (dia)
5	36kV	Up to 2500	35210005506 SH05	26.3kA	70kV/170kVp	315mm (H)
6	36kV	Up to 2000	35210005506 SH06	26.3kA	70kV/170kVp	490mm(H) & 160 mm dia
7	25kV	Up to 2000A	35190000510 SH01	20kA	95kV/250kVp	500mm(H)
8	36kV	Up to 2500A	35170000051 SH01	31.5kA	70kV/170kVp	493mm(H)
9	36kV	Up to 2500A	35170000052 SH01	40kA	70kV/170kVp	493mm(H)

4. Technical Specification :

SNO	Description of requirement	Bidder to furnish/specify/ Confirm	Offered Parameter	Deviation	Remark
i	Vacuum interrupters shall be as per technical parameters given in Reference drawing at Table 2.	i. Bidder to confirm the offered VIs are as per BHEL reference drawings and technical details. ii. Bidder to furnish detailed technical data sheet along with dimensional drawing of each VI Type, as per attached datasheet.			

5. Other Terms and Conditions: Following other documents are also required.

SNO	Description of required document	Offered document
i	The vendor has to submit Quality Assurance Plan (QAP) along with technical bid and manufacturing shall be started only after approval of the QAP. The QAP must include tests and measurements on raw material,	

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	semi-finished /finished product. Details of manufacturing process followed in including tools, jigs/fixture and gauges used at different stages to ensure quality of end product	
ii	Method of disposition of interrupter on completion of its electrical/mechanical life.	
iii	Supplier shall confirm, no harmful X rays are emitted at rated voltage when continuous in use and at rated insulation withstand voltage for short duration of 1 minute when under test.	

6. Evaluation & clearance for supply (following steps shall be followed)-

- Vendor to submit documents as per PQR, technical requirement and comments on all other clauses. PQR documents & Technical offer of all the vendors shall be evaluated based on the documents submitted against requirement stipulated above.

PQR (Clause 2.) qualified and Technical specification (Clause 3.) meeting vendors shall be asked to submit 6 no free samples, on returnable basis, for each type of offered Vacuum Interrupters. The samples will be used for assembly, evaluation and functional checks with BHEL Breakers. Vendor to supply 6 nos samples within 4 weeks of BHEL's intimation.

If any component i.e. adaptor etc. required for adoption in Vacuum interrupters with BHEL breakers, same shall be supplied by the vendor (only for prototype manufacturing). Adopter (if any) will be in BHEL scope for regular manufacturing of VCB.

- Vendors shall arrange to send & take back all returnable samples from BHEL Bhopal works at their own cost.
- After functional tests of Breakers, BHEL will share the results with vendor and only after mutual agreement of functional parameters, vendor shall be qualified for particular Vacuum Interrupter and BHEL will go for further evaluation. Unsuccessful Bidder's 6 nos samples shall be available at BHEL Bhopal works for collection by vendor.
- Price bid, of each type of Vacuum Interrupters, shall be separately opened for only technically qualified vendors. **Hence all the vendors shall quote price bid in separate envelope for all 9 variety of Vacuum Interrupter.**
- (Price bid shall be evaluated on F.O.R. Bhopal cost basis (i.e. HESG price).) Both bidders, on which split will be proposed (as per clause 1.), have to submit further 12 nos. returnable samples of each qualified Vacuum interrupters for prototype manufacturing within 8 weeks (for prototype manufacturing for Type Tests).
- BHEL shall manufacture 2 no. prototype for each type and dispatch, within 6 weeks of receipt of Vacuum Interrupter and associated components, i.e. adapter etc. (if any).
- Dispatch of Prototypes shall be organized by BHEL from Bhopal works to Test Lab.
- Type tests must be completed within 18 weeks from dispatch of breakers from Bhopal for item sl no 1 to 8 of Table1 and 24 weeks for item sl no 9. If the Type Tests are not successful, then the offer of the vendor will be cancelled without any financial liability on either side.

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ix. **Scope of conducting following mandatory tests (as per IEC 62271-100 for MV Switchgear) is as below-**

A | Short-time withstand current and peak withstand current tests.
Short-circuit current making and breaking tests.
A- Is in scope of Vendor as stated in clause 2.v.

B | Dielectric Test.
Temperature rise test.
Mechanical operation test.
Measurement of the resistance of main contact.
Additional tests on Auxiliary & Control Circuit.
B- Is in scope of BHEL Bhopal.

x. After Receipt of successful Type Test reports from vendor for
a) Short-time withstand current and peak withstand current tests.
b) Short-circuit current making and breaking tests, RC will be finalized and PO will be placed for desired quantity.

xi. Vacuum Interrupters samples after Type testing shall be returned to vendor. It shall be collected by vendor from Bhopal works.

7. Guarantee and Warranty :

The product shall have a guarantee of three years from date of supply.

8. Identification & traceability

Each interrupter shall have identification label giving following information:-

- Name of manufacturer.
- Rating of vacuum interrupter
- Sl. No. of the interrupter and month& year of manufacture.
- Type reference of interrupter.

9. Packing instructions

One pack should contain maximum 03 no of vacuum Interrupter in Moulded Thermocol (or with alternate material) casting two half suitable to accommodate from top and bottom OR better arrangement. Vendor to get approval of the sample of packing material before first supply. Manufacturer stamp to be marked on each packing.

10. Routine Test Certificates:

Three copies of certificates shall be supplied along with consignment giving the following information.

BHEL Order No.
Manufacturer's/Supplier's Name.
Batch/Lot No.
Quantity Supplied.
Dimension and Test report of Vacuum Interrupter as per approved quality plan.

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11. Acceptance criterion (to be noted by supplier)

Acceptance criteria for bulk supply will be as below:-

- i. Identification and tractability label on each Vacuum Interrupter as per clause 8.
- ii. Packing as per clause 9.
- iii. Test Certificate as per clause 10.
- iv. Guarantee /Warranty Certificate as per clause 7.
- v. Visual verification and rating plate parameters (on receipt at BHEL).

12. Deviations:

Deviation, if any, shall be clearly brought out at the offer stage itself by the vendor or else shall be deemed meeting all specification requirements.

13. Rejection And Replacement:

If the material does not comply with the requirements of this product standard during receipt & inspection at BHEL or if any defect is found during further processing of the material, BHEL reserves the right to reject the whole consignment notwithstanding any previous certification of satisfactory testing and/or inspection and the supplier shall replace the materials free of cost immediately so as not to hamper BHEL's further assembly plan.

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Datasheet (to be filled by vendor for each offered type of Vacuum Interrupter)

Sl.no	Description	Parameters	Unit
	Vacuum Interrupter Make & Type Reference:		
ELECTRICAL RATINGS,			
1	Rated Frequency		Hertz
2	Rated Maximum Line-to-Ground Voltage		Kilovolts (rms)
3	Rated Power Frequency Withstand Voltage		Kilovolts (rms)
4	Rated Impulse Withstand Voltage		Kilovolts (Peak)
5	Rated Normal Current		Amperes
6	Contact Resistance		Micro Ohms
7	Rated Short Circuit Current (Symmetrical)		Kilo Amps
8	Rated Short Circuit Breaking Current percentage d.c		%
9	@ required added force		Kilo Amps
10	Rated duration of Short Circuit		Seconds
MECHANICAL DATA			
11	Interrupter Weight		Kilograms
12	Moving Part Weight		Kilograms
13	Contact Force from Atmospheric Pressure		Kilograms force
MECHANICAL REQUIREMENTS			
14	Contact Stroke		Millimeter
15	Opening Speed, Average to 75% of Rated Stroke		Meter/second
16	Over travel During Opening, Max		Millimeter
17	Closing Speed, Average of Last 33% of Rated Stroke		Meter/Second
18	Contact Bounce Duration, Max		Second
19	Added Force for Short-Circuit Making Current (Minimum)		Kilogram force
LIFE			
20	Mechanical Life:		
21	@ Required Contact Stroke		Operations
22	Contact Erosion Limit		Millimeter
23	Electrical Life:		
24	@Rated Continuous Current		Operations
25	@ 10 kA Short Circuit Current		Operations
26	@ Rated Short Circuit Current Minimum Electrical life at rated short circuit current should be 100 operations Bidder to furnish basis for claiming Electrical life of the offered interrupter.		Operations
27	Mechanical life > 30000 operations Bidder to furnish basis for claiming mechanical life of the offered interrupter		Yes/No
28	Applicable de-rating factor for use of interrupter at an elevated ambient temperature of 500C. as against 400C reference ambient temperature of IEC IEC: 62271-100,		Yes/No

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	IEC: 60265-1 and IEC: 60694.		
29	Anti-twist arrangement for bellows to be provided.		Details to be mentioned in the Outline drawings to be submitted
30	External insulation if any, to obtain desired insulation level shall be part of interrupter only.		Details to be mentioned in the Outline drawings to be submitted.
31	Interrupter to be fixed in the assembly from fixed contact side of VI.		Details to be mentioned in the Outline drawings to be submitted.
32	Wear indication mark shall be provided on moving stem of VI.		Details to be mentioned in the Outline drawings to be submitted
33	Electrical Conditioning through High Voltage shall be done by supplier before dispatch		Details to be furnished
34	Electrical life at rated short circuit current, 50% of rated short circuit current and rated normal current.		

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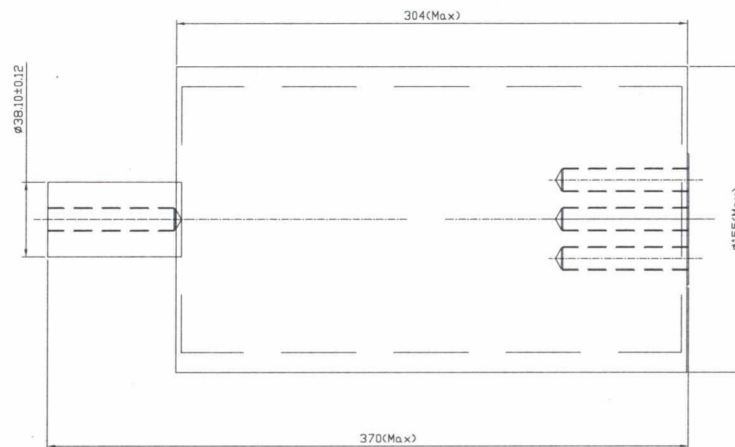
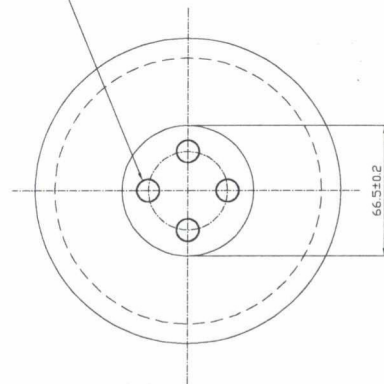
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FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 35170000052

4-M12 AT PCD 40



SPECIFICATION OF VACUUM INTERRUPTER

ELECTRICAL RATING DATA

RATED VOLTAGE	:	36 kV
RATED CURRENT	:	2500A
RATED SHORT-CIRCUIT BREAKING CURRENT	:	40 KA
RATED PEAK SHORT CIRCUIT MAKING CURRENT	:	100 KA
RATED PEAK WITHSTAND CURRENT	:	100 KA
RATED SHORT TIME WITHSTAND CURRENT(3s)	:	40 KA

RATED INSULATION LEVEL

RATED POWER-FREQUENCY WITHSTAND VOLTAGE	:	70 kV
RATED LIGHTENING IMPULSE WITHSTAND VOLTAGE	:	170kV

ELECTRICAL LIFE

AT RATED NORMAL CURRENT	:	20000 OPERATIONS
AT RATED SHORT-CIRCUIT CURRENT	:	30 OPERATIONS

MECHANICAL DATA

CONTACT STROKE	:	20±1mm
MECHANICAL LIFE	:	30000 OPERATIONS
OPENING SPEED AVERAGE TO 75 % OF RATED STROKE)	:	1.2-1.6 M/S
CLOSING SPEED AVERAGE OF LAST 33% OF RATED STROKE)	:	0.9-1.2 M/S
MAX. CLOSING FORCE	:	4360 N

VAR00	REMARKS	VAR NO.	ITEM NO.	DESCRIPTION	STD	DRAWING NO.	IT.NO.	MATL. CODE	MATL. SPCN.	UNIT WT.	QTY.	CS	ZONE
65		75	78 79	25 27	29	58 59 60	77	29 31 34	45	55 56 57	58	65 72	
								32 33 46	54	68	71		
								VAR.					

28 → CARD TYPE-3

28 → CARD TYPE-1

28 → CARD TYPE-2

ADDITIONAL INFORMATION

STATUS OF DRAWING

DISTRIBUTION OF PRINTS

O.COPY-----1
SWM-----3
TCX-----1

उत्पाद का प्रकार या
ग्राहक/परियोजना का नाम
TYPE OF PRODUCT OR
NAME OF CUSTOMER/PROJECT

(GVM-36)



भारत हेवी इलेक्ट्रिकल्स लिमिटेड
भोपाल
BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

क्रमांक/DRN	नाम/NAME	हस्ताक्षर/SIGN	दिनांक/DATE	से. र. की संख्या/NO. OF VAR
AKN			30.04.20	
RRR			30.04.20	
SKP			30.04.20	

विभाग
DEPT. SWE

उत्प. टूल. नाप की श्रेणी
UNTD. DIMS. GR.



उत्पाद
SCALE

भारत भार. भार.
WEIGHT (KG.)

उत्प. ड्राइंग का संदर्भ
REF. TO ASSY. DRG.

मद. क. संख्या/ITEM NO.

मद. संख्या/NO. OF ITEM

शीर्षक/TITLE

VACUUM INTERRUPTER 36kV,40kA,2500A

उत्प. सं. क./DRAWING NO.

35170000052

पुन./REV

00

पृष्ठ सं./SHT. No.

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पृष्ठों की संख्या/NO. OF SHT.

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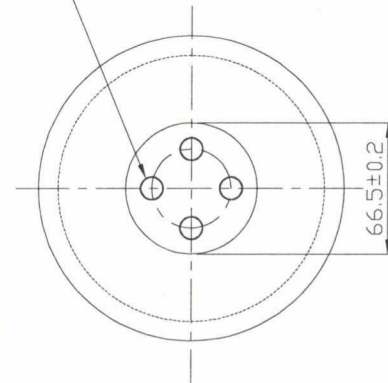
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FIRST ANGLE PROJECTION

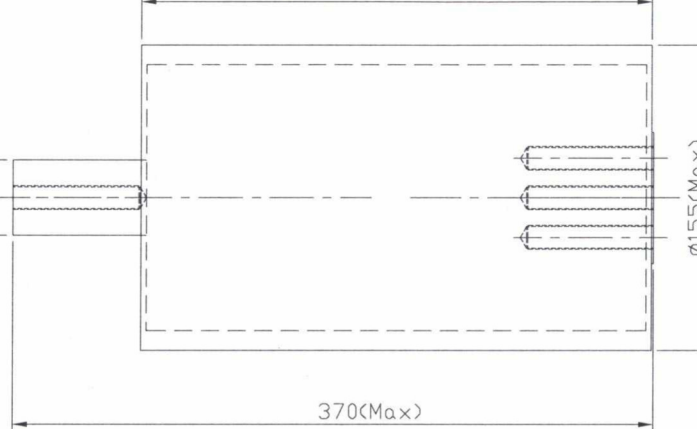
(ALL DIMENSIONS ARE IN mm)

DRG. NO. 35170000052

4-M12 AT PCD 40


 $\phi 38.10 \pm 0.12$
 66.5 ± 0.2

304(Max)



370(Max)

 $\phi 155(\text{Max})$

SPECIFICATION OF VACUUM INTERRUPTER

ELECTRICAL RATING DATA

RATED VOLTAGE	: 36 kV
RATED CURRENT	: 2500A
RATED SHORT-CIRCUIT BREAKING CURRENT	: 31.5 KA
RATED PEAK SHORT CIRCUIT MAKING CURRENT	: 78.25 KA
RATED PEAK WITHSTAND CURRENT	: 78.25 KA
RATED SHORT TIME WITHSTAND CURRENT(3s)	: 31.5 KA

RATED INSULATION LEVEL

RATED POWER-FREQUENCY WITHSTAND VOLTAGE	: 70 kV
RATED LIGHTENING IMPULSE WITHSTAND VOLTAGE	: 170kV

ELECTRICAL LIFE

AT RATED NORMAL CURRENT	: 20000 OPERATIONS
AT RATED SHORT-CIRCUIT CURRENT	: 100 OPERATIONS

MECHANICAL DATA

CONTACT STROKE	: 20±1mm
MECHANICAL LIFE	: 30000 OPERATIONS
OPENING SPEED AVERAGE TO 75 % OF RATED STROKE	: 1.2-1.6 M/S
CLOSING SPEED AVERAGE OF LAST 33% OF RATED STROKE	: 0.9-1.2 M/S
MAX. CLOSING FORCE	: 4360 N

REF. DRG. NO.

SIGN. & DATE

INVENTORY NO.

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28 → CARD TYPE-3

28 → CARD TYPE-1

28 → CARD TYPE-2

ADDITIONAL INFORMATION

STATUS OF DRAWING

DISTRIBUTION OF PRINTS

O.COPY-----1
 SWM-----3
 TCX-----1

उत्पाद का प्रकार या
 ग्राहक/परियोजना का नाम
 TYPE OF PRODUCT OR
 NAME OF CUSTOMER/PROJECT

(GVM-36)



भारत हेवी इलेक्ट्रिकल्स लिमिटेड
 भोपाल
 BHARAT HEAVY ELECTRICALS LTD.
 BHOPAL

क्रमांक DRN	नाम/NAME	हस्ता/ SIGN	दिनांक/DATE	वे. र. की संख्या NO. OF VAR
अंश CHK	AKN		30.04.20	
अनुमोदित APPD	RRR		30.04.20	
	SKP		30.04.20	

विभाग DEPT	उत्प. टंक. माप की श्रेणी UNITS.DIMS. GR.	उत्सृपात SCALE	भार. वजन WEIGHT (K.G.)	उत्प. ड्राइंग का संदर्भ REF. TO ASSY. DRG.	मद. क्र. ITEM NO.	मद. संख्या NO. OF ITEM
SWE		1:1			001	001

शीर्षक/TITLE
 VACUUM INTERRUPTER 36kV,31.5kA,2500A

उत्प्रेषण क्र./DRAWING NO.

35170000051

पुन./REV

00

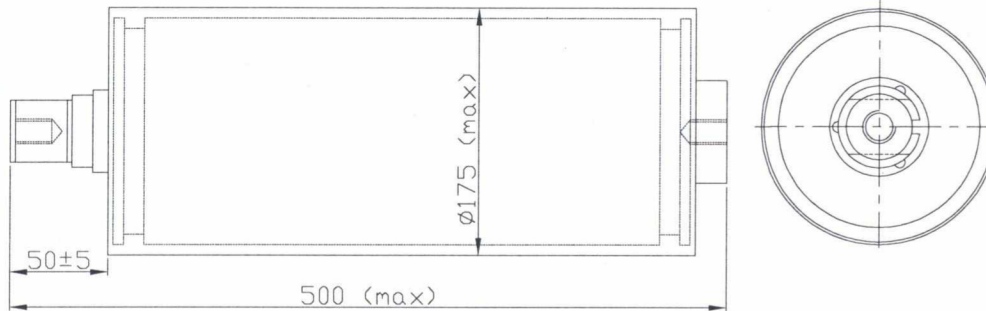
पृष्ठ क्र./SHT. No. 01

पृष्ठों की संख्या/NO. OF SHT. 01

A3

35190000510

DRG. NO.



ITEM 001

RATED VOLTAGE	:	27.5 KV
RATED NORMAL CURRENT	:	2000A
RATED SHORT-CIRCUIT BREAKING CURRENT	:	25 KA
RATED PEAK SHORT CIRCUIT MAKING CURRENT	:	63 KA
RATED PEAK WITHSTAND CURRENT	:	63 KA
RATED SHORT TIME WITHSTAND CURRENT(3s)	:	25 KA

RATED POWER-FREQUENCY WITHSTAND VOLTAGE : 95 KV
RATED LIGHTENING IMPULSE WITHSTAND VOLTAGE : 250KV

AT RATED NORMAL CURRENT	:	20000 OPERATIONS
AT RATED SHORT-CIRCUIT CURRENT	:	30 OPERATIONS

CONTACT STROKE	: 23±1mm
MECHANICAL LIFE	: 20000 OPERATIONS
AVERAGE OPENING SPEED (70% STROKE)	: 1.3-1.8 M/S
AVERAGE CLOSING SPEED (70% STROKE)	: 1.0-1.7 M/S
MAX. CLOSING FORCE	: 3600 N

	SG12761		001	VACUUM INTERRUPTER 27.5kV, 2000A, 25kA						KG	- 001	-	-
VAR DD	REMARKS	VAR. NO.	ITEM NO	DESCRIPTION	STD.	DRAWING NO.	IT.NO	MATL. CODE	CIA	UNIT	UNIT WT.	G.S.	ZONE
							VAR	MATL. SPECN.			QTY.		

भारत हेवी इलेक्ट्रिकल्स लिमिटेड
भोपाल
BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

कलाकार DRN	नाम/ NAME	हस्ता/ SIGN	दिनांक/ DATE	वे.र. की संख्या NO. OF VAR
जै चा CKD	A.K.	Sd-	08.05.20	
अनुमोदित APPO	A.K.	Sd-	08.05.20	
	A.D.	Sd-	08.05.20	-

विभाग DEPT	SWE	उल. टन. नाप की श्रेणी UNTL.DIMS. GR.		उत्पात SCALE	भार कि.ग्रा. WEIGHT (KG.)	उसे. ड्राईंग का संदर्भ REF. TO ASSY. DRG.	सद. क्र. ITEM NO.	सद. संख्या NO. OF ITEM
कोड CODE	409	M		NTS				001

शीर्षक/ TITLE

VACUUM INTERRUPTER
27.5kV, 2000A, 25kA

आरेख क्रं./ DRAWING NO.

35190000510

ප්‍රථම ක්/SHT. No.01

पृष्ठों की संख्या/ NO. OF SHT. 01

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

35210005506

DRG. NO.

SPECIFICATION OF VACUUM INTERRUPTER

ELECTRICAL RATING DATA

RATED VOLTAGE : 36 KV
 RATED NORMAL CURRENT : 2000 A
 RATED SHORT-CIRCUIT BREAKING CURRENT : 26.3 KA
 RATED PEAK SHORCIRCUIT MAKING CURRENT : 65.75 KA
 RATED PEAK WITHSTAND CURRENT : 65.75 KA
 RATED SHORT TIME WITHSTAND CURRENT(3s) : 26.3 KA

RATED INSULATION LEVEL

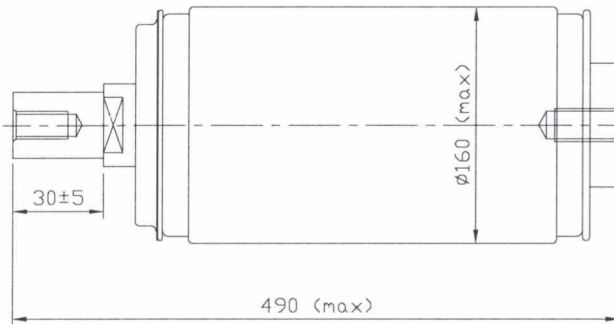
RATED POWER-FREQUENCY WITHSTAND VOLTAGE : 70 KV
 RATED LIGHTNING IMPULSE WITHSTAND VOLTAGE : 170KV

ELECTRICAL LIFE

AT RATED NORMAL CURRENT : 20000 OPERATIONS
 AT RATED SHORT-CIRCUIT CURRENT : 30 OPERATIONS

MECHANICAL DATA

CONTACT STROKE : 20±1mm
 MECHANICAL LIFE : 30000 OPERATIONS
 AVERAGE OPENING SPEED (0 TO 6mm STROKE) : 1.0-1.8 M/S
 AVERAGE CLOSING SPEED (6 TO CONTACT MARKING) : 0.8-1.0 M/S
 MIN. CLOSING FORCE * : 2 MS
 MIX. CLOSING FORCE * : 5000 N
 FORCE REQUIRED TO HOLD CONTACTS OPEN : 5700 N
 AT FULL STROKE**
 CONTACT EROSION LIMIT INCLUDING MECHANICAL SHORTENING : 310±10% N



ITEM 006

VAR NO	REMARKS	VAR NO.	ITEM NO	DESCRIPTION	DRAWING NO.	IT.NO	MATL. CODE	UNIT	KG.	UNIT WT.	QTY.	G.S.	ZONE
				VACUUM INTERRUPTER 36kV, 2000A, 26.3 KA						001			
						VAR	MATL. SPECN.						

ADDITIONAL INFORMATION

STATUS OF DRAWING

DISTRIBUTION OF PRINTS

TCX

1

उत्पाद का प्रकार या
 ग्राहक/परियोजना का नाम
 TYPE OF PRODUCT OR
 NAME OF CUSTOMER/PROJECT



भारत हेवी इलेक्ट्रिकल्स लिमिटेड
 भोपाल
 BHARAT HEAVY ELECTRICALS LTD.
 BHOPAL

क्रमांक	नाम/ NAME	हस्ता/ SIGN	दिनांक/ DATE	वेरि. की संख्या
DRN	A.K.	Sd-	05.03.20	NO. OF VAR
CHK	A.K.	Sd-	05.03.20	
APPD	A.D.	Sd-	05.03.20	

डिजाइन	उत्प. टोल. नाप की श्रेणी	उत्पाद	भारत हेवी इलेक्ट्रिकल्स लिमिटेड	उत्प. टोल. नाप की श्रेणी	उत्पाद	भारत हेवी इलेक्ट्रिकल्स लिमिटेड
DEPT SWE	UNTOL.DIMS. GR.	SCALE	M	SCALE	SCALE	SCALE
कोड 409		NTS				

ड्राइंग/ TITLE	ड्राइंग/ TITLE	ड्राइंग/ TITLE	ड्राइंग/ TITLE	ड्राइंग/ TITLE	ड्राइंग/ TITLE	ड्राइंग/ TITLE

VACUUM INTERRUPTER

ड्राइंग नं./ DRAWING NO.
 35210005506

ड्राइंग की संख्या/ NO. OF SHT. 06
 ड्राइंग की संख्या/ NO. OF SHT. 06

A3

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

SIGN. & DATE

INVENTORY NO.

REF. DRG. NO.

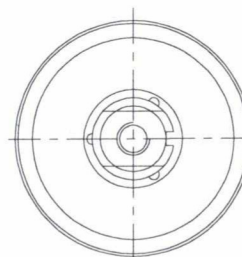
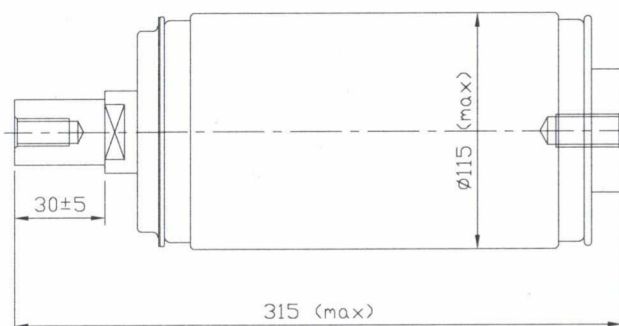
REV.	DATE	ALTERED
		CHECKED
		APPROVED

REV.	DATE	ALTERED
		CHECKED
		APPROVED

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

35210005506 DRG. NO.



ITEM 005

SPECIFICATION OF VACUUM INTERRUPTER

ELECTRICAL RATING DATA

RATED VOLTAGE : 36 KV
RATED NORMAL CURRENT : 2500 A
RATED SHORT-CIRCUIT BREAKING CURRENT : 26.3 KA
RATED PEAK SHORCIRCUIT MAKING CURRENT : 65.75 KA
RATED PEAK WITHSTAND CURRENT : 65.75 KA
RATED SHORT TIME WITHSTAND CURRENT(3s) : 26.3 KA

RATED INSULATION LEVEL

RATED POWER-FREQUENCY WITHSTAND VOLTAGE : 70 KV
RATED LIGHTNING IMPULSE WITHSTAND VOLTAGE : 170KV

ELECTRICAL LIFE

AT RATED NORMAL CURRENT : 20000 OPERATIONS
AT RATED SHORT-CIRCUIT CURRENT : 30 OPERATIONS

MECHANICAL DATA

CONTACT STROKE : 20±1mm
MECHANICAL LIFE : 30000 OPERATIONS
AVERAGE OPENING SOEED (0 TO 6mm STROKE) : 1.0-1.8 M/S
AVERAGE CLOSING SOEED (6 TO CONTACT MARKING) : 0.8-1.0 M/S
MIN. CLOSING FORCE * : 2 MS
MIX. CLOSING FORCE * : 5000 N
FORCE REQUIRED TO HOLD CONTACTS OPEN : 5700 N
AT FULL STROKE**
CONTACT EROSION LIMIT INCLUDING : 310±10% N
MECHANICAL SHORTENING

VAR 00	REMARKS	VAR. NO.	ITEM NO	DESCRIPTION	STD.	DRAWING NO.	IT.NO	MATL. CODE	A	UNIT	KG.	UNIT WT.	QTY.	U.	ZONE
				VACUUM INTERRUPTER 36kV, 2500A, 26.3KA											

ADDITIONAL INFORMATION

STATUS OF DRAWING

DISTRIBUTION OF PRINTS

TCX

1

उत्पाद का प्रकार या
ग्राहक/परियोजना का नाम
TYPE OF PRODUCT OR
NAME OF CUSTOMER/PROJECT



भारत हेवी इलेक्ट्रिकल्स लिमिटेड
भोपाल
BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

क्रमांक/	नाम/ NAME	हस्ता/ SIGN	दिनांक/ DATE	वेर. की
DRN	A.K.	Sd-	05.03.20	NO. OF
चैक/	A.K.	Sd-	05.03.20	VAR
अनुमोदित	A.D.	Sd-	05.03.20	

विभाग	उत्प. टल. नाप की श्रेणी	उत्पाद	भार	उत्प. टल. नाप की श्रेणी	उत्पाद	भार
DEPT	UNTOLDIMS. GR.	SCALE	WEIGHT (K.G.)	DEPT	UNTOLDIMS. GR.	SCALE
कोड	M	NTS		कोड	M	NTS

शीर्षक/ TITLE

VACUUM INTERRUPTER

उत्प. टल. नाप की श्रेणी

35210005506

पृष्ठों की संख्या/ NO. OF SHI.06

पृष्ठों की संख्या/ NO. OF SHI.06

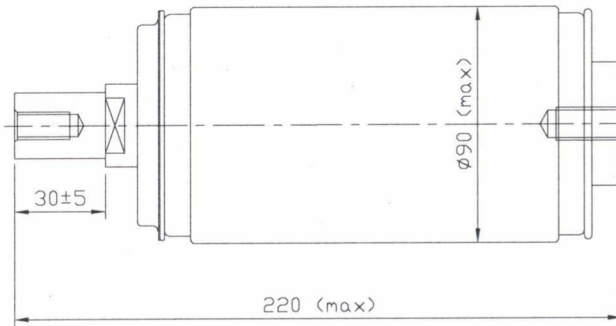
A3

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

90990001293

DRG. NO.



ITEM 004

SPECIFICATION OF VACUUM INTERRUPTER

ELECTRICAL RATING DATA

RATED VOLTAGE : 12 KV
RATED NORMAL CURRENT : 1250 A
RATED SHORT-CIRCUIT BREAKING CURRENT : 26.3 KA
RATED PEAK SHORCIRCUIT MAKING CURRENT : 65.75 KA
RATED PEAK WITHSTAND CURRENT : 65.75 KA
RATED SHORT TIME WITHSTAND CURRENT(3s) : 26.3 KA

RATED INSULATION LEVEL

RATED POWER-FREQUENCY WITHSTAND VOLTAGE
RATED LIGHTNING IMPULSE WITHSTAND VOLTAGE

ELECTRICAL LIFE

AT RATED NORMAL CURRENT : 20000 OPERATIONS
AT RATED SHORT-CIRCUIT CURRENT : 30 OPERATIONS

MECHANICAL DATA

CONTACT STROKE : 6 ± 1 mm
MECHANICAL LIFE : 30000 OPERATIONS
AVERAGE OPENING SPEED (0 TO 6 mm STROKE) : 1.0-1.8 M/S
AVERAGE CLOSING SPEED (6 TO CONTACT MARKING) : 0.8-1.0 M/S
MIN. CLOSING FORCE * : 2 MS
MIX. CLOSING FORCE * : 5000 N
FORCE REQUIRED TO HOLD CONTACTS OPEN : 5700 N
AT FULL STROKE**
CONTACT EROSION LIMIT INCLUDING : 310 ± 10% N
MECHANICAL SHORTENING

VAR 00	REMARKS	VAR. NO.	ITEM NO.	DESCRIPTION	STD	DRAWING NO.	IT. NO.	MATL. CODE	UNIT	QTY.	U S	ZONE
				VACUUM INTERRUPTER 12kV,1250A,26.3 KA					KG	001		
							VAR	MATL. SPECN.				

ADDITIONAL INFORMATION

STATUS OF DRAWING

DISTRIBUTION OF PRINTS

TCX

1

उत्पाद का प्रकार या
ग्राहक/परियोजना का नाम
TYPE OF PRODUCT OR
NAME OF CUSTOMER/PROJECT



भारत हेवी इलेक्ट्रिकल्स लिमिटेड
भोपाल
BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

क्रमांक DRN	नाम / NAME	हस्ता/ SIGN	दिनांक/ DATE	वे. र. की संख्या NO. OF VAR
जि.वा. CHKD	A.K.	Sd-	05.03.20	
अनुमोदित APPD	A.K.	Sd-	05.03.20	
	A.D.	Sd-	05.03.20	

विभाग
DEPT SWE
कोड
CODE 409

उत्प. टोल. नाप की श्रेणी
UNTO. DIMS. GR.
M



उत्पात
SCALE
NTS

भार. वजन
WEIGHT (KG)

उत्प. दुर्घटा का संदर्भ
REF. TO ASSY. DRG.

मद. व.
ITEM NO.

मद. संख्या
NO. OF
ITEM
005

शीर्षक/ TITLE

VACUUM INTERRUPTER

उत्प. सं. / DRAWING NO.

35210005506

पृष्ठ सं./SHT. No. 04

पृष्ठों की संख्या/ NO. OF SHT. 05

A3

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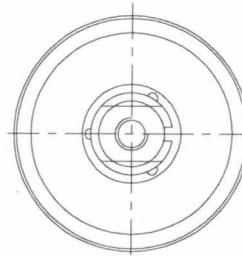
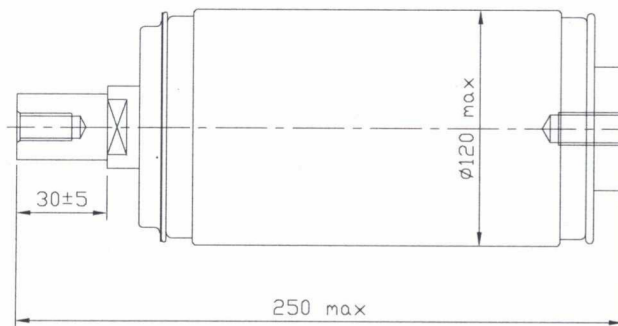
INVENTORY NO. SIGN. & DATE REF. DRG. NO.

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

90990001293

DRG. NO.



ITEM 003

SPECIFICATION OF VACUUM INTERRUPTER

ELECTRICAL RATING DATA

RATED VOLTAGE	:	12 KV
RATED NORMAL CURRENT	:	2000 A
RATED SHORT-CIRCUIT BREAKING CURRENT	:	26.3 KA
RATED PEAK SHORCIRCUIT MAKING CURRENT	:	65.75 KA
RATED PEAK WITHSTAND CURRENT	:	65.75 KA
RATED SHORT TIME WITHSTAND CURRENT(3s)	:	26.3 KA

RATED INSULATION LEVEL

RATED POWER-FREQUENCY WITHSTAND VOLTAGE	:	35 KV
RATED LIGHTNING IMPULSE WITHSTAND VOLTAGE	:	95KV

ELECTRICAL LIFE

AT RATED NORMAL CURRENT	:	20000 OPERATIONS
AT RATED SHORT-CIRCUIT CURRENT	:	30 OPERATIONS

MECHANICAL DATA

CONTACT STROKE	:	6±1mm
MECHANICAL LIFE	:	30000 OPERATIONS
AVERAGE OPENING SPEED (0 TO 6mm STROKE)	:	1.0-1.8 M/S
AVERAGE CLOSING SPEED (6 TO CONTACT MARKING)	:	0.8-1.0 M/S
MIN. CLOSING FORCE *	:	2 MS
MIX. CLOSING FORCE *	:	5000 N
FORCE REQUIRED TO HOLD CONTACTS OPEN AT FULL STROKE**	:	5700 N
CONTACT EROSION LIMIT INCLUDING MECHANICAL SHORTENING	:	310±10% N

VAR 00	REMARKS	VAR. NO.	ITEM NO	DESCRIPTION	DRAWING NO.	IT. NO	MATL. CODE	UNIT	QTY.	ZONE
				VACUUM INTERRUPTER 12kV, 2000A, 26.3 kA				KG	001	
						VAR	MATL. SPECN.			

ADDITIONAL INFORMATION

STATUS OF DRAWING

DISTRIBUTION OF PRINTS

TCX

1

REV.	DATE	ALTERED
CHECKED		
APPROVED		

REV.	DATE	ALTERED
CHECKED		
APPROVED		

उत्पाद का प्रकार या
ग्राहक/परियोजना का नाम
TYPE OF PRODUCT OR
NAME OF CUSTOMER/PROJECTभारत हेवी इलेक्ट्रिकल्स लिमिटेड
भोपाल
BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

कम/NAME	हस्ता/ SIGN	दिनांक/ DATE	वे. की संख्या NO. OF VAR
A.K.	Sd-	05.03.20	
A.K.	Sd-	05.03.20	
A.D.	Sd-	05.03.20	

विभाग
DEPT SWE उल. दल. नाप की श्रेणी
UNTOLDIMS. GR. Mउत्पाद
SCALE NTSभारत
WEIGHT (K.G.)उत्पा. दुर्घटा का संदर्भ
REF. TO ASSY. DRG.मद. क.
ITEM NO. मद. संख्या
NO. OF
ITEM

शीर्षक/ TITLE

VACUUM INTERRUPTER

उत्प्रेस की/ DRAWING NO.

35210005506

पृष्ठ की/ SHT. No. 03

पृष्ठों की संख्या/ NO. OF SHT. 06

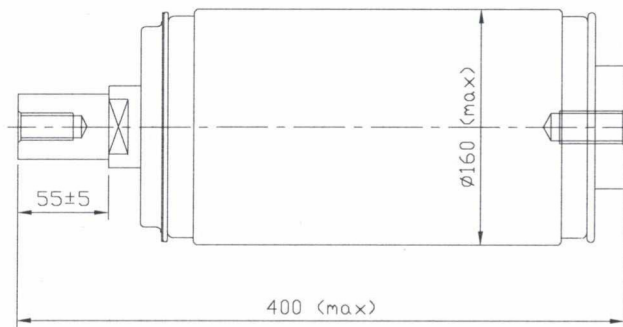
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FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

35210005506

DRG. NO.



ITEM 001

SPECIFICATION OF VACUUM INTERRUPTER

ELECTRICAL RATING DATA

RATED VOLTAGE	: 12 KV
RATED NORMAL CURRENT	: 3150 A
RATED SHORT-CIRCUIT BREAKING CURRENT	: 40/44 KA
RATED PEAK SHORCIRCUIT MAKING CURRENT	: 102/112 KA
RATED PEAK WITHSTAND CURRENT	: 102/112 KA
RATED SHORT TIME WITHSTAND CURRENT(3s)	: 40/44 KA

RATED INSULATION LEVEL

RATED POWER-FREQUENCY WITHSTAND VOLTAGE	: 35 KV
RATED LIGHTNING IMPULSE WITHSTAND VOLTAGE	: 95KV

ELECTRICAL LIFE

AT RATED NORMAL CURRENT	: 20000 OPERATIONS
AT RATED SHORT-CIRCUIT CURRENT	: 30 OPERATIONS

MECHANICAL DATA

CONTACT STROKE	: 11±1mm
MECHANICAL LIFE	: 30000 OPERATIONS
AVERAGE OPENING SPEED (0 TO 6mm STROKE)	: 1.0-1.8 M/S
AVERAGE CLOSING SPEED (6 TO CONTACT MARKING)	: 0.8-1.0 M/S
MIN. CLOSING FORCE *	: 2 MS
MIX. CLOSING FORCE *	: 5000 N
FORCE REQUIRED TO HOLD CONTACTS OPEN	: 5700 N
AT FULL STROKE**	
CONTACT EROSION LIMIT INCLUDING MECHANICAL SHORTENING	: 310±10% N

VAR 00	REMARKS	VAR. NO.	ITEM NO	DESCRIPTION	STD	DRAWING NO.	IT.NO	MATL. CODE	A	UNIT	UNIT WT.	QTY.	U	SIZE
				VACUUM INTERRUPTER 12kV, 3150A, 44kA					KG		001			
									C					

ADDITIONAL INFORMATION

STATUS OF DRAWING

DISTRIBUTION OF PRINTS

TCX

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उत्पाद का प्रकार या
ग्राहक/परियोजना का नाम
TYPE OF PRODUCT OR
NAME OF CUSTOMER/PROJECT



भारत हेवी इलेक्ट्रिकल्स लिमिटेड
भोपाल
BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

क्रमांक DRN	नाम/ NAME	हस्ता/ SIGN	दिनांक/ DATE	वे. र. की संख्या NO. OF VAR
जे. या CKD	A.K.	Sd-	05.03.20	
उत्तुमोदित APPD	A.D.	Sd-	05.03.20	

विभाग DEPT	SWE	उत्प. टोल. नाप की श्रेणी UNTO.DIMS. GR.	M	उत्तुपात SCALE	NTS	भार. वजन WEIGHT (KG)	उत्प. दृष्टिगत का संदर्भ REF. TO ASSY. DRG.	सद. क्र. ITEM NO.	सद. संख्या NO. OF ITEM
कोड CODE	409								005

शीर्षक/ TITLE

VACUUM INTERRUPTER

उत्प. क्र. / DRAWING NO.

35210005506

पुन. / REV

00

पृष्ठ क्र./SHT. No.02

पृष्ठों की संख्या/ NO. OF SHT.06

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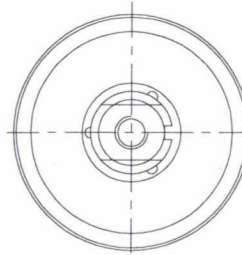
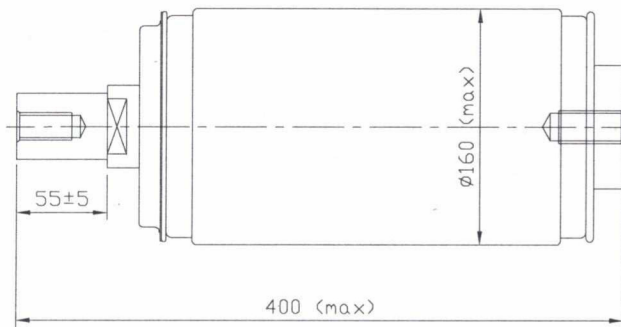
22

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

90990001298

DRG. NO.



ITEM 001

SPECIFICATION OF VACUUM INTERRUPTER

ELECTRICAL RATING DATA

RATED VOLTAGE	: 12 KV
RATED NORMAL CURRENT	: 4000A
RATED SHORT-CIRCUIT BREAKING CURRENT	: 50 KA
RATED PEAK SHORT CIRCUIT MAKING CURRENT	: 125 KA
RATED PEAK WITHSTAND CURRENT	: 125 KA
RATED SHORT TIME WITHSTAND CURRENT(3s)	: 50 KA

RATED INSULATION LEVEL

RATED POWER-FREQUENCY WITHSTAND VOLTAGE	: 35 KV
RATED LIGHTNING IMPULSE WITHSTAND VOLTAGE	: 95KV

ELECTRICAL LIFE

AT RATED NORMAL CURRENT	: 20000 OPERATIONS
AT RATED SHORT-CIRCUIT CURRENT	: 30 OPERATIONS

MECHANICAL DATA

CONTACT STROKE	: 11±1mm
MECHANICAL LIFE	: 30000 OPERATIONS
AVERAGE OPENING SPEED (70% STROKE)	: 1.0-1.8 M/S
AVERAGE CLOSING SPEED (70% STROKE)	: 0.8-1.0 M/S
MAX. CLOSING FORCE	: 5000 N

VAR 00	REMARKS	VAR. NO.	ITEM NO	DESCRIPTION	STD	DRAWING NO.	IT.ND	MATL. CODE	A	UNIT	KG	UNIT WT.	QTY.	ZONE
			001	VACUUM INTERRUPTER 12kV, 4000A, 50kA								001		
							VAR	MATL. SPECN.	C					

ADDITIONAL INFORMATION

STATUS OF DRAWING

DISTRIBUTION OF PRINTS

TCX

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उत्पाद का प्रकार या
ग्राहक/परियोजना का नाम
TYPE OF PRODUCT OR
NAME OF CUSTOMER/PROJECTभारत हेवी इलेक्ट्रिकल्स लिमिटेड
भोपाल
BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

क्रमांक DRN	नाम / NAME	हस्ता/ SIGN	दिनांक/ DATE	वे. की संख्या NO. OF VAR
	A.K.	Sd-	05.03.20	
जोड़ा CKD	A.K.	Sd-	05.03.20	
अनुमोदित APPD	A.D.	Sd-	05.03.20	

सिमा
DEPT SWE अन. दल. नाम की श्रेणी
UNTD.DIMS. GR.अनुपात
SCALEभार. वजन
WEIGHT (KG)उत्प. दुर्घटा का संदर्भ
REF. TO ASSY. DRG.मद. क्र.
ITEM NO.मद. संख्या
NO. OF
ITEM

शीर्षक/ TITLE

VACUUM INTERRUPTER
12kV, 4000A, 50kA

उत्प. क्र./ DRAWING NO.

35210005506

पृष्ठ क्र./SHT. No.01

पृष्ठों की संख्या/ NO. OF SHT.01

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