

# AIRCELL

FOR OIL FILLED TRANSFORMERS



# AIRCELL

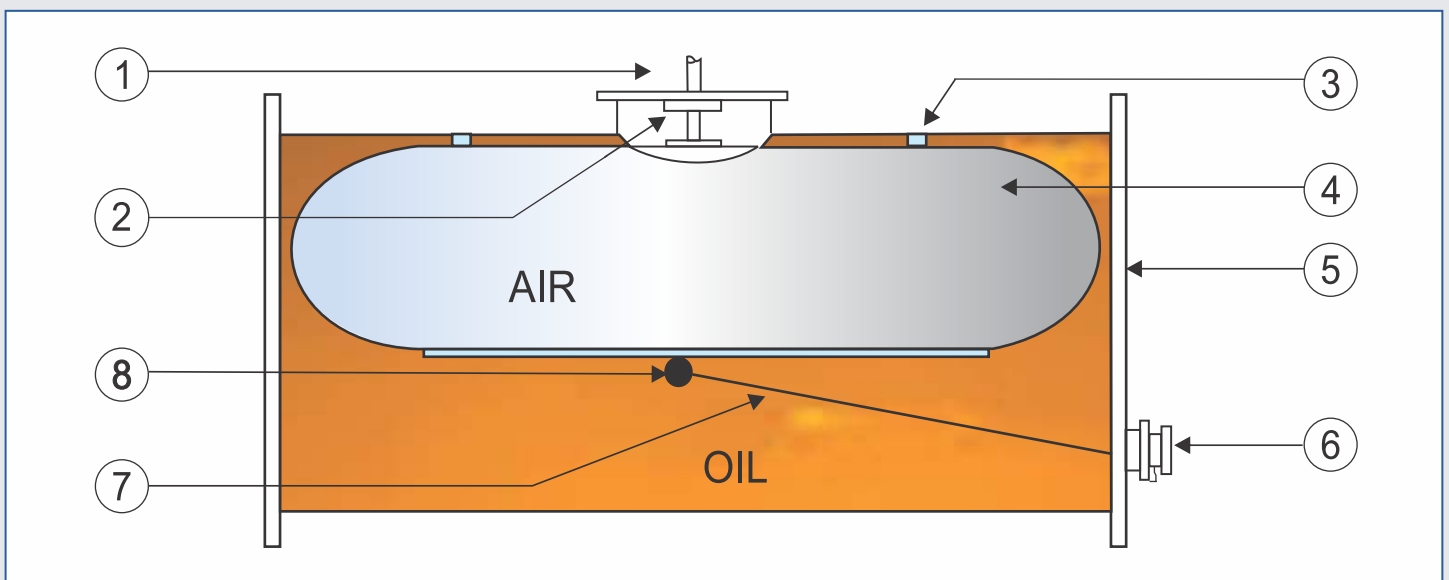
## OVERVIEW

The Air Cell (Flexible Separator) is fitted inside a conservator tank, isolating insulating oil from the atmosphere, and thus preventing contamination of gas and/or moisture from coming in to contact with the transformer oil due to oxidation and hydrolysis. The bag is vented on the transformer through flange type mounting such that it inflates or deflates to accommodate oil volume displacements due to changes in the transformer temperature.

The Air Cells are manufactured using time tested combination of Nylon (Polyamide) fabric and thick coating of Elastomers i.e. Acrylonitrile Butadiene Rubber (NBR), Polychloroprene (CR) and Hypalon (CSM). The rubber compounds are so formulated, so as to minimize separator degradation and resist leakage of air through membranes thus reducing the amount of air in the transformer oil. Over a period of time this air/gases can reduce dielectric strength and thereby accelerate the aging of the insulation system.

**The advantages of the Air-Cell can be well concluded from the facts :**

- Simple design with no expandable parts
- Needs negligible man hours for inspection
- Extended service life
- Economical
- Prevents corrosion
- Oil can be filled into the transformer tank without being exposed to the air
- Since insulating oil is completely isolated from the atmosphere by an air cell, there is no Possibility of oxygen or moisture penetrating the oil
- Pressure on the surface of the oil is constantly maintained at the atmospheric pressure, offering no possibility of the oil becoming supersaturated and forming bubbles; thus, high dielectric strength can be maintained



- |                             |                        |
|-----------------------------|------------------------|
| 1. Connecting Flange        | 5. Conservator         |
| 2. Pipe Connecting Breather | 6. Oil Level Indicator |
| 3. Straps                   | 7. Float Arm           |
| 4. Aircell                  | 8. Float               |



## THE TECHNOLOGY

The product design and construction of **Aircell** is based on thorough analysis of the stringent and diverse environments in which they have to perform. Their constitution takes into account the various factors that affect the performance over long periods of operation. The Air Cell we manufacture incorporates the latest coating technology.

**Some of the most important features that make SUKRUT Aircell exclusive are :**

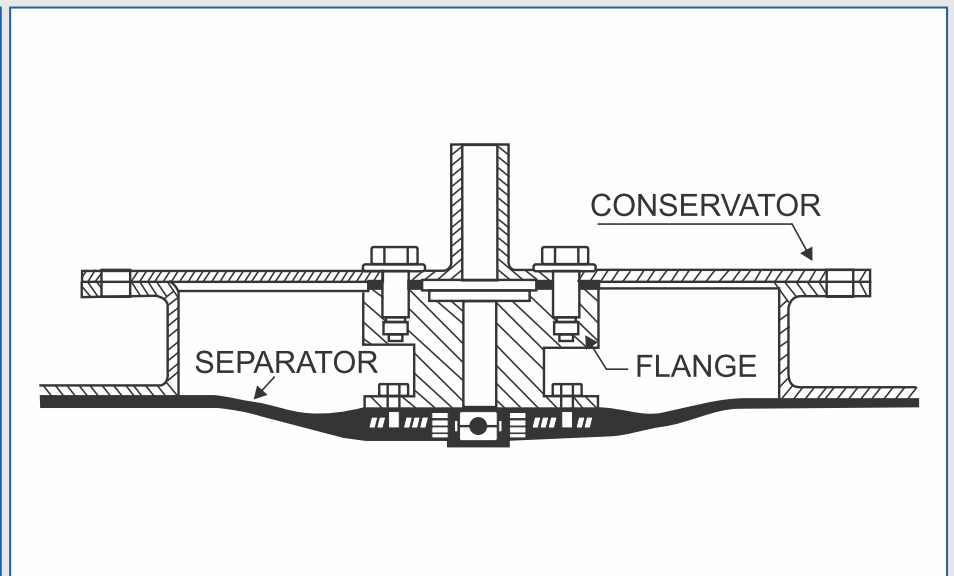
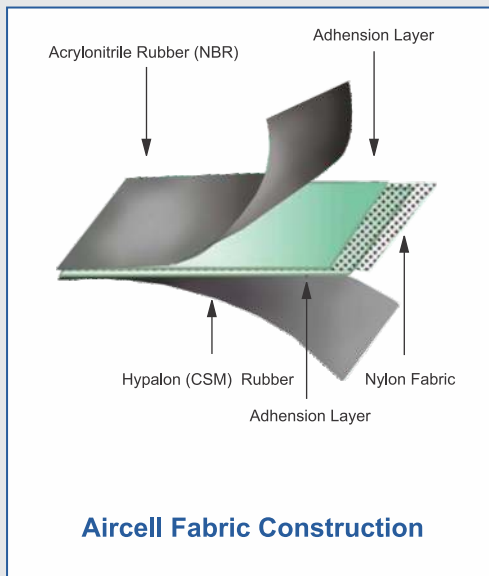
### The Polyamide Substrate :

The textile reinforced supporting fabric is made from high tenacity Nylon yarns and designed specifically for flexible Separators. The fabric has high tear & tensile strength, high flexibility & fatigue resistance and superior dimensional stability.

### The Polymer Technology :

Air Cells are manufactured by using combination of various Elastomers. The inside of the fabric is coated with combination of Olive Green-Hypalon (CSM) & Black- Polychloroprene(CR) for imparting better ozone resistance. Whereas the outer side is coated with Black-Acrylonitrile Butadiene Rubber (NBR) for providing better oil resistance. The compounds are carefully formulated to accommodate critical technical parameters such as:

- High bonding strength between rubber to fabric
- Improved temperature and ozone resistance
- Good swell and chemical resistance to transformer oil
- Crack and weathering resistance



### The Coating Technology :

Our Aircells are manufactured using sophisticated manufacturing facility to produce rubber coated fabrics, which are roto-cured under automatically controlled time, pressure and temperature. This distinctively offers advantages such as:

- Higher bond strength between the polymer and fabric substrate
- Hot vulcanised seams to ensure no leakage at all times
- Guaranteed mechanical strength to fixation lugs
- Smooth glossy surface free of pin-holes and defects due to rotocuring
- Superior thickness control under tolerance of  $\pm 0.05$  mm giving greater dimensional stability.



## TESTS

### Routine Tests

#### Basic Fabric :

1. Visual Inspection for Knots & Holes
2. Breaking Strength
3. Elongation

#### Coated Fabric :

1. Air permeability
2. Visual Inspection for Pin-holes
3. Mass Surface
4. Thickness
5. Swelling
6. Tear Strength
7. Breaking Strength
8. Elongation
9. Adhesion

#### Finished Product :

1. Pressure Testing by Compressed Air
2. Leakage Testing with Soap Solution
3. Puncture Testing
1. Heat Aging
2. Compression Test
3. Low Temperature Flexibility
4. Sludge Content
5. Acidity
6. Ozone Resistance
7. Air Permeability

Test Certificates can be provided upon request

### Faults & Remedies

Air Cell is manufactured considering all aspects of application during its use in the transformers. In the normal course of use, careful handling, storing and fitting of the Aircell will give a good service life.

However in the event of mishandling or accident the fabric can get ruptured or the joint may open, leading to leakage of air in the conservator.

For minor repairs, a kit with working instructions is provided along with each air cell. For major damage the Aircell will have to be returned to our manufacturing facility.

The serial Number of Aircell must be informed when any observation is to be communicated to us.

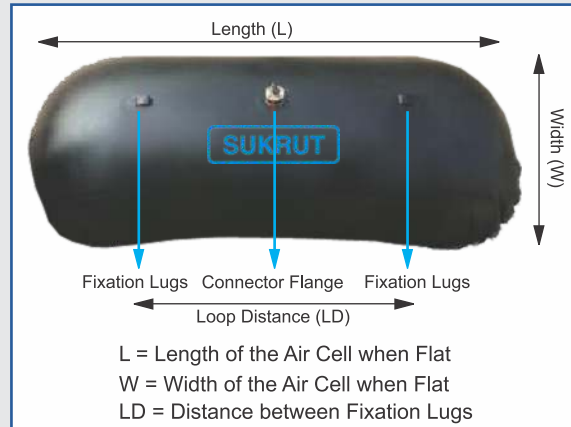
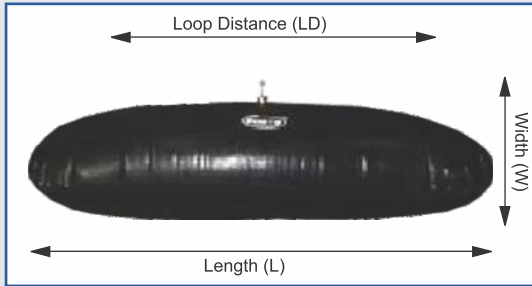
Please note that it will not be possible to depute our representative to site to access / inspect the damage / fault.



# AIRCELL

## DIMENSIONS & SIZES

### Dimensions :



| SR. NO. | F S P SIZE  | EXPANSION VOLUME | CONSERVATOR SIZE |        |          | SEPARATOR SIZE |        |           |
|---------|-------------|------------------|------------------|--------|----------|----------------|--------|-----------|
|         |             |                  | Dia              | Length | Volume   | Width          | Length | Loop Dist |
|         |             | (Litres)         | A (mm)           | B (mm) | (Litres) | W (mm)         | L (mm) | LD (mm)   |
| 1       | 500 - 500   | 500              | 500              | 2710   | 530      | 825            | 3035   | 2010      |
| 2       | 500 - 600   | 500              | 600              | 1970   | 560      | 982            | 2352   | 1170      |
| 3       | 750 - 600   | 750              | 600              | 2850   | 810      | 982            | 3232   | 2050      |
| 4       | 750 - 700   | 750              | 700              | 2180   | 840      | 1140           | 2620   | 1280      |
| 5       | 1000 - 700  | 1000             | 700              | 2830   | 1090     | 1140           | 3270   | 1930      |
| 6       | 1000 - 800  | 1000             | 800              | 2167   | 1088     | 1290           | 2657   | 1167      |
| 7       | 1000 - 800  | 1000             | 800              | 2260   | 1130     | 1297           | 2757   | 1260      |
| 8       | 1500 - 800  | 1500             | 800              | 3250   | 1630     | 1297           | 3747   | 2250      |
| 9       | 1500 - 900  | 1500             | 900              | 2660   | 1690     | 1454           | 3214   | 1560      |
| 10      | 2000 - 900  | 2000             | 900              | 3440   | 2190     | 1454           | 3994   | 2340      |
| 11      | 2000 - 1000 | 2000             | 1000             | 2400   | 1884     | 1610           | 3010   | 1200      |
| 12      | 2000 - 1000 | 2000             | 1000             | 2990   | 2347     | 1610           | 3600   | 1790      |
| 13      | 2500 - 1000 | 2500             | 1000             | 3300   | 2590     | 1610           | 3910   | 2100      |
| 14      | 2500 - 1000 | 2500             | 1000             | 3400   | 2669     | 1610           | 4010   | 2200      |
| 15      | 2500 - 1000 | 2500             | 1000             | 3540   | 2779     | 1610           | 4150   | 2340      |
| 16      | 3000 - 1000 | 3000             | 1000             | 3800   | 2983     | 1610           | 4410   | 2600      |
| 17      | 2000 - 1000 | 2000             | 1000             | 2880   | 2260     | 1611           | 3491   | 1680      |
| 18      | 2500 - 1000 | 2500             | 1000             | 3520   | 2760     | 1611           | 4131   | 2320      |
| 19      | 3500 - 1000 | 3500             | 1000             | 4740   | 3721     | 1611           | 5351   | 3540      |
| 20      | 2500 - 1100 | 2500             | 1100             | 3000   | 2850     | 1768           | 3668   | 1700      |
| 21      | 3000 - 1100 | 3000             | 1100             | 3520   | 3350     | 1768           | 4188   | 2220      |
| 22      | 3000 - 1200 | 3000             | 1200             | 3050   | 3450     | 1925           | 3775   | 1650      |
| 23      | 4000 - 1200 | 4000             | 1200             | 3940   | 4450     | 1925           | 4665   | 2540      |
| 24      | 3500 - 1200 | 3500             | 1300             | 2800   | 3715     | 2082           | 3582   | 1300      |
| 25      | 4000 - 1300 | 4000             | 1300             | 3450   | 4580     | 2082           | 4232   | 1950      |
| 26      | 4500 - 1300 | 4500             | 1300             | 3600   | 4775     | 2082           | 4382   | 2100      |
| 27      | 5000 - 1300 | 5000             | 1300             | 4000   | 5306     | 2082           | 4782   | 2500      |
| 28      | 5000 - 1300 | 5000             | 1300             | 4200   | 5580     | 2082           | 4982   | 2700      |
| 29      | 6000 - 1300 | 6000             | 1300             | 4770   | 6328     | 2082           | 5552   | 3270      |
| 30      | 8000 - 1300 | 8000             | 1300             | 6520   | 8650     | 2082           | 7302   | 5020      |
| 31      | 3000 - 1300 | 3000             | 1300             | 2512   | 3332     | 2100           | 3300   | 1110      |
| 32      | 5000 - 1400 | 5000             | 1400             | 3710   | 5720     | 2239           | 4549   | 2110      |
| 33      | 6000 - 1400 | 6000             | 1400             | 4360   | 6720     | 2239           | 5199   | 2760      |
| 34      | 6000 - 1400 | 6000             | 1400             | 5000   | 6633     | 2240           | 5840   | 3400      |
| 35      | 6000 - 1500 | 6000             | 1500             | 3900   | 6880     | 2396           | 4796   | 2200      |



# AIRCELL

## HOW TO ORDER

### CYLINDRICAL CONSERVATOR

L(mm) = Length of conservator + W - Diameter of conservator  
 W (mm) =  $\frac{(TT \times \text{Conservator diameter})}{2} + 40 \text{ mm}$

LD (mm) = L - W - 200 mm

L: flat (fully deflated) length of the STP

W : flat (fully deflated) width of the STP

LD : pitch distance of lugs

### RECTANGULAR CONSERVATOR

L(mm) = Length of conservator + 40 mm

W (mm) = width of the conservator + H+ 40 mm

LD (mm) =  $x - \frac{(H \times TT)}{2} - 200 \text{ mm}$

L: flat (fully deflated) length of the STP

LD: pitch distance of lugs

W: flat (fully deflated) width of the STP

H: conservator height

### ELLIPTICAL CONSERVATOR

L(mm) = Length of conservator + 40 mm

W (mm) = 1/2 developed length of the conservator

LD (mm) =  $x - \frac{(H \times TT)}{2} - 200 \text{ mm}$

L: flat (fully deflated) length of the STP

LD: pitch distance of lugs

### RECTANGULAR CONSERVATOR

L(mm) = Length of conservator + 40 mm

W (mm) = width of the conservator + H+ 40 mm

LD (mm) =  $x - \frac{(H \times TT)}{2} - 200 \text{ mm}$

L: flat (fully deflated) length of the STP

LD: pitch distance of lugs W: flat (fully deflated) width of the STP

H: conservator height

### CUSTOMER SPECIAL REQUEST CONSERVATOR

L (mm) = Length of conservator + 40 mm

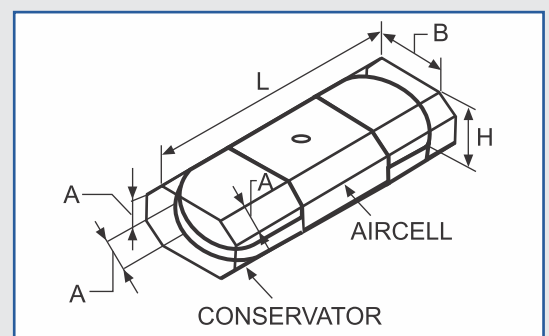
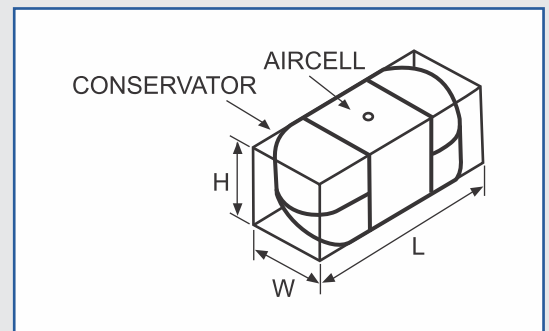
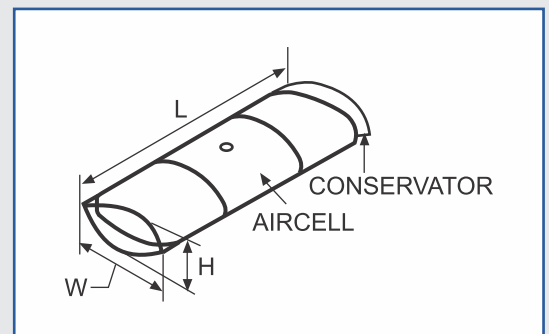
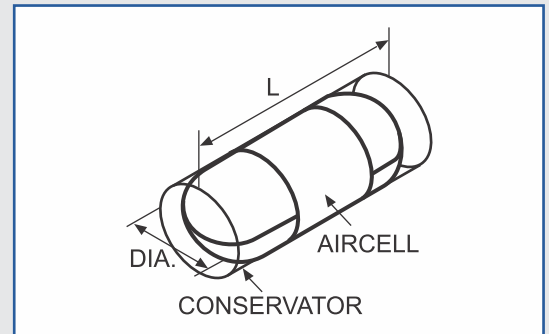
W (mm) =  $A + 2XB + \frac{c}{2}$

LD (mm) =  $x - (H \times TT) - 200 \text{ mm}$

W: flat (fully deflated) width of the STP

H: conservator height

Your requirements can be specified by giving dimensions **L, W & LD**  
 Other Conservator Shapes Available On **REQUEST**





## AIRCELL

### INSTALLATION OF THE AIR CELL

#### Step 1

Push the Air Cell into the conservator through the open end or inspection hatch in the end of the conservator.

#### Step 2

Suspend the Air Cell from hooks (2) in the ceiling of the conservator using the loops.

#### Step 3

Fit the Air Cell flange (8) on the conservator flange using a ring (7) to ensure air tightness of the system.

#### Step 4

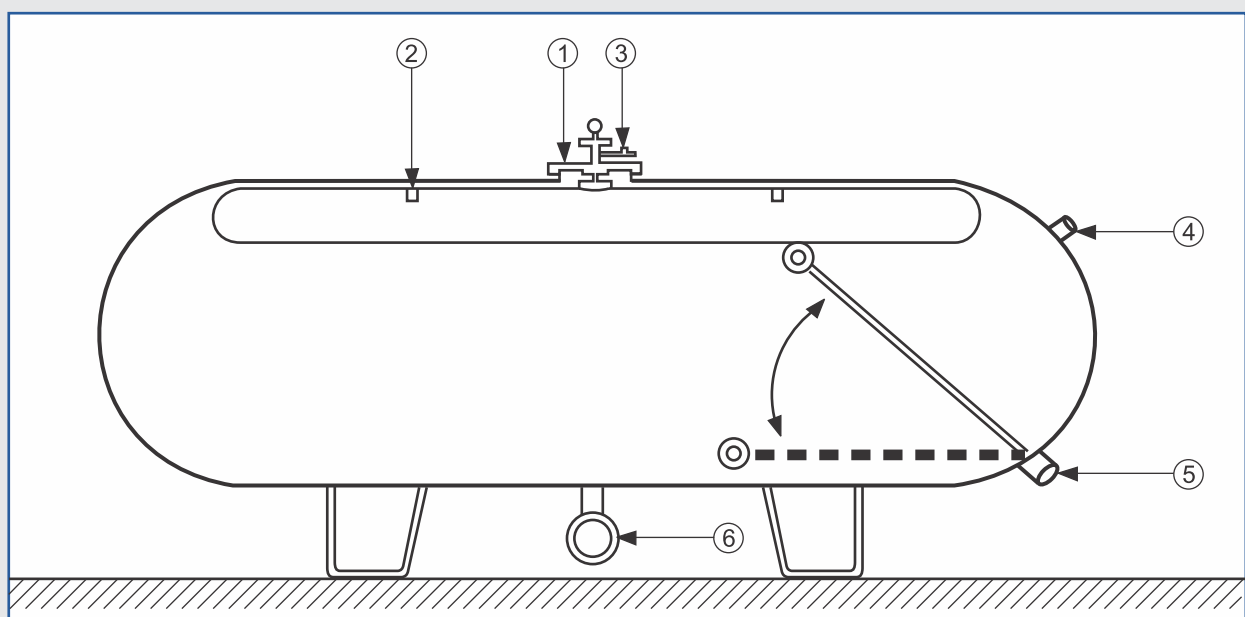
Close the open end of the conservator.

#### Step 5

Fill the Air Cell to a pressure of 10kPa (0.1 bar). Close the filling valve (3) while leaving the system pressurized. A relief hole (4) must be on the oil filled side of the conservator so that the Air Cell can freely expand.

#### Step 6

The Air Cell will gradually stabilize. After 6 hours, adjust the air pressure again to 10kPa (0.1 bar). A 24 hours leak test is then to be made on the Air Cell. After 24 hours check the pressure reading again. If the pressure has not dropped significantly, the test is correct. The temperature should be as stable as possibly during the leakage testing period.



## FILLING THE CONSERVATOR

### Step 1

The pressure of air in the Aircell should be 10kPa (0.1 bar). If not, increase the pressure to the correct level and close the air-filling valve.

### Step 2

Check the air vent valves (4) are open at both ends of the conservator.

### Step 3

Open the valve (6) between the conservator and transformer tank and pump in more oil so that the oil rises to the conservator. The pumping speed should be suitably slow so that the pressure within the Air Cell does not exceed 13 kPa (0.13 bar). Stop pumping, when oil begins to come out of the vent valves and close the vent screws.

### Step 4

Regulate the pressure in the Air Cell to normal by opening the plug in the flange or air filling valve from which the pressure hose is removed.

### Step 5

Reopen the valve (6) between the conservator and the transformer tank and continue filling with oil until the oil level indicator gives the correct reading according to the temperature of transformer.

