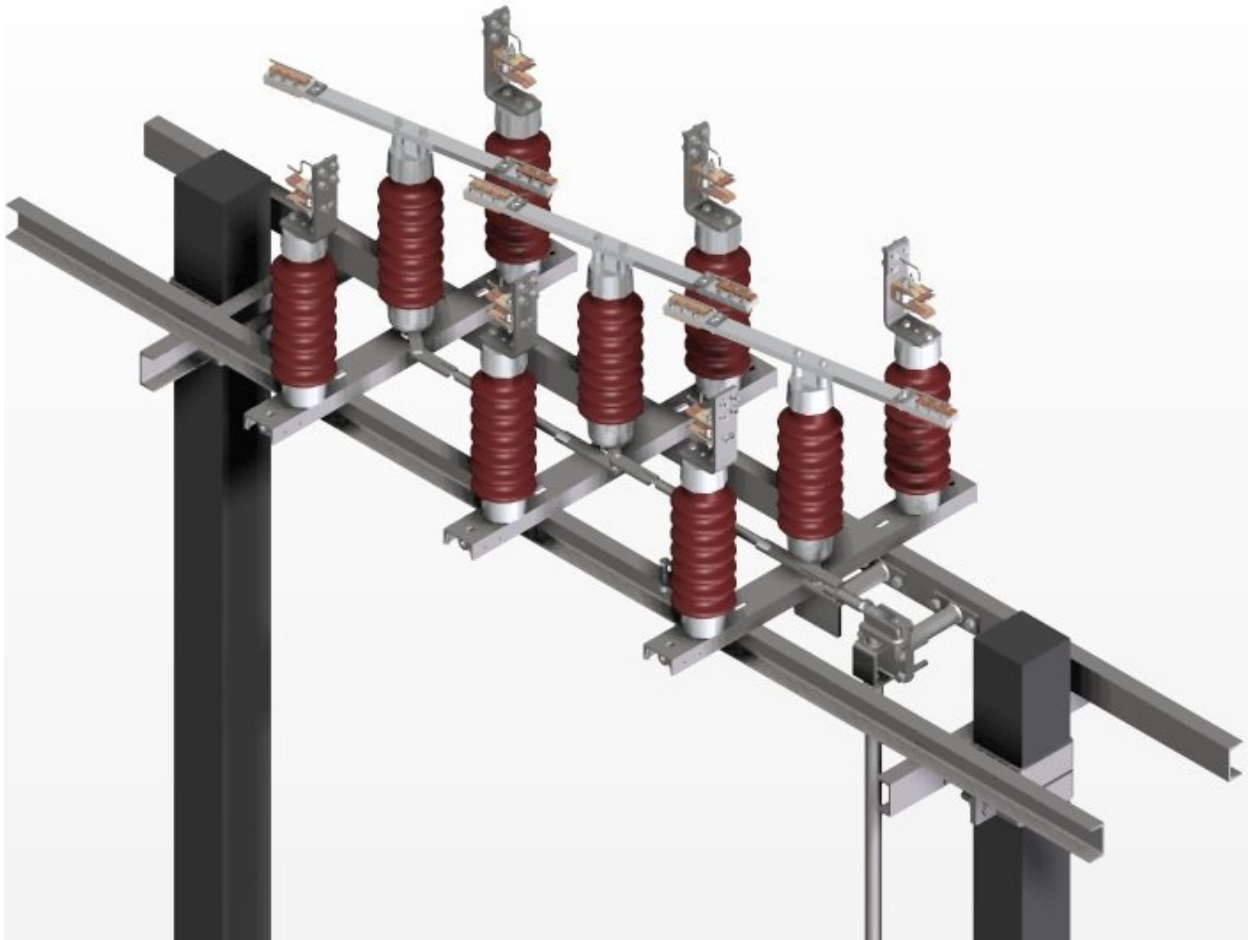




# **S&S POWER SWITCHGEAR EQUIPMENT LIMITED**

## **UNLOADING, STORAGE, ERECTION, INSTALLATION & MAINTENANCE MANUAL**



**DOUBLE BREAK DISCONNECTOR  
(TYPE: RD36kV)**



Disconnectors are remarkable pieces of equipment. They can stay in the same position for years before they have to switch. But, then at the critical movement they have to work perfectly. No matter what the conditions are, whether they are in the freezing cold or in the extreme heat.



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## **1.0 PREAMBLE:**

The Disconnecter described in this publication is designed, manufactured and tested with care and will give satisfactory service if it is installed, operated and maintained in accordance with the instructions, by fully skilled personnel duly authorized to carryout this work.

Efforts are constantly being made to improve design and manufacturing. Hence the equipment supplied may differ in minor detail from the data given in this publication.

## **2.0 GENERAL DESCRIPTION OF THE DISCONNECTOR:**

- Disconnectors are primarily off- load mechanical switching device used to isolate equipments and lines in electrical network. They are able to make or break the magnetizing current and line charging current of 0.7Amps at 0.15 power factors.
- Double Break Disconnecter is designed for independent single pole operation or three poles electrically / mechanically ganged operation. Disconnectors can be supplied with or without earth switches. Where earth switch is required, single or double earth switch can be provided. Disconnecter and earth switches can be operated either manually or by motor.
- Double Break Disconnecter is checked for satisfactory operation at the works. They are supplied in knock down condition ready for assembly at site. The relevant standards for disconnectors are IEC: 62271-102/62271-1 and IS: 9921 and for insulators IEC: 60273 / 60168 and IS: 2544.

## SECTION-A

### UNLOADING AND STROAGE INSTRUCTIONS

#### 3.0 UNLOADING:

- Unload the crates / boxes using crane / fork lift truck, as appropriate.
- **Do not roll the crates. Do not drop the crates over tyres / rubber mats. Etc.**
- Use proper lifting tools / tackles like nylon belts / ropes etc.
- Count the number of crates / boxes and tally them against the shipping document.
- Inspect thoroughly all the crates / boxes for damages.
- In case of damage, identify the crate / box and keep it separately.
- Take adequate photos of the damage.
- Kindly report the damage to the transporter in writing.
- Also mail the damage report (along with the photographs) to the **Contracts Manager** of **S&S Power Switchgear Equipment Limited**. Email: [cir@ssppower.com](mailto:cir@ssppower.com) and [sales@ssppower.com](mailto:sales@ssppower.com).

#### 3.1 STORAGE:

**“Failure to properly store and protect disconnectors / parts may cause damage to equipment. Such damage could cause hard operation, mal-operation and contact resistance issue when equipment is installed / tested and mal-function in service.”**

- Storage shall be made in an area that is well ventilated and provided with drains to prevent water stagnation.
- It is advisable to leave all crates / boxes in packed condition until the start of erection.
- All crates / boxes shall be properly stored / stacked with proper covers.
- Disconnector and operating mechanism crates / boxes should always be stored in elevated position (at least two feet above ground) to prevent water entry.
- In case of longer storage period / damp atmosphere, the operating mechanism boxes shall be removed from packing and electrical space heating is to be provided.
- Space heating should continue till complete removal of moisture / condensation.
- Adequate care to be taken to prevent entry / ingress of dirt, moisture, cement, sand and other corrosive material.

### **3.2 LONG TERM STORAGE INSTRUCTIONS:**

#### **General instruction (for all materials):**

##### **Ground clearance:**

All materials, including operating mechanisms, should be kept at a minimum of 600 mm (two feet) height from the ground level using pallets or cement concrete bed, to avoid water entry during rainy season. However, the water level rise at the respective site / storage locations shall be considered for fixing the ground clearance (but shall not be less than 600 mm).

##### **Other contacts and steel materials:**

- Clean all the contact surfaces thoroughly with a lint-free cloth.
- Protect all contact surfaces with a thin layer of petroleum gel.
- Cover all contacts and Aluminium arms with polythene sheets / covers.
- Ensure that the inside surfaces of the polythene coverings are pasted with foam based adhesive strip.
- Provide volatile corrosion inhibitors sheets and paste them along the inner surfaces.
- Kindly repeat the above steps once in every three months.

##### **Galvanized steel items:**

These are to be wrapped / covered with waterproof / dust proof covering and sufficient bags of silica gels to be placed in various places inside the covering. Once in 3 months all materials to be cleaned and replaced with silica gel bags.

## SECTION – B

### CONSTRUCTION

#### 4.0 SCOPE OF SUPPLY

Our Double Break Disconnecter consists of the following components:

Disconnecter:

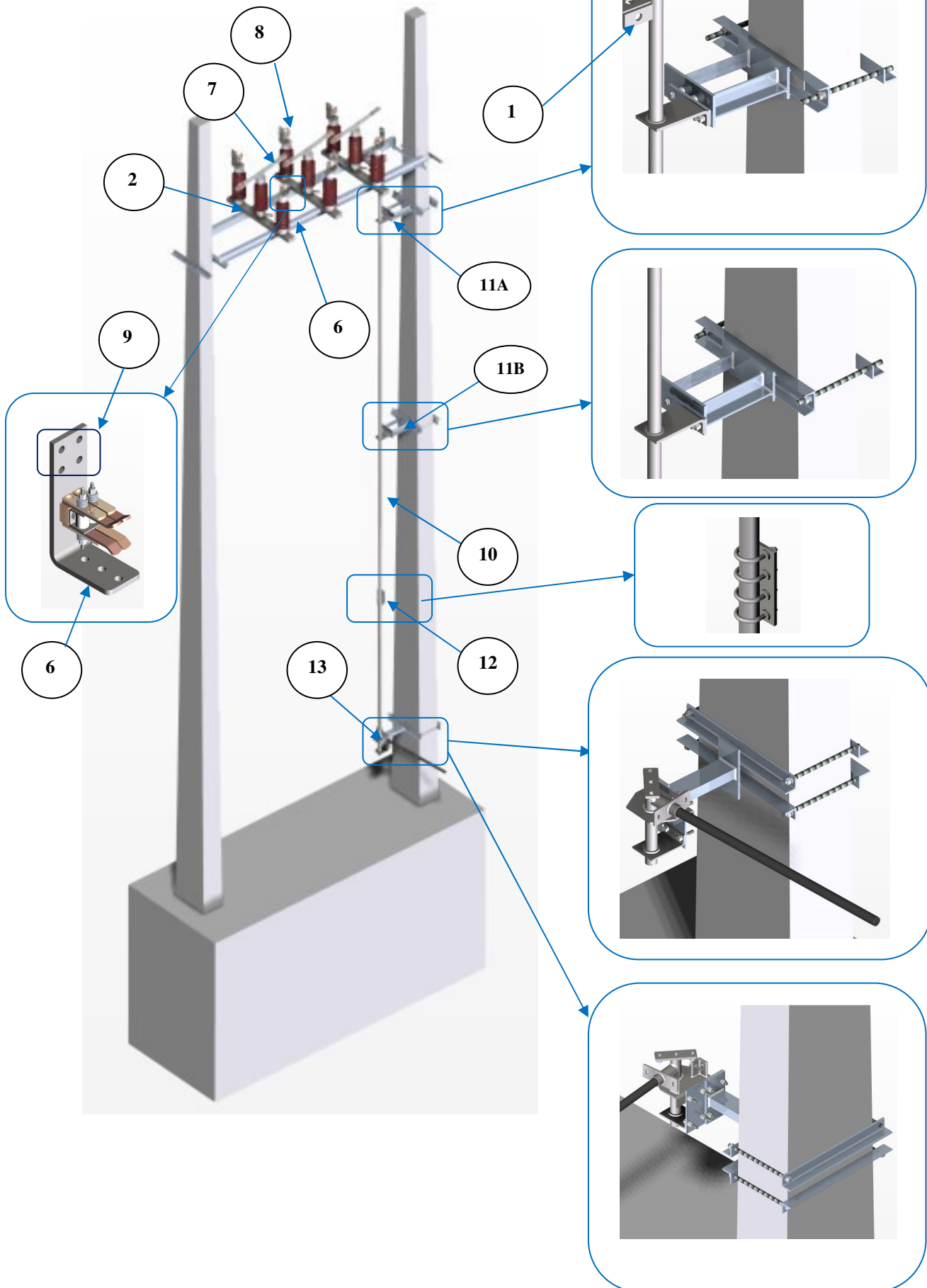
- Base assembly.
- Moving blade assembly.
- Fixed contact assembly.
- Tandem pipe assembly (phase to phase coupling pipes) in case of three pole arrangement
- Down operating pipe.
- Operating drive.
- Support insulators (optional)
- Support structure (Optional).
- Terminal connectors (Optional).

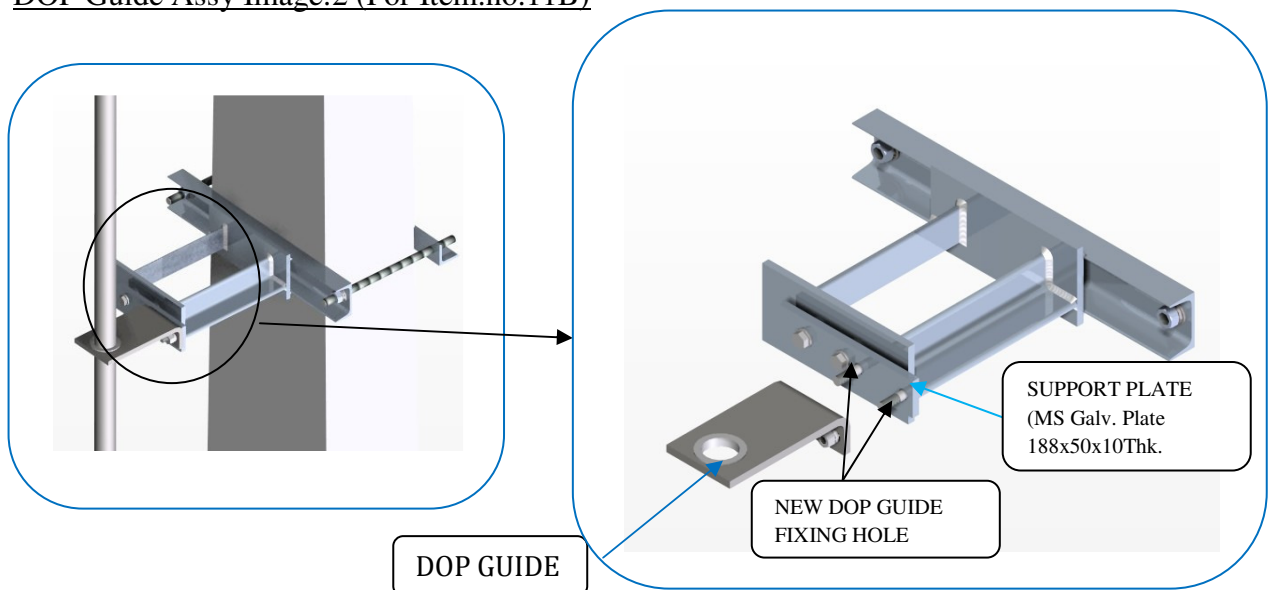
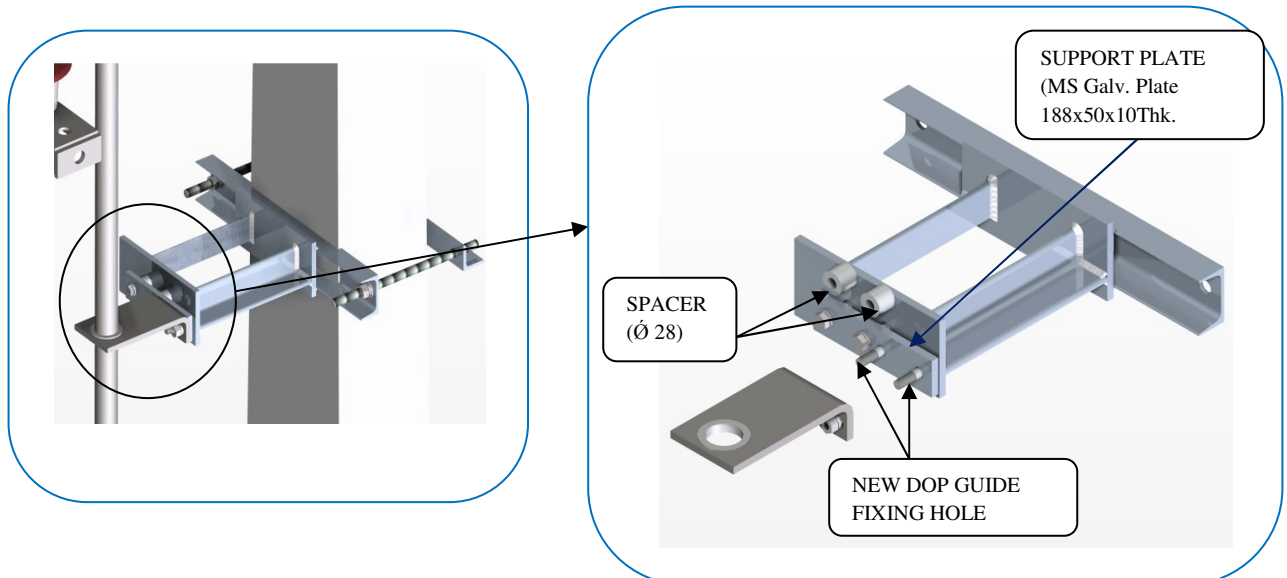
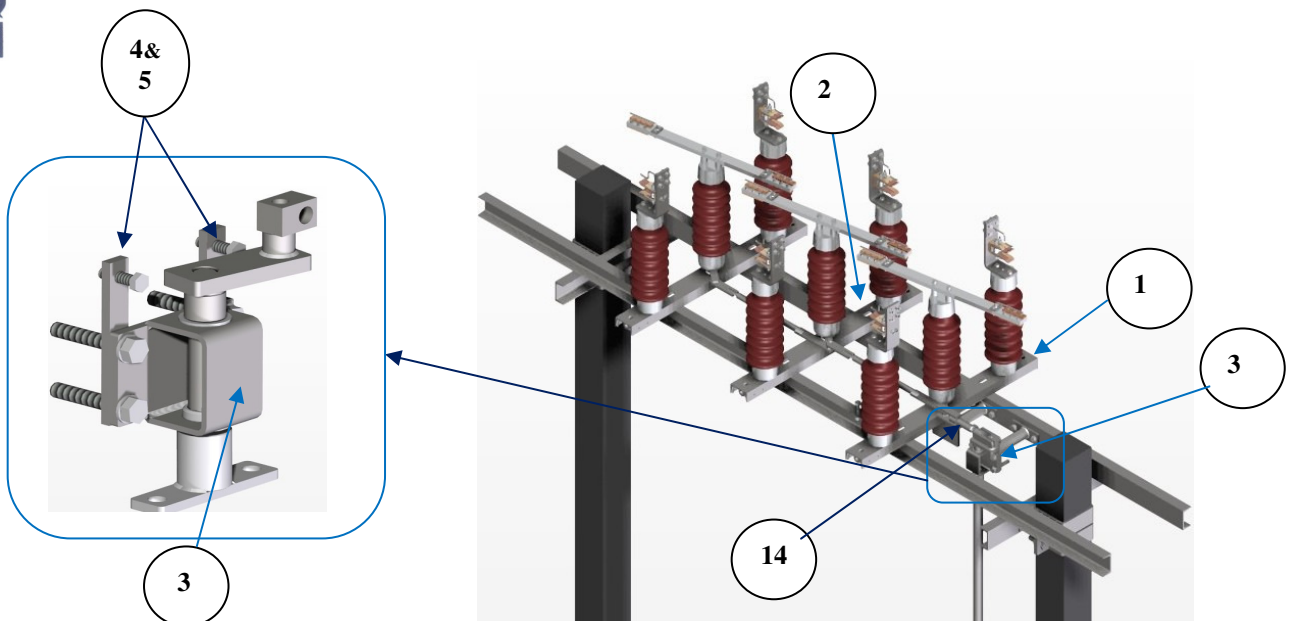
#### 5.0 BASE ASSEMBLY:

- Each 3 pole disconnecter (R, Y, B) is supplied with two types of base assemblies.
  - a. One base Assembly (say R pole) with drive arrangement.
  - b. Other two bases (i.e. Y&B) without drive arrangement.
- The base consists of a hot-dip-galvanized steel channel (**See figure. A**).
- All ferrous parts in base assembly are hot-dip galvanized to IS 4759-1984.
- Base assemblies are supplied with:
  - a. Lever and hinges with pins, Friction washer, Brass washers and Split pins.
  - b. Two slots in base channel for fixing the base channel to the supporting structure.
  - c. One rotating support with two fixed support.
- Each base is provided with two holes for M12 grounding bolt.

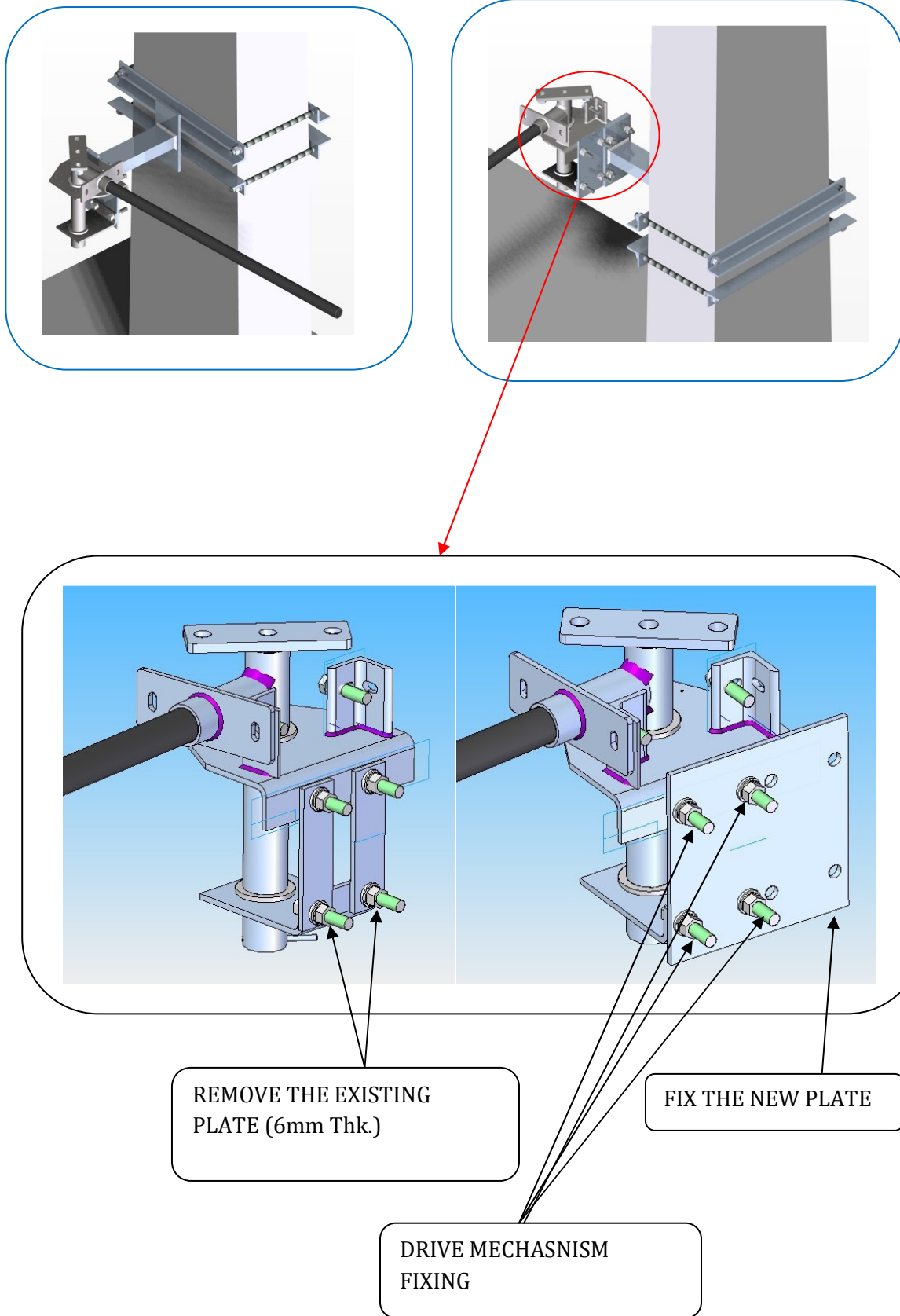


**FIGURE – A**





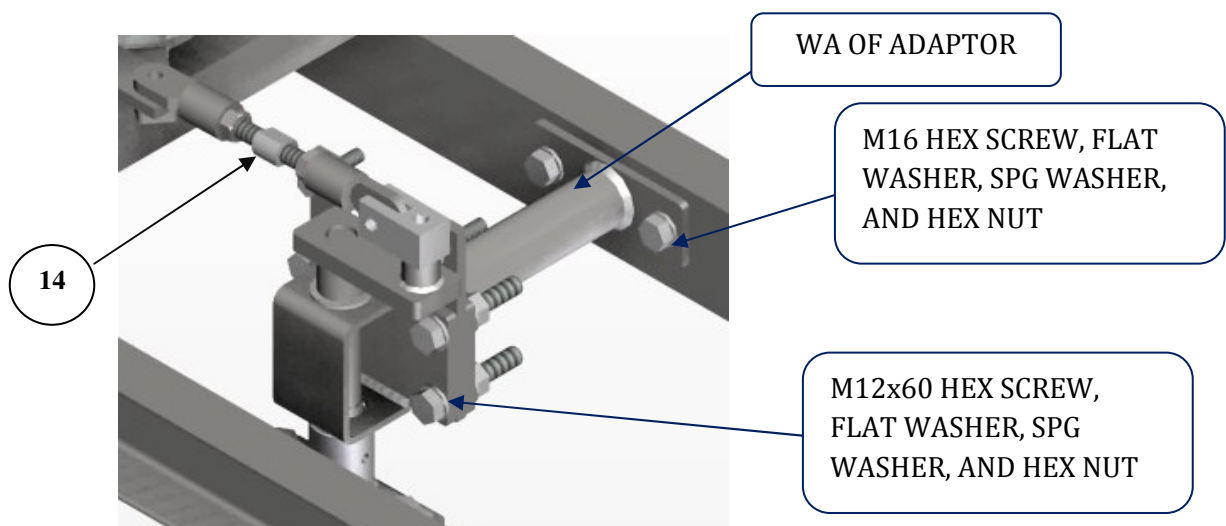
Operating Drive Assy. Image 3&4 (For Item.no.13)



Item. No.	Item Description	Qty / Switch	Remarks
1	Base – Drive End Base – Non drive end	1 2	Galvanized Steel Channel Section having provision for bearing shaft, Drive coupling arrangement for main.
2	Base fixing slots	2 per base	For fixing the base channel to the supporting structure.
3	Torque Bearing	1	Torque bearing assembly in per-set condition
4 & 5	Mechanical limit stop	2	The mechanical limit stop of the disconnecter in “closed” position and another limit stop in “open” position for disconnectors
6	Support Insulator	9	Solid core (Optional Item)
7	Moving Blade Assembly	3	Aluminum flat consists of Silver plated Copper extrusion contacts bolted at both the ends.
8	Fixed Contact Assembly	6	Spring loaded Silver plated Copper fingers together with copper contact block bolted to the Aluminium flat.
9	Terminal pads	6	Aluminium pad fixed to the fixed contact mounting bracket.
10	DOP – Main	WOE – 1	Galvanized Steel Pipe.
11	DOP Guide	2	Galvanized Steel Plate.
12	DOP Coupling	1	Galvanized Steel Plate with U-Bolts.
13	Operating Drive	1	Galvanized
14	Main Push Pipe	1	Galvanized

### Torque Bearing Fixing

### Main Push Pipe



### **Note:**

- Suitable arrangement should be provide in your structure for item:3
- Push is used to connect the torque bearing with drive end base.

#### **6.0 MOVING BLADE ASSEMBLY:**

- The current carrying moving blade is made of Aluminium flat (1). **(See figure. B).**
- At the end of the flat, Moving contact (2) is bolted which is made of electrolytic copper in extruded form with silver plating on contact side and tin plating in fixing side (with Aluminium flat). Depending on the current rating the size of the contact may vary.

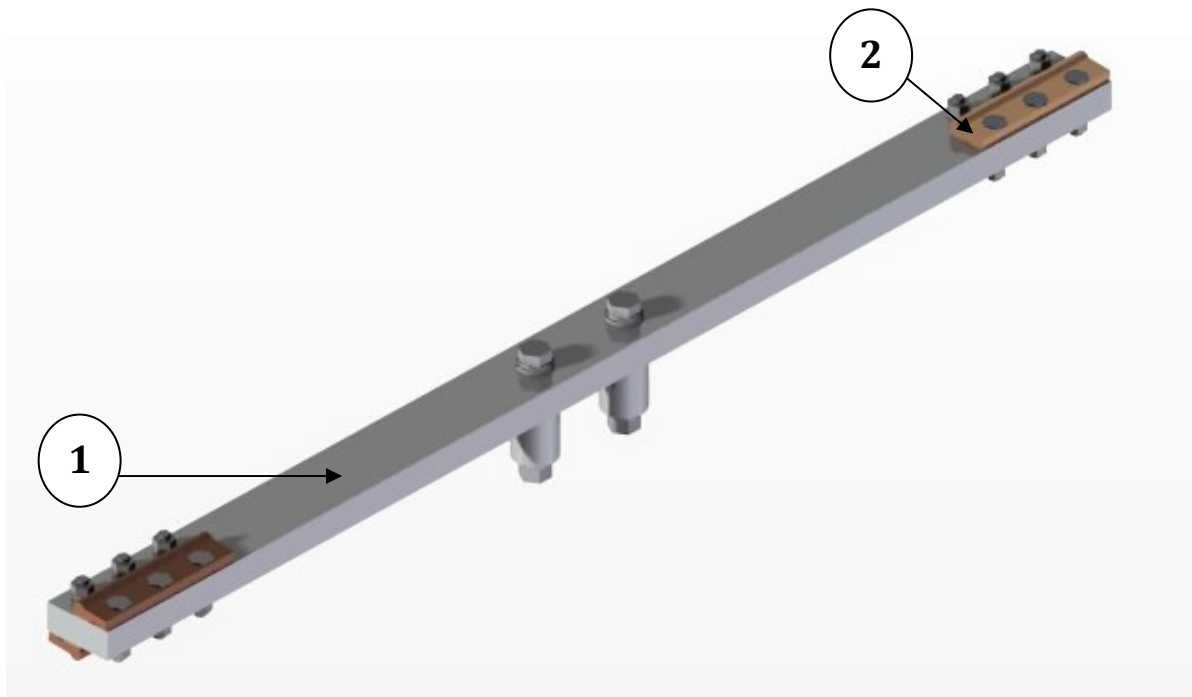
#### **7.0 FIXED CONTACT ASSEMBLY:**

- The Aluminium support (1) has provision to fix the contact block (2) made of copper with silver plating on contact side and tin plating in fixing side. **(See figure. C).**
- The fixed contacts are of the multi-finger. Contact pressure is applied to each individual finger by an insulated stainless steel spring (3). Contact fingers (4) are of hard drawn copper, silver plated and are bolted.

#### **8.0 TANDEM PIPE:**

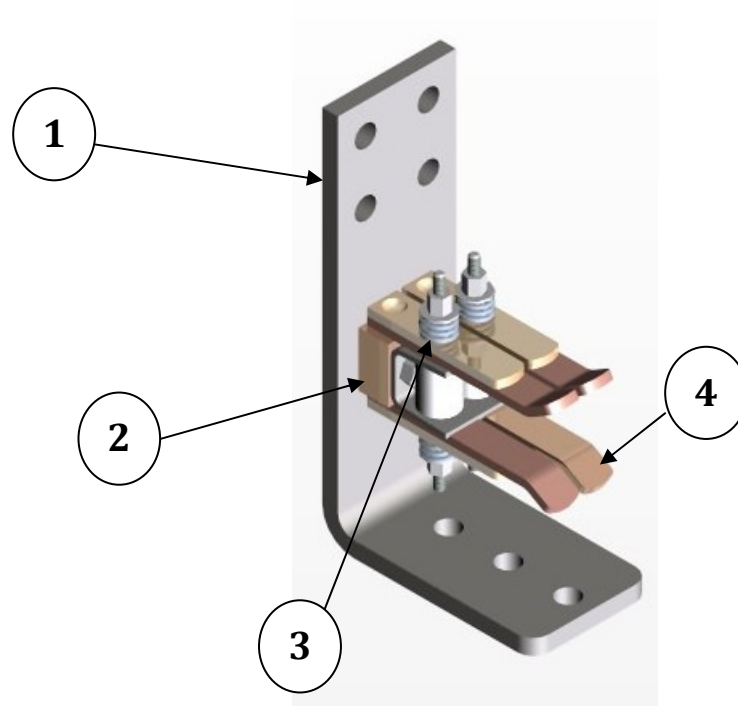
- The tandem pipe assembly is used to connect adjacent poles for gang operation of all the three poles with one drive mechanism. The lengths are adjustable to suit minor variation at site. **(See figure. G)**
- These parts are hot-dip galvanized and assembled with necessary pins & bushes etc.

**FIGURE-B**



**MOVING BLADE ASSEMBLY**

**FIGURE-C**

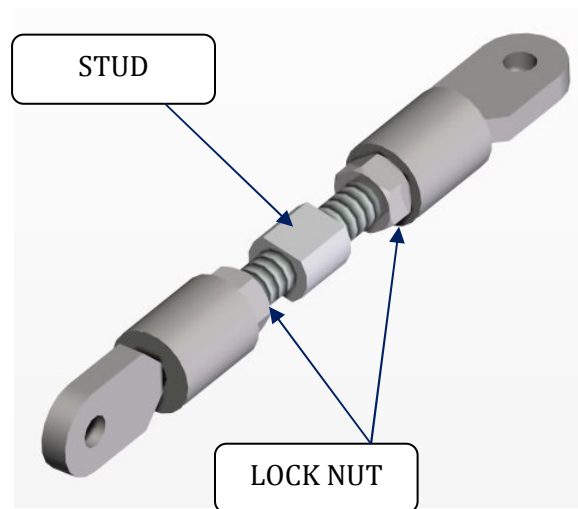


**FIXED CONTACT ASSEMBLY**

## 9.0 MAIN PUSH PIPE

- Main push pipe is connected between torque bearing lever and drive lever of base assembly (See figure. D)
- it transfers the rotating motion to longitudinal motion to operate the disconnecter.
- Adjustment is provide to increase/decrease the length of the main push pipe.

**FIGURE–D**



## 10.0 DOWNOPERATING PIPE(DOP):

- This assembly is used to connect the operating drive in the base assembly (See figure. F).
- The above assemblies are made out of steel pipe (3) with one plain end and T- bar plate welded at other end.
- The above welded assembly is hot dip galvanized.
- The length of down operating pipe provided one number with 6000mm & another one number with 3000mm.
- DOP coupling (Item no: 12 in Figure: A) is used to connect the two different length of DOP.
- Excess length of DOP to be cut at site depending upon the requirement.

## 11.0 OPERATING DRIVE:

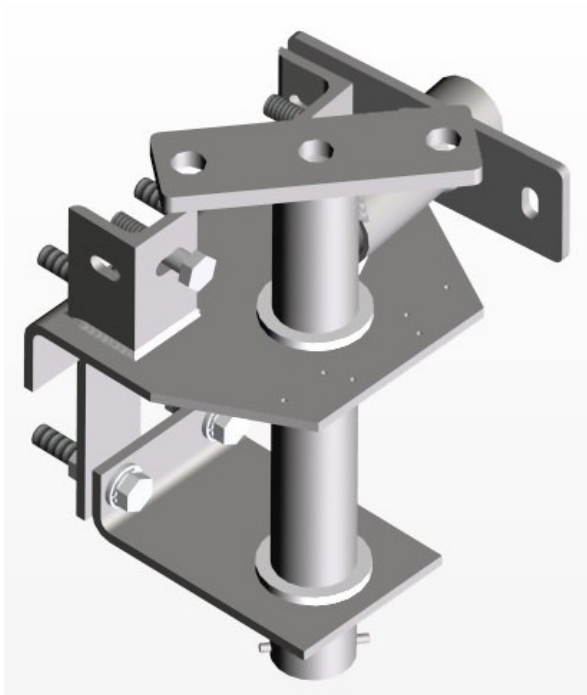
- This assembly is used to open and close the main disconnecter (See figure. E).
- The above assemblies are made of steel material and hot dip galvanized.
- This operating mechanism consists of locking facility at both open and close condition.
- Open and close indicators are provided for identification.
- This drive is operated by one meter (sleeve) pipe.



## 12.0 INSULATOR ASSEMBLY:

- Insulators (8) are selected to meet the basic insulation level, minimum creepage and minimum bending load to suit the Customer / Design requirement. (See figure. A).

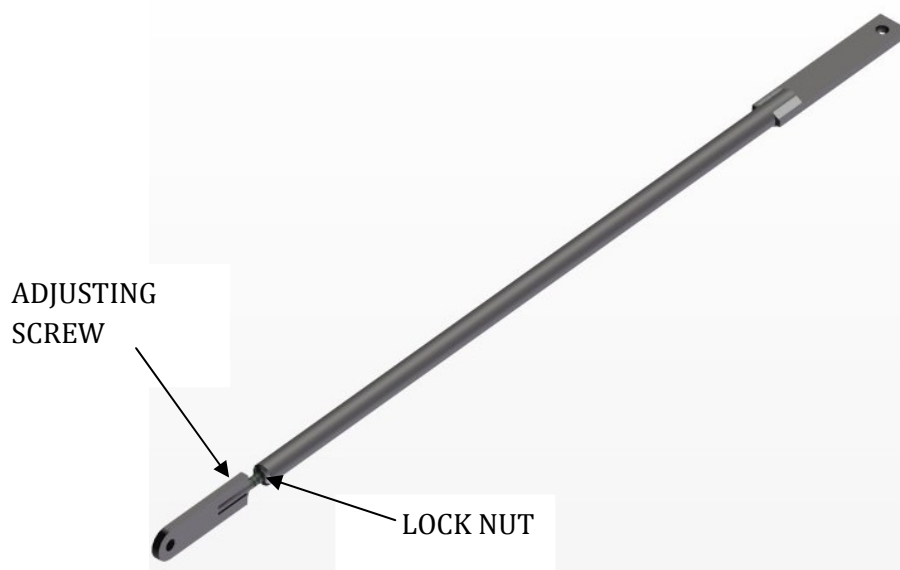
**FIGURE - E**  
**OPERATING DRIVE**



**FIGURE - F**  
**DOWN OPERATING PIPE**



**FIGURE - G**

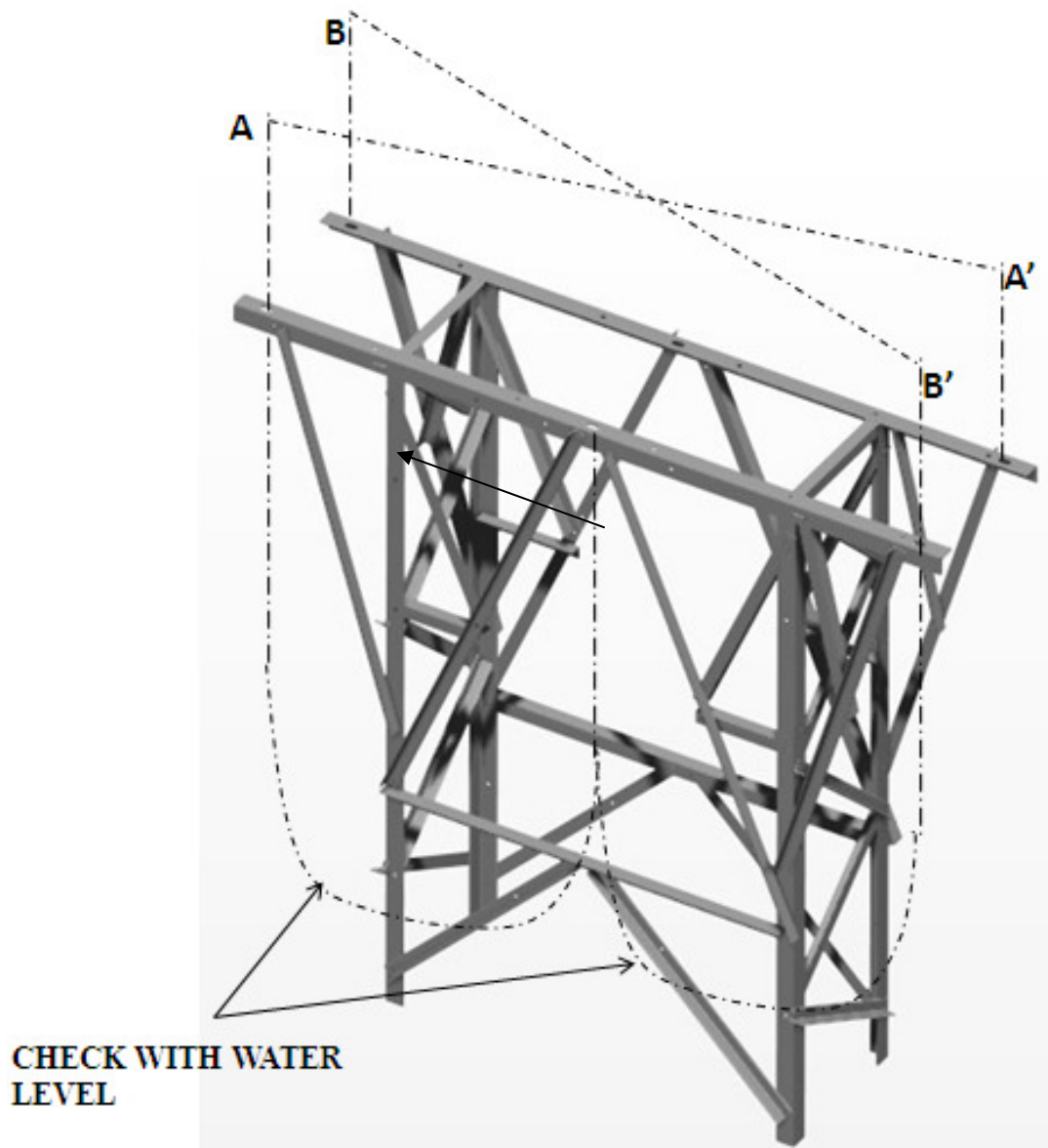


**TANDEM PIPE**



### 13.0 SUPPORT STRUCTURE:

- Support structure, when ordered, shall be designed and manufactured to meet customer specifications. They are assembled on the civil foundations of the customer and shall meet the dimensions of the disconnectors with their respective drives etc.
- Structures are hot dip galvanized to meet IS4759 – 1984 Specifications.
- Structures are designed with necessary factor of safety to withstand all forces i.e., short circuit force, wind force and dead load etc.



**STRUCTURE(TYPICAL)**

## SECTION – C

### INSTALLATION & SETTING INSTRUCTION

#### 14.0 ERECTION SEQUENCE:

- Structure
- Bases
- Insulators
- Fixed contact assembly
- Moving blade assembly
- Operating drive
- Down Operating pipes
- Tandem pipe
- Terminal connectors

#### 15.0 BASE ASSEMBLY:

- Identify the base drive & non drive end.
- Remove the base fixing hardware from bases and keep it in proper place.
- Identify the drive end base and place in the proper position on top of the structure. Fix the hardware; do not tighten fully.
- Place the other two bases on top of the structure in the proper position. Fix the hardware; do not tighten fully.
- Check with spirit level on top of bearing shaft and give shims if required on the leg of the bases.
- Check the diagonal distances.
- Tighten all the bolts. After complete tightening once again check with spirit level.

**Note:**

- Ensure the correctness of centre line of same pole and centre line of other phases.

**FIGURE - H**

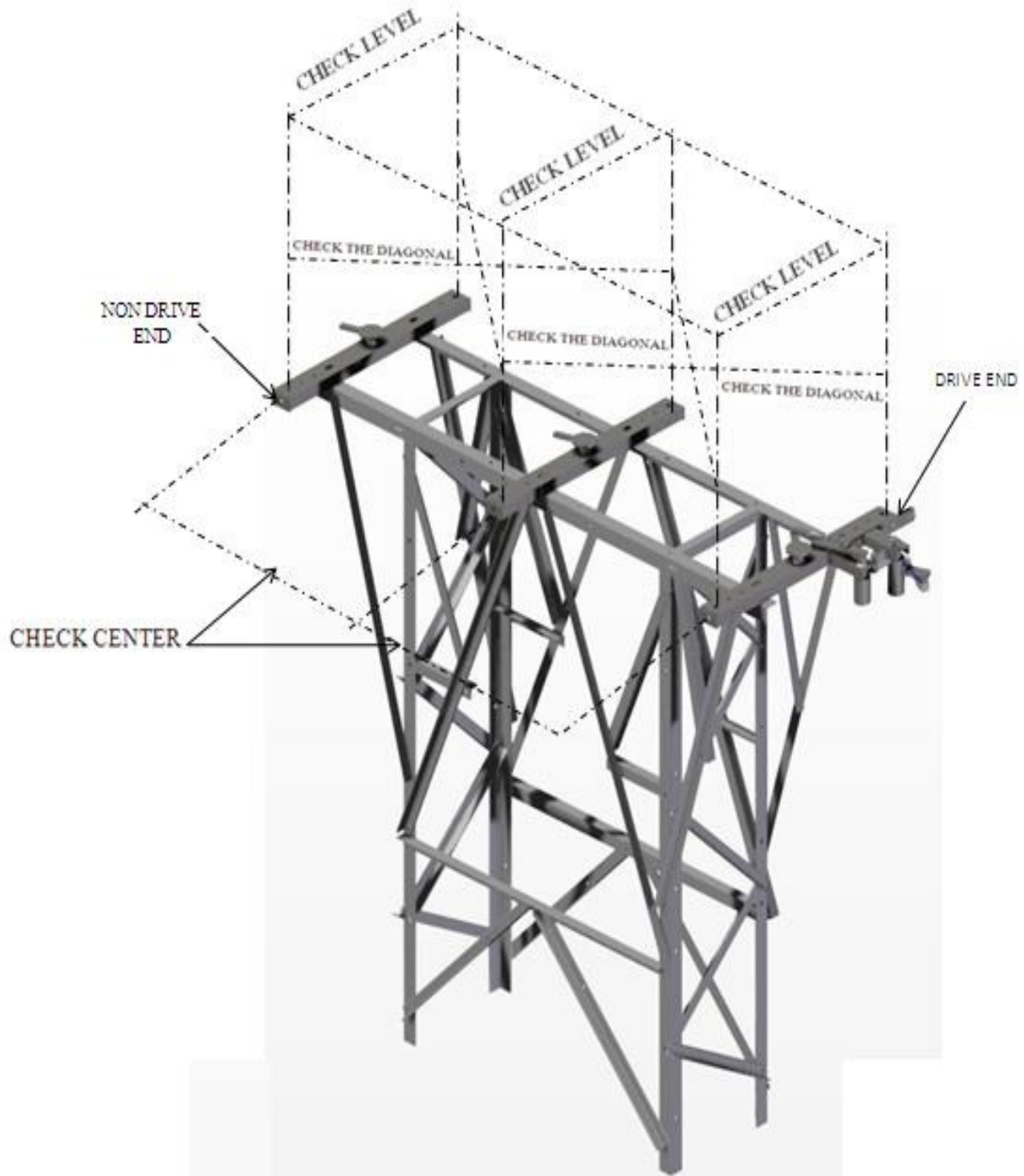


**LIFTING OF BASE ASSEMBLY**

**FIGURE - I**



## ALIGNMENT AND LEVELLING OF BASE WITH STRUCTURE



## 16.0 INSULATORS:

Before Start of erection

- Clean the insulator thoroughly.
- Keep the fixing hardware in respective places.
- Identify the Insulator and keep them in respective position.

### ERECTION

- Lift the insulator by using proper Cloth / Nylon sling and place it over the base assembly (Middle). (Ensure top 4 holes of insulator are parallel to base center line).
- Without removing the sling match the bottom fixing holes and fix all bolts.
- Remove the sling and check for level of the top surface of insulator by spirit level / plumb(See figure. J).
- If necessary add shims below the bottom flange of the insulator.
- Rotate the shaft assembly and check for the rotation of insulator (eccentricity) for middle and – ensure the verticality.
- Repeat the same for other stacks also.
- Use the C-shim for minor adjustment to get perfect alignment.

## 17.0 FIXED CONTACT ASSEMBLY:

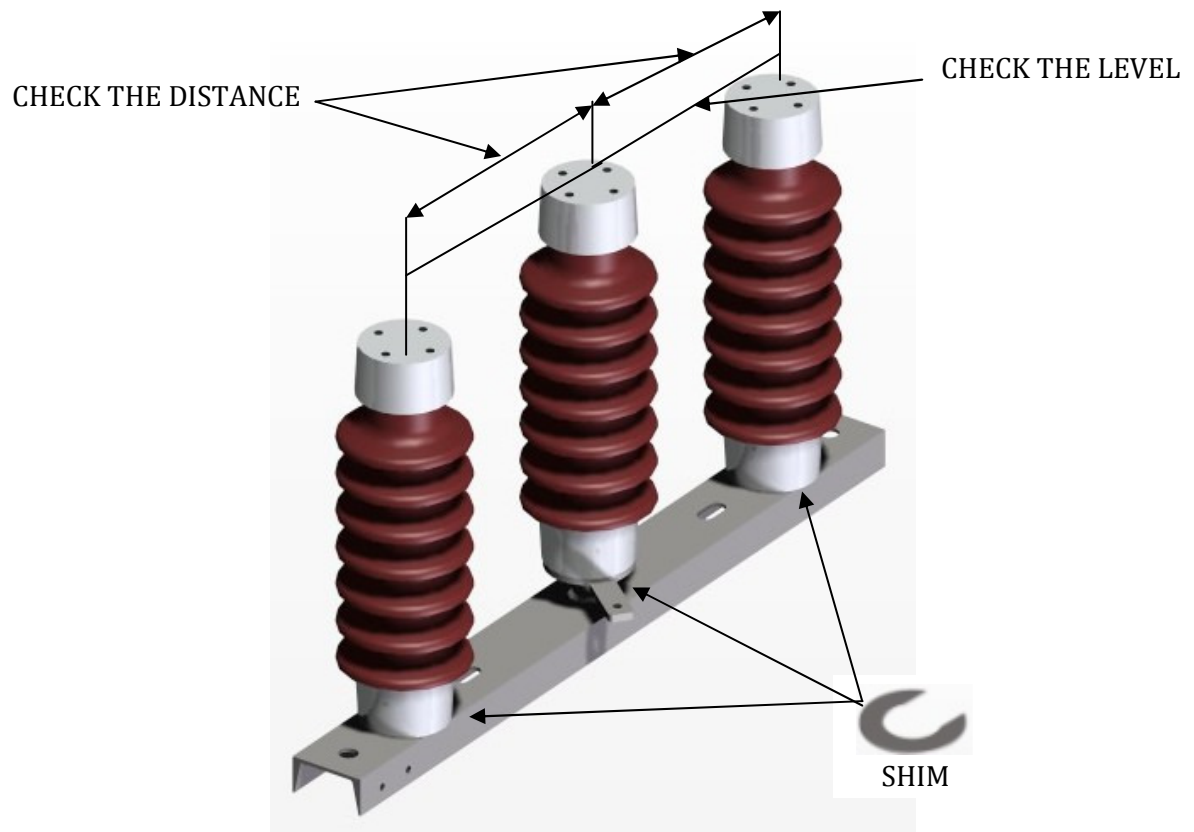
Before Erection

- Identify the Moving blade & fixed contacts.
- Keep the fixing hardware.

### ERECTION

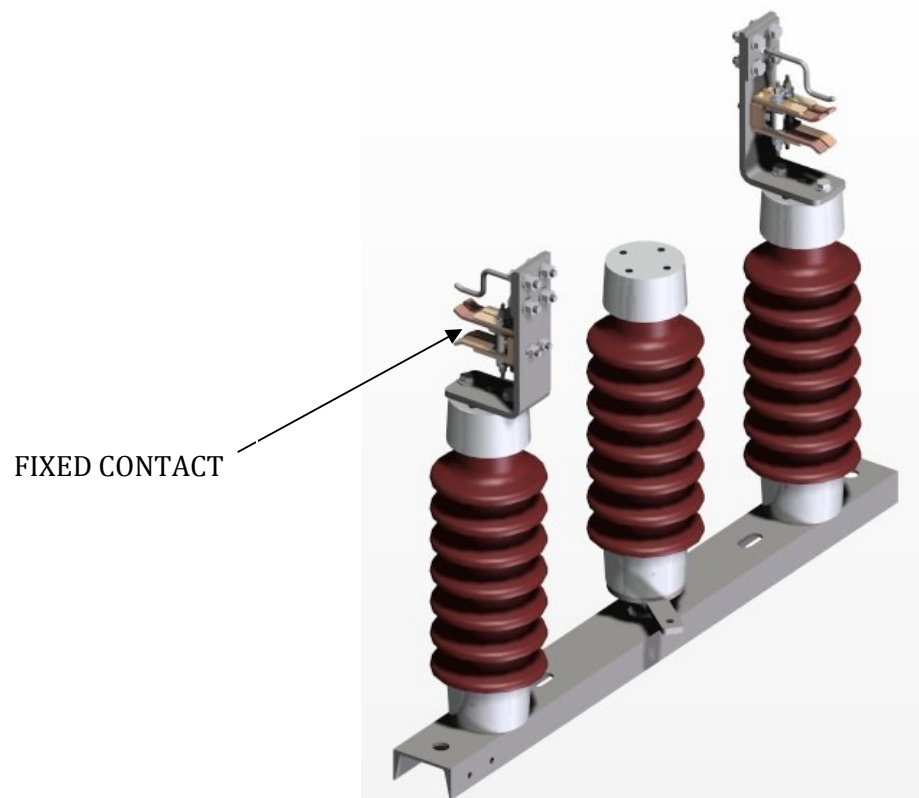
- Take the Fixed Contact Assembly and place it over the Insulator and tighten the bolt (Hand tight) (See figure. K).
- Repeat the same for the other side & three poles also.

**FIGURE – J**



**ERECTION OF INSULATOR ASSEMBLY**

**FIGURE – K**

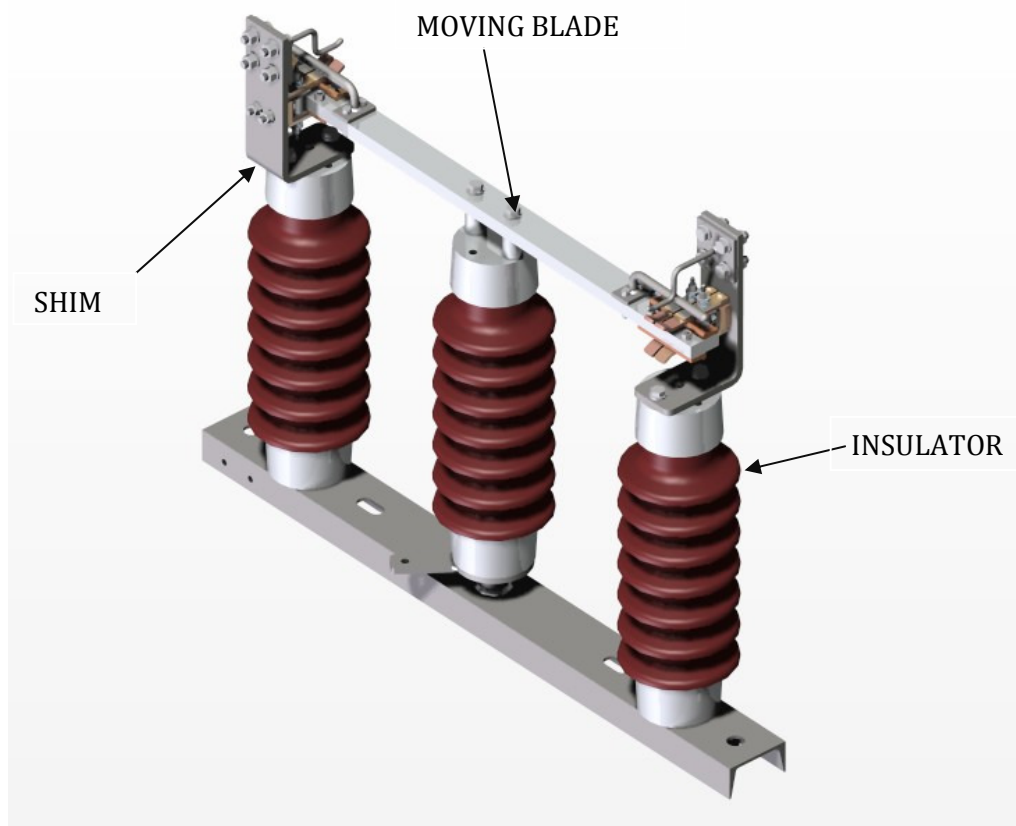


## MOUNTING OF FIXED CONTACT ASSEMBLY

### 18.0 MOVING BLADE ASSEMBLY:

- Identify the opening position of the moving blade by referring general assembly drawing.
- Keep the bearing shaft assembly in open position.
- Lift the moving blade assembly and place it over the insulator. Ensure the position of operation.
- Align the holes with insulator and fix the bolts (Hand tight).
- Rotate the moving blade through shaft assembly and check for free entry of blade into fixed contact.
- If the blade is not entering freely align properly by using shims below the fixed contact (See **figure. L**).
- After alignment check for free entry and after full close check for equal contact pressure on both sides.
- Repeat 2 to 3 times and ensure the alignment and full tight all bolts.
- Repeat the same for other two poles also.

**FIGURE - L**

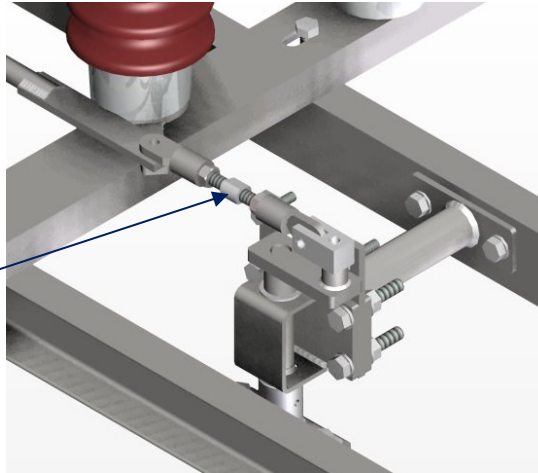




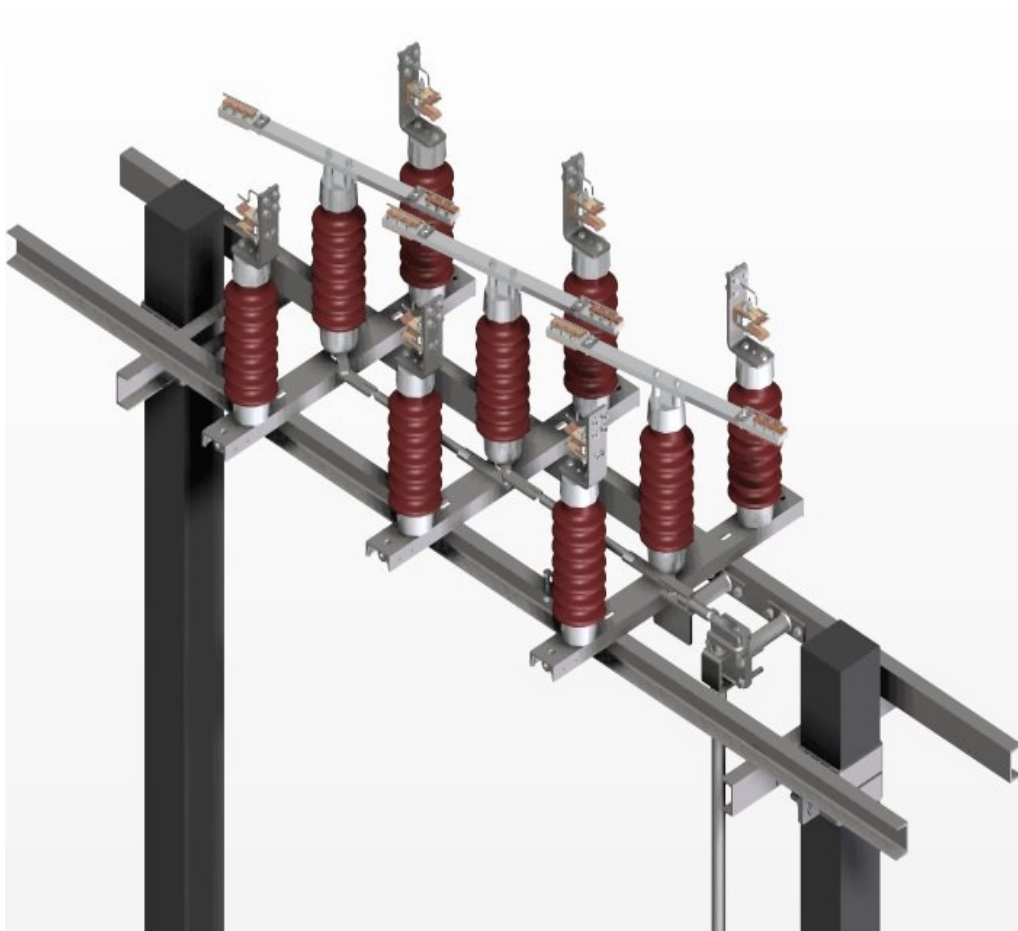
## 19.0. MAIN PUSH PIPE ASSEMBLY:

- Connect the main push pipe between the torque bearing lever and drive lever of base assembly.(see figure. M)

MAIN PUSH PIPE



## 3 POLE ASSEMBLY OPEN CONDITION





## **20.0 OPERATING DRIVE AND DOWN OPERATING PIPE (MAIN):**

Identify the drive with the help of drawing and packinglist and open the case carefully.

### **MOUNTING:**

Do not attempt to lift mechanism by drive coupling flange. Lift the drive position and fix with structure. At this stage fixing bolts should only be hand tightened.

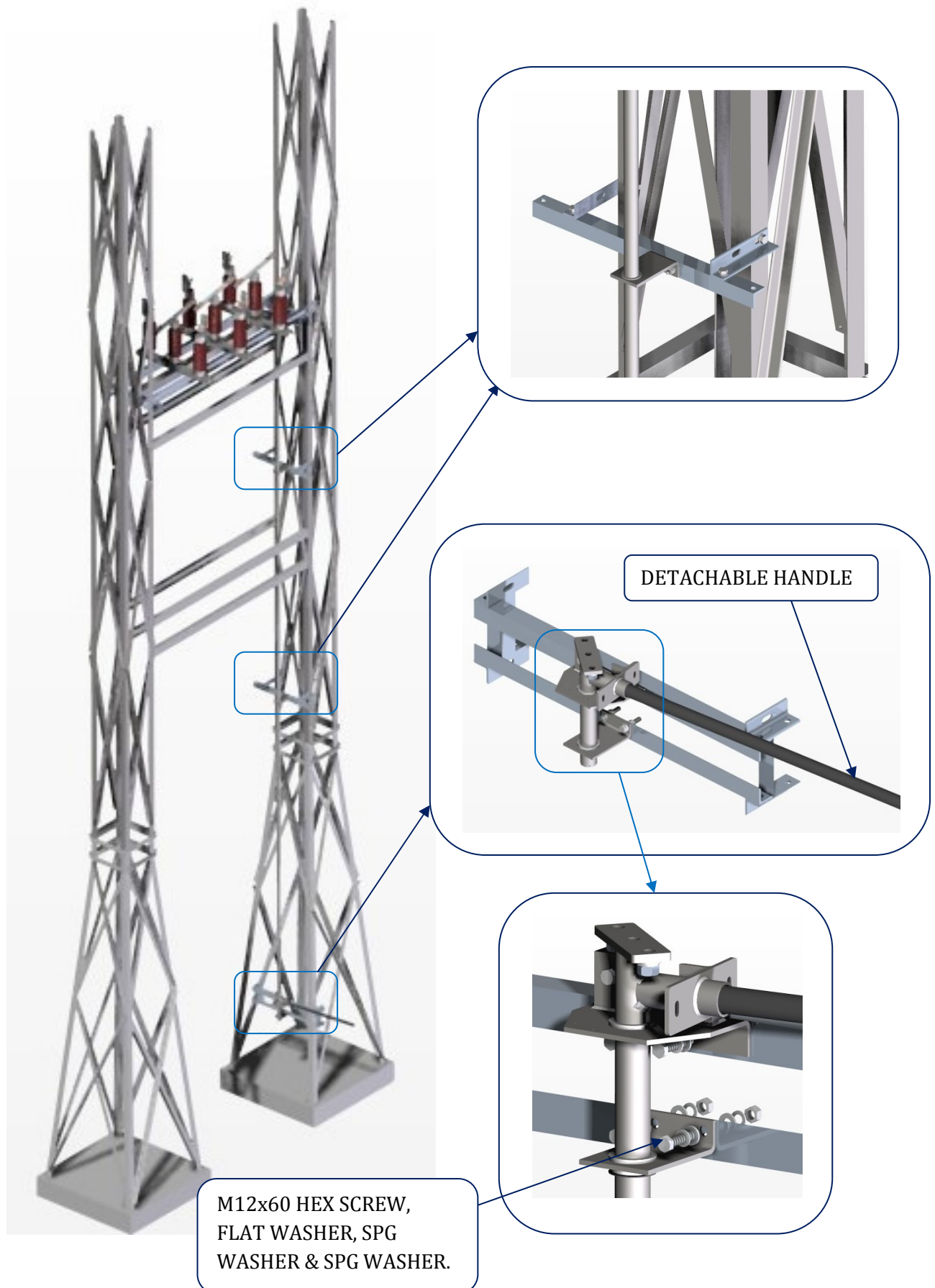
### **CONNECTING DOWN OPERATING PIPE (DOP):**

- Check for centre line and vertical line between torque bearing flange and drive flange with a plumb.
- Fix the tee bar end of the one down operating pipe to the tee bar of the torque bearing assembly (**See figure. M**).
- Now fix the other down operating pipe tee bar to the tee bar of operating drive. Cut the down operating pipe to required length.
- Tighten all bolts.
- Operate the pole manually and ensure open/close label is in proper position.

**FIGURE – M**  
**DISCONNECTOR ASSEMBLY WITH OPERATING DRIVE MECHANISM**



## DISCONNECTOR ASSEMBLY WITH OPERATING DRIVE MECHANISM



## 21.0 TANDEM PIPE ASSEMBLY(MAIN):

- Remove the connecting pin from the lever and keep it separately.
- Keep the drive pole disconnector in closed position.
- Keep the second pole in closed position. Connect the tandem pipe (Phase coupling pipe). If required extend or shorten by adjusting the screw rod.
- Likewise, with the drive pole & second pole in closed condition, keep the third pole also in closed condition and connect the tandem pipe between the second & the third pole.
- Operate the disconnector manually and ensure it opens and closes properly. If not, then adjust the tandem pipe length.
- Ensure all split pins are secured properly. **(See figure. N).**

**FIGURE – N**

**TANDEM PIPE**



## SECTION – D COMMISSIONING AND MAINTENANCE

### 22.0 COMMISSIONING OF DISCONNECTOR:

- Carry out test operation manually; ensure satisfactory engagement of contacts for all three poles. If necessary, align the contacts.
- Apply contact grease.

### 23.0 MAINTENANCE:

#### Caution:

- **Working on high-voltage is very dangerous; hence follow substation and other standardsafety rules.**
- Don't use emery paper for cleaning the contacts.
- Don't try to operate the Earth switch when Disconnect or is in closed condition.

#### Do:

- Ensure disconnection of circuits before doing maintenance activity.
- Do proper earthing of the circuit.
- Stay clear of adjacent live parts; wherever possible, earth the adjacent live parts.
- Use proper tools.

We recommend the following inspection intervals

- Normal ambient condition: After every 5 years or after every 1000 operations (Close/open cycle).
- Extreme ambient conditions i.e. Climate (tropical) and heavy contamination (dust, salt, rust and sulphur): After every 2 years or after every 500 operations (Close/open cycle).

### 24.0 TOOLS AND TACKLES:

Apart from standard tools, the following are required

- Brass wire brush for cleaning of Copper surfaces.
- Steel wire brush for cleaning for Aluminum and steel surfaces.
- Contact grease (Petroleum jelly).
- Cold cleaning agent for Silver plated surfaces.
- Lint – free cloth's

## **25.0 Cleaning:**

Bolted or sliding contact surfaces that conduct current have an effect on the electrical resistance of the current path. Dirty or oxidized contact surfaces increase the electrical resistance. This will result in damage to main contacts. Hence the following cleaning procedure shall be strictly adhered to:

Bolted Contact Surfaces: Aluminum

- Grease lightly.
- With steel wire brush, remove oxide film fully (Do not use emery paper).
- Wipe off contaminated grease immediately using lint – free cloth.
- Re-apply grease again (Immediately after cleaning with lint –free cloth).
- Bolt together treated surfaces and grease joints.

Silver plated contact surfaces.

- Clean with cold cleaning agent (do not destroy silver surfaces).
- Grease immediately.
- Bolt together treated surfaces and grease joints.

Silver plated contact surfaces (Sliding)

- Clean with cold cleaning agent (do not destroy silver surfaces).
- Grease immediately

## **26.0 Inspection checks:**

The following operations must be carried out during inspection

### **Disconnecter:**

- Clean contact area (Male and Female contacts). Check for any damage; if required, change the contacts.
- Apply grease on contact surfaces.
- Clean the insulators. Check for any damage; if required, change.
- Check all bolted connections.
- Carry out three or four test operations manually.
- Reconnect the power supplies and control voltage.
- Carry out three or four test operations electrically.

## **27.0 RECOMMENDED SPARES:**

Keep adequate quantity of following spares at all times.

- Fixed contact fingers.
- Moving contact extrusion.
- Clevis pins with nylon washers, split pins.
- Control springs.



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