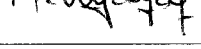
PRODUCT STANDARD
EDC-ECI
BAP/BHEL/RANIPET – 632 406

TECI:EOH:GEN:REV 00
EFFECTIVE DATE 01.12.2012

TITLE : TECHNICAL SPECIFICATION FOR BOUGHT ITEMS FOR ESP

ITEM : ELECTRICALLY OPERATED HOIST

CUSTOMER : GENERAL SPECIFCATION FOR NTPC & NON NTPC PROJECTS

	NAME	DESIGNATION	SIGNATURE	DATE
PREPARED	M.VIJAYALAKSHMI	JST		01.12.2012
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ISSUED BY

EDC – ECI

REVISION NO:00

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1.0.0 **SCOPE:**

This specification covers the design, material constructional features, manufacture, testing, inspection, packing, erection supervision, commissioning and supply of electrically operated hoists assembly, with cross travel complete in all respect including control box, flexible trailing cable, cable trolleys, drag chain, auxiliary girder, FUSE-SWITCH unit etc. The assembly shall be complete in all respect ready for erection & commissioning. Operation & Maintenance manual in required number of copies shall be supplied.

2.0.0 **PROJECT INFORMATION:**

2.1.1	Ambient Temperature	:	5 deg. C to 50 deg.
2.1.2	Design ambient temperature	:	50 deg.
2.1.3	Relative humidity	:	100% RH
2.1.4	Location	:	Outdoor
2.1.5	Atmospheric condition	:	The atmosphere is heavily dusty with abrasive dust and coal particles present in large quantity. The climate is tropical, conducive to fungus growth.
2.1.6	Supply	:	3 ph, 415V AC, 50Hz
2.1.7	Tolerance in voltage	:	±10%
2.1.8	Tolerance in frequency	:	±5%
2.1.9	Tolerance in Voltage & Frequency	:	±10% (absolute sum)

2.2.0 **APPLICATION**

The electrical hoist and trolley is meant for handling up High Voltage Transformer Rectifier (HVR) from ground level to the roof of the Electrostatic Precipitator (ESP), position the same on rail & vice – versa. Details are as under:

2.3.0 **HOIST DATA**

Capacity	:	3 tonnes
Speed of the hoist (range)	:	5 to 10 metres per minute
Speed of cross travel (range)	:	5 to 6 metres per minute

SL. NO.	DESCRIPTION	UNIT	VARIANT-1 QTY/EOH	VARIANT-2 QTY/EOH
01	**3T EOH** assembly for lifting & cross travel including brakes, drum with Ropes suitable for **35 MR Height of Lift**, Electrical control panel, Pendant PB with control cable with link chain.	ST	**1**	**1**
02	63A FSU with enclosure suitable for outdoor installation, wall mounted.	NO	**1**	**1**
03	Trailing flexible copper cable for power supply	MR	**55**	**90**
04	Galvanized link drag chain.	MR	**44**	**77**
05	Cable trolley assembly.	ST	**20**	**30**
06	Auxiliary girder assembly for trailing cable for a cross travel length of	MR	**40**	**70**
07	Rain hood for Hoist motor, cross travel motor and control box.	ST	**1**	**1**
08	Grease gun with grease.	NO	**1**	**1**
09	10 % lubricant	ST	**1**	**1**

3.0.0 **CODES AND STANDARDS**

The applicable codes and standards are as given below (with latest amendments if any)/ equivalent international standards.

3.1.0 Electrical wire rope hoist : IS 3938

3.2.0 Service class : IS 807

3.3.0 Drum, Sheave : IS 3938

3.4.0 Gears : IS 3681, IS 7403

3.5.0 Rope : IS 2266

3.6.0 Hook : IS 3815

3.7.0 Bearings : IS 6455, IS 6457

3.8.0 Grease nipple : IS 4009

3.9.0 Motor : IS 325, IS 4691, IS 4729

3.10 Cables : IS 694 Part I&II, IS 3961, IS 1554, IS 9968, IS 6380

3.11	Structural materials	:	IS 2062
3.12	Earthing	:	IS 3043
3.13	Colour shade	:	IS 5
3.14	AC Contactors	:	IS 13947 Part - IV
3.15	HRC Cartridge fuse links up to 650V	:	IS 9224
3.16	Heavy duty air brake switches and composite units for air brake switches and fuses for voltage not exceeding 1000V	:	IS 4064
3.17	General requirements for switchgear and control gear for voltage not exceeding 1000V	:	IS 4237
3.18	Control switches for voltage up to and including 1000 V AC, 1200 V DC	:	IS 6875 (Part-I&II)

4.0.0 DESIGN REQUIREMENT

Electrical hoists and trolley shall be complete with hoisting and cross travel motor, wire rope drum, wire rope, hook, gear box for CTs hoist wheels with Trolley necessary gearing, sheaves, shoe type electromagnetic brakes for hoisting & cross travel, guides, weather and dust proof pendent push button station, & control panel, all wiring, 4 core trailing cable for power supply connection with complete supporting arrangement, pendent cable, limit switches, earthing terminals and other accessories to make system complete and ready for erection & commissioning. The hoist assembly shall be fully balanced. Limit switches shall be provided for over hoisting, over lowering and for cross travel limits at both extreme positions.

The supplier shall provide 63A fuse switch unit (FSU) with enclosure suitable for outdoor condition to receive the power supply. The FSU shall be provided with double compression cable glands and crimping type ATC lug to receive owner's Aluminium armoured/ un-armoured power cable. The FSU shall be located 5 meters away from the hoist. Control supply shall be 110V AC, 50Hz and the same shall be derived from 3ph, 415V, and 50Hz supply provided at 63A FSU. Suitable earthing terminals shall be provided in the FSU enclosure for terminating the earth conductor of the flexible trailing cable. All outdoor electrical equipments shall be suitable for IP 55 degree of protection.

5.0.0 FEATURES OF CONSTRUCTION (MECHANICAL SYSTEM)

5.1.0 DRUM

Rope drum shall be either cast/seamless/welded to sustain concentrated loads resulting from the rope pull. Drum shall be machine grooved right or left or both with grooves of a proper shape to suit the ropes used. Drum shall accommodate all the length of the rope required for the lift plus two dead wraps at each anchor point, without over lapping.

5.2.0 SHEAVES

Rope sheaves shall be of rolled or cast steel. Grooves shall be machined to the proper shape for the rope used. Sheaves shall be equipped with sheave guards to retain the rope in groove. Sheaves shall be fully guarded so that the rope cannot come off.

5.3.0 GEARS& PINIONS

Gears shall be cut from quality alloy steel of chromium& nickel and shall be heat treated suitably. Pinions shall be of heat treated alloy steel.

5.4.0 BEARINGS

Bearings shall comply with relevant IS/BS. Depending upon the capacity and loading conditions the manufacturer shall design suitable grease lubricated or oil lubricated bearings.

5.5.0 ROTATING AND STATIONERY SHAFT

Shafts and axles shall be of080M40/EN8 as per BS 970.

5.6.0 LUBRICATION

Hoist shall be supplied with all required lubricant. One number grease gun shall be supplied per project.

5.7.0 HOIST ROPE

Hoist ropes shall be of extra flexible steel rope with a well lubricated and having six strands of minimum 36 wires per strands. The rope shall be of sufficient length so that two full wraps shall remain on the drum at the extreme low position of the hook. Number of falls shall be two. Braking loads for the hoist rope shall not be less than six times the calculated load in the ropes at the drum, based on rated load on hook plus the weight of the bottom block plus the weight of the rope. Hoisting rope shall confirm to IS 2266.The rope shall be hot dip galvanised. The rope shall be free from kinks and shall be continuous.

5.8.0 **HOOK**

Hooks made of 080M40/EN-8 as per BS 970 or 30C8/35C8 as per IS 2004 material. The hooks shall be solid, forged, heat treated, high tensile steel of tough construction and shall be provided with a standard depress type safety latch. It shall have swivels and operate on bearings with hardened race. Lock to prevent hooks from unscrewing shall be provided.

5.9.0 **BRAKES**

Hoisting motor and trolley motor shall be equipped with electrically released, spring set shoe type/ disc type/ electromagnetic type brakes. The brakes shall apply when either the motor starter or the main power switch is in OFF position or in the event of "power failure". The braking capacity of the brakes shall be 150% of the rating of the hoist.

5.10.0 **ROPE GUIDE**

Rope guides shall have wear resistant property. It shall prevent slack rope and retain wire rope in the barrel grooves.

5.11.0 **LINK (DRAG) CHAIN**

Hot dip galvanized link (drag) chain shall be provided for the Flexible Trailing Cable to avoid direct loading on the cable.

5.12.0 **AUXILIARY GIRDER FOR TRAILING CABLE**

Auxiliary girder system shall be provided for the support of Flexible Trailing Cable. The trolleys for the trailing cable shall be supported by the Auxiliary girder. The Auxiliary girder will be supported by the main beam (main beam of size ISMB 450 or ISMB 400 will be supplied by the purchaser). The hoist supplier shall provide necessary support materials to support the Auxiliary Girder on the main beam at intervals not exceeding 750mm. Complete structural materials required for Auxiliary Girder system shall be included in the scope of supply of the hoist supplier.

6.0.0 **FEATURES OF CONSTRUCTION (ELECTRICAL SYSTEM)**

Electrical system comprises of 63A Fuse Switch Unit, Control panel, Pendent Push Button Station, Trailing cable, Pendent cable, Hoist & Cross travel motors with electromagnetic brake etc., to make the system complete. All these items are included in the scope of supply of the vendor.

6.1.0 **MOTOR**

The motors shall meet IS 325 or equivalent international standards. The motor shall be designed for frequent reversal, braking and acceleration similar to crane duty. Frequency of reversal shall be minimum 125 times/hour. The motor shall be rated for S4 duty 40% cyclic duration factor. Maximum continuous rating shall have at least 10% margin over maximum load demand including voltage and

frequency variations, temperature rise and other variations. The body shall have two earthing points on opposite sides.

The motor shall be provided with an enclosure fully meeting the requirements of IP 55 as per IS 4691 meant for outdoor service. In addition rain-hood shall be provided for the motors. The motor shall be Totally Enclosed Fan Cooled (TEFC) type or Totally Enclosed Surface Cooled (TESC) type.

Motors shall have minimum class "F" type insulation with temperature rise limited to class "B". The winding shall be suitable for successful operation in hot, humid, & tropical climate with the ambient temperature of 50 degree centigrade. The temperature rise shall be limited to 70 degree C (by resistance method) over an ambient of 50 degree C. The insulation shall be given fungicidal and tropical treatment as per IS 3202. The frame shall be cast and rigid. The motors shall be designed for both directions of rotation. The terminal box shall be weather and water tight and suitable for outdoor service, having a degree of protection of IP 55. It shall be provided with removable front cover for making connections. Neoprene gaskets at cover joints shall be provided. The terminal box shall be suitable to withstand 31 MVA for 0.25 seconds without damaging the box with fuse protection. Nickel-plated brass double compression cables glands and ATC lugs shall be provided to receive the power cables. If the hoist motor is placed inside the rope drum, then the motor lead wires can also be taken out without necessity of a terminal box.

The motor vibration and noise shall be within the limits specified in IS 12065 and IS 12075. The noise level shall be limited to 85dB.

6.2.0 SWITCHES

Heavy-duty power switches with quick make and brake mechanism meeting relevant IS requirements shall be provided. The switches shall be adequately rated to get complete protection even under abnormal operating conditions.

6.3.0 PUSH BUTTONS

The Pendant Push Button station shall have the following Push Buttons: a) Hoist, b) Lower, c) Forward, d) Reverse & e) Emergency Stop. The Emergency stops Push Button shall be Lockable type. The Pendant Push Button station shall have the following LED clustered type indicating lamps: a)SUPPLY ON, b)HOIST MOTOR Raise/Lower, c)CT MOTOR Forward/Reverse, d)HOIST MOTOR TRIP and e)CT MOTOR TRIP.

The Pendant Push Button station shall be supported from the Control Panel with hot dip galvanized Link Chain. The Pendant Push Button Station shall be connected to the Control Panel using multi -core copper flexible control cable of 10 m length. The Enclosure of Pendant Push button station shall be designed for IP 55 degree of protection.

Push buttons shall be spring return type with 2NO+2NC self-reset contacts rated for 5A at 415volts AC. The push buttons for different operations like "HOIST/ LOWER, FORWARD / REVERSE", "STOP"

shall have different colours. All Push buttons shall be as per relevant IS. The Push buttons shall be properly shrouded so as to prevent water & dust entry.

6.4.0 CONTACTOR

All Contactors shall be suitable for DOL application with coils suitable for the control voltage provided by the supplier. Contactor construction shall be rugged.
For control purpose, only auxiliary contactors shall be used. Relays are not acceptable in place of Auxiliary Contactors.
The power contactors shall have Mechanical interlocking in addition to Electrical interlocking so that at any point of time only any one of the two Power contactors (either up or Down, Left or Right) will be energized.
The contactor shall be AC4 duty for inching operation.

6.5.0 THERMAL OVER LOAD RELAYS

Thermal over load relays wherever provided shall be ambient temperature compensated with suitable setting ranges. The relay shall be auto reset type. The relay shall be provided with a door mounted hand reset push button. The O/L relay shall have inbuilt single phasing protection as built-in feature.

6.6.0 FUSES

Only HRC fuses of plug-in type with Class-4 AC duty shall be provided.
Fuse base shall be rugged. Adequate shrouding shall be provided for live accessible parts and it shall be possible to replace any fuse without damages of contacts when the circuit is alive.

6.7.0 INDICATING LAMPS

LED clustered type indicating lamps of low watt consumption with suitable built-in series resistor shall be used. LED and lenses shall be inter-changeable and easily replaceable from the front. The indication lamps shall be properly shrouded so as to prevent the dust and water entry. Indicating lamp shall be provided for "HOIST MOTOR ON","CT MOTOR ON", "HOIST MOTOR TRIP", "CT MOTOR TRIP", "SUPPLY ON" ETC.

6.8.0 WIRING

The control panel wiring shall be complete in all respects and ready for connection of external power for terminating external cables. Necessary double compression Nickel plated Brass cable glands along with suitable terminal blocks and lugs to receive trailing cable and pendent push button cable shall be provided. The cable glands, lugs and terminal blocks shall not be supplied loose. Point to point wiring shall be adopted. Not more than two wires shall be terminated at each terminal. Wiring shall be neatly laid out and bunched together suitably. The wiring shall be done with minimum 2.5 sq.mm multi stranded copper, PVC insulated 1100V wires.

6.9.0 **TERMINATION**

All power and control wires shall be terminated on terminal block/component using crimping type Annealed Tinned Copper lugs/connectors. CLIP-ON type terminal block shall be used. The terminal blocks shall be used for control wiring. The terminal blocks shall be complete with insulated barriers, terminal studs, washers, nuts, lock nuts and identification strips with terminal numbering.

6.10.0 **CONTROL PANEL**

Control panel shall be provided to house the electrical components like fuses, contactors, relays, isolators, switches, and control supply transformers etc along with necessary wiring. The components shall be clearly identified by labels. The panel shall be made of sheet steel of minimum 2mm thick and shall be dust and vermin proof, suitable for outdoor condition. Adequate number of DOUBLE COMPRESSION type cable glands (heavy duty) of brass with nickel plating and Annealed Tinned Lugs shall be provided for incoming and outgoing power and control cables. The cable glands shall be provided with dummy plugs. The door, removable cover plates, and metal-to-metal joints shall be fully neoprene gasketted.

The control panel shall be pre treated in seven tank process and epoxy painted. Space heater with thermostat shall be provided for the control panel. The control panel shall be designed for IP 55 degree of protection.

6.11.0 **CONTROL SUPPLY TRANSFORMER**

Dry type, step down control supply transformer 415V / 110V AC shall be provided to derive control supply for starter operation & indication. The transformer shall have minimum class 'B' insulation. The rating of the transformer shall be decided based on maximum power consumption plus 25% margin. The transformer shall meet IS 12021.

6.12.0 **FUSE SWITCH UNIT**

Metal enclosed, FOUR POLE fuse switch unit (TPN) of 63A, 415V, 3 phase 4 wire AC, rating suitable for outdoor location shall be provided to receive purchaser's supply. The enclosure shall be suitable for IP 55 degree of protection. Suitable Nickel-Chromium plated brass DOUBLE COMPRESSION glands and crimp type ATC lugs to receive purchaser's 4C-16 sq. mm Al armoured/ un-armoured FRLS cable & vendor's 4C-4 sqmm copper un-armoured cable shall be provided. Cable glands and lugs shall also be provided for the flexible trailing cable. The FSU shall be provided with 2 No's of earthing terminals with M12 screws, nuts and washers. The FSU shall be located at a fixed location about 5 m away from the start position of the hoist.

6.13.0 **CABLES**

6.13.1 The trailing cable shall be1100V extra flexible having 4 cores and shall carry the power supply to the hoist from FSU. The conductor cross section shall be minimum 4 sqmm multi stranded tinned copper of

class 5 of IS 8130. The insulation shall be heat resistant elastomeric compound based on ETHYLENE PROPYLENE RUBBER (EPR) with continuous withstanding temperature of 90 deg C. The inner sheath shall be heat resistant elastomeric compound with black colour. The outer sheath shall be heat resistant oil resistant & flame retardant heavy duty elastomeric compound. The outer sheath shall be marked with cable size, voltage grade by embossing the word FRLS at every 5 meters by embossing, sequential marking at every one meter of length by embossing.

6.13.2 The pendent cable and power cables between HOIST / CT MOTORS to control box shall be as per IS 1554. The conductor shall be stranded PLAIN ANNEALED copper with minimum cross section of 1.5 sqmm for control & 4 sqmm for power. The insulation shall be PVC. The inner sheath shall be extruded PVC and the outer sheath shall be FRLS-PVC. The outer sheath shall be marked with cable size, voltage grade by embossing the word FRLS at every 5 meters by embossing, sequential marking at every one meter of length by embossing.

6.14.0 LIMIT SWITCHES

Limit switches shall be provided for over hoisting, over lowering, extreme left & extreme right positions.
Necessary limit switch actuating arrangement shall be provided to actuate the limit switches at the above positions.
The limit switches shall have enclosures designed for IP 55 degree of protection.
Proximity switches are not acceptable in place of Limit Switches.

7.0.0 EARTHING

The structure, motor frames and enclosures of electrical equipment shall be effectively connected to earth complying with Indian Electricity Rules and IS 3043. The earthing materials from hoist to FSU shall be in supplier's scope.

8.0.0 MAKE OF COMPONENTS:

Only one of the following makes shall be used. Mix up of make for same item is not acceptable.
Any deviation with respect to the makes given below is not acceptable.

Hoist/Cross travel motor	:AUTOLEC/SIEMENS/KEC/NGEF/ABB/CROMPTON GREAVES/BHARAT BIJLEE
Cable	:INCAB/CCI/DELTON/FORT/GLOSTER/UNIVERSAL CABLES/ ASIAN CABLES/ NICCO
Fuse switch unit	:L&T/SIEMENS/CONTROLS & SWITCHGEAR (STROMBERG)/GE /SCHNEIDER
Power switch	:L&T/ SIEMENS/CONTROLS & SWITCHGEAR/ SCHNEIDER/GE

Power contactor	:L&T/SIEMENS/TELEMECHANIQUE/BCH/GE
Auxiliary contactor	:L&T/SIEMENS/TELEMECHANIQUE/BCH/GE
Thermal overload relay	:L&T/SIEMENS/TELEMECHNIQUE/BCH/GE
Fuse & Fuse base	:L&T/SIEMENS/GE/CONTROLS&SWITCHGEAR/BUSMANN/GE
Push button	:L&T/SIEMENS/TEKNIC/BCH/CONTROLS&SWITCHGEAR/ TELEMECHANIQUE/GE
LED type Indicating lamp	:L&T/SIEMENS/BCH/TEKNIC/RASS CONTROLS/GE
Internal wiring	:ISI CERTIFIED
Glands	:COMET/SUNIL&CO/QUALITYPRECISION/BRACCO/ARUP ENGINEERING
Lugs	:DOWELLS/3D
Terminal block	:ELMEX/TOSHA/CONNECTWELL/WAGO/PHOENIX
Control switch	:L&T/SIEMENS/KAYCEE/CONTROLS&SWITCHGEAR/ SCHNEIDER/GE
Selector switch	:L&T/ SIEMENS/KAYCEE/GE
Fuse carriers	:L&T/ SIEMENS/GE/CONTROLS&SWITCHGEAR/BUSMANN
Control supply transformer	:AE/KAPPA/INDCOIL/LOGICSTAT/PRECISE/ SOUTHERNELECTRICAL/STATIC TRANSFORMER/G&M
Limit switches	:SIEMENS/BCH/JAI BALAJI
Neutral link	:L&T/SIEMENS/GE/SCHENIDER/CONTROLS & SWITCHGEAR

Make of various components for NTPC projects are subject to NTPC approval. No additional delivery or price implication is acceptable due to NTPC comment on make of components. Mix up of make for same item is not acceptable in any enquiry.

9.0.0 **PAINTING**

The colour shade shall be Blue as per RAL 5012.

10.0.0 **DRAWINGS / DOCUMENTS TO BE SUBMITTED**

(A) Along with the offer:

1. Schedule A - Clause by clause confirmation for this TEP:
2. Schedule B - Deviations, if any, to be spelt out clearly. Any clarification furnished against any clause of the technical specification will be construed as compliance only.
3. Schedule C - BOM for the system.
4. Rating of cross travel and hoist motor

The bidders are instructed not to submit bidders' own technical specification and any other technical details.

(B) After placement of order, within three weeks.

1. Power and Control scheme
2. Bill of material indicating description of the item, rating, make, quantity, type reference etc., for
   a) Panel mounted components
   b) Pendent mounted components
   c) Items covered in the system like trailing cable, trolley etc.
   d) Hoist, Cross travel arrangement, Auxiliary Girder system, all cables under scope etc.
3. Detail drawings
   a) OGA of Control panel
   b) OGA of Pendent
   c) Gasketting and locking arrangement of Control panel
   d) EOH & trailing cable mounting arrangement.
4. Justification for
   a) Motor rating selected
   b) Rope selected
   c) KVA rating of control transformer.
5. a) List of items mounted in the assembly and list of loose item supplied along with weight.
   b) Packing drawings.
6. a) Data sheet for Hoist & cross travel motor
   b) Data sheet for brake.
   c) Data sheet for trailing & pendent cable.
7. Cable schedule for hoist indicating size, termination between which equipments, rating, quantity, make etc.

(C) Manufacturing shall proceed on obtaining BHEL approval.

(D) Shipping list indicating items, quantity, weight and package number to be submitted before inspection call is given. Despatch shall be maintained in line with the shipping list.

(E) All the drawings shall be prepared in AUTOCAD. After final approval the above documents shall be submitted in CD apart from hard copies.

(F) The drawings and data sheet shall be submitting in SOFT MEDIA (PDF format, apart from 6 sets of hard copies for BHEL approval).

11.0.0 **INSEPCTION:**

The inspection will be carried out based on the following documents.

1. BHEL Purchase order
2. BHEL Technical specification
3. Quality plan or Quality checklist indicated in the enquiry.
4. BHEL approved supplier drawing &data sheets.

12.0.0 **O&M MANUAL:**

O&M instruction manual in the required quantity as in enquiry shall be supplied directly to BHEL Ranipet in required numbers as per enquiry immediately after the despatch of the hoist. Instruction manual shall be submitted in soft media apart from hard copies. Hard copy of the O&M manual shall be sent along with the hoist.
The O&M manual shall include but not limited to the following.
a) Dos & Don'ts during receipt, storage, erection & commissioning.
b) Instruction to be followed on receipt, storage & erection.
c) Construction details of the hoist assembly.
d) Drawing indicating various parts of EOH assembly with part numbers.
e) Recommended lubrication & maintenance schedule.
f) Cut view drawing for the Gear box assembly.
g) As built drawings, BOM, cable schedule.
h) Disposal procedure for environmental hazardous material if any.

13.0.0 **PACKING:**

The ELECTRICAL HOIST and accessories shall be properly packed so as to avoid damage during transit and storage. Wooden crate shall be used for packing various equipment / items as per shipping list. Lining with plastic sheet shall be provided inside the crate to avoid water entry during transit / storage. Packing drawing shall be submitted for BHEL approval. Two sets of manual (hard copies) with drawing & data sheet shall be sent along with the packing box. Each packing shall be accompanied with packing slip & all relevant drawings.

14.0.0 **NAME PLATE**

The name plate shall be non corrosive material indicating manufacturer's name, serial number, rating, capacity type.

15.0.0 Deviation to any clause will not be accepted.

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