COST EFFECTIVE
MASS TRANSFER TECHNOLOGY
WITH TOTAL TURNKEY SOLUTION

S-CUBE Mass Transfer Pvt Ltd do have Patented Process for Biodiesel with Patent Number 201621030302 for Distillation Column and it’s Internal for Better Quality and with Low Emission.

www.s3dist.in
S-Cube Mass Transfer Pvt. Ltd was founded in 2019 by Mr. Chetan B Sayankar after getting the Global consultancy experience in Turnkey Process Plants with the intent of delivering the highest quality of products and services at competitive prices and family oriented commitment to customer service and satisfaction. Through constant dedication to these principles for more than 15 years, S Cube Mass Transfer Pvt Ltd has earned a glowing reputation as a specialist in the field of mass transfer and separation technology. Main Expertise is in Biodiesel, Pharma, Oil and Fats, Distillation Column Internals etc.

Headquartered in Pune, S-Cube commenced its operations in 2019. The unique location has offered us attract employees of high caliber and strong work ethic, and at the same time utilise the vast wealth of resources the city of Pune has to offer.

S-Cube is a reliable partner in offering innovative and sustainable product solutions for performance critical operations and adds value and strengthens the competitive position of our customers. We hold key positions in a number of industries including oil & gas, petrochemicals, pharmaceutical, water treatment and food & beverage and are dedicated to provide sustainable solutions and long-term value for our customers.

**S-CUBE: MISSION, VISION & VALUE**

**MISSION**
To develop & deliver cost effective reliable solutions with quick adaptability and customer centric approach through a standardized process and innovative thinking which would lead to achievement of common goal in an eco friendly way.

**VISION**
To become a leading single point solution provider with the greatest value and developed strategies to exceed the expectations of our partners and clients by keeping quality and ethical dealing as priority.

**VALUE**
To consistently explore the new horizons of the science and technology by preserving philanthropic cultural, social and environmental morals.
DISTILLATION COLUMN

OVERVIEW
A distillation column is an essential item used in the distillation of liquid mixtures to separate the mixture into its component parts, or fractions, based on the differences in volatilities. Fractionating columns are used in small scale laboratory distillations as well as large scale industrial distillations.

Distillation Column is used to for Solvent Recovery, refining oils from the crude oil.

DISTILLATION COLUMN DESIGN
The design of a distillation column can be divided into the following steps:
1. Specify the degree of separation required: set product specifications.
2. Select the operating conditions: batch or continuous; operating pressure.
3. Select the type of contacting device: Random Packing, Structured packing and Trays,
4. Determine the stage and reflux requirements: the number of equilibrium stages.
5. Size the column: diameter, number of Theoretical stages.
6. Design the column internals: plates, distributors, packing supports.
7. Mechanical design: vessel and internal fittings

TYPES OF DISTILLATION COLUMNS
There are many types of distillation columns, each designed to perform specific types of separations, and each design differs in terms of complexity.

Batch Columns:
In batch operation, the feed to the column is introduced batch-wise. That is, the column is charged with a ‘batch’ and then the distillation process is carried out. When the desired task is achieved, a next batch of feed is introduced.

Continuous Columns:
In contrast, continuous columns process a continuous feed stream. No interruptions occur unless there is a problem with the column or surrounding process units. They are capable of handling high throughputs and are the most common of the two types. We shall concentrate only on this class of columns.
BASIC OPERATION AND TERMINOLOGY

The liquid mixture that is to be processed is known as the feed and this is introduced usually somewhere near the middle of the column to a tray known as the feed tray. The feed tray divides the column into a top (enriching or rectification) section and a bottom (stripping) section. The feed flows down the column where it is collected at the bottom in the reboiler.

Heat is supplied to the reboiler to generate vapour. The source of heat input can be any suitable fluid, although in most chemical plants this is normally steam. In refineries, the heating source may be the output streams of other columns. The vapour raised in the reboiler is re-introduced into the unit at the bottom of the column. The liquid removed from the reboiler is known as the bottoms product or simply, bottoms.

The vapour moves up the column, and as it exits the top of the unit, it is cooled by a condenser. The condensed liquid is stored in a holding vessel known as the reflux drum. Some of this liquid is recycled back to the top of the column and this is called the reflux. The condensed liquid that is removed from the system is known as the distillate or top product.
DISTILLATION COLUMN TYPE OF INTERNALS:

1. Structured Packing
2. Random Packing
3. Internals for Packed Column
4. Distillation Trays

**Structured Packings**

Lot of experience in the field of development of structured packing’s makes us the ideal partner to provide you the best solution for your application.

**Random Packings**

We offer a wide range of random packings ranging from traditional to high performance random packings to suit your requirements.

**Internals for Packed Columns**

Packings will perform to their optimum level only when complimented by appropriately designed column internals.

**Mass Transfer Trays**

We offer a wide variety of traditional as well as high performance mass transfer tray configurations.
A BENCHMARK FOR QUALITY IN DISTILLATION:

S-Cube Mass Transfer structured packings is formed from multiple layers of metal lath that were corrugated and assembled in such a manner as to produce a honeycomb-like structure. In a refinery vacuum column, Solvent Recovery Column. S-Cube Structured Packing has very less pressure drop to Random packing and bubble-cap trays.

The corrugated metal sheets of structured packing's provide a number of advantages compared to random packing's and distillation trays. This packing's offer high efficiency, excellent throughput, low pressure drop and a very broad application area.

S Cube Mass Transfer Private Limited offers high performance Structured Packing using raw materials like SS 304/304L, SS316/316L, Duplex, 904L, etc. These are technically advanced equipment available with assured performance in process column for purifying solvent all the way through Distillation.

Its unmatched quality and unique design have improved the efficiency and capacity of the product. Its excellent and incomparable features have attracted millions of buyers from worldwide. So, we are accredited as one of foremost Manufacturers, Exporters and Wholesale Wire Mesh Structured Packing Suppliers from Pune (Maharashtra), India.

Despite of this, it is used for increasing vapour-liquid contact and thus, there is a variety of surface enhancements that are easily accessible for promoting liquid spreading over the packing surface.

Features of Structured Packing:

- High void volume in the packing bed
- High mass transfer surface area
- Very low pressure drop, highly recommended for vacuum distillation system
- Higher vapor load capacity compared to random packing and trays
- Pressure drop per theoretical stage 0.5-1.5 mbar/m (For Standard System)
Specifications of Structured Packing’s:
- Offered in specific mass transfer surface areas (m²/m³) of 125, 250, 350, 500 & 750
- Materials used are like SS 304/304L, SS316/316L, Duplex, 904L, etc.

## S-CUBE TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>S-Cube Structured Packing</th>
<th>Surface Area (m²/m³)</th>
<th>F-Factor</th>
<th>No. of Theoretical Stages Per Meter Ht. (NTSM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCM 1.25 L/M</td>
<td>125</td>
<td>3.5</td>
<td>1.0</td>
</tr>
<tr>
<td>SCM 1.70L</td>
<td>170</td>
<td>3.0</td>
<td>1.5</td>
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<tr>
<td>SCM 2.0 L</td>
<td>200</td>
<td>2.7</td>
<td>2.0</td>
</tr>
<tr>
<td>SCM 2.5 L</td>
<td>250</td>
<td>2.2</td>
<td>2.3</td>
</tr>
<tr>
<td>SCM 3.5 L</td>
<td>350</td>
<td>1.8</td>
<td>2.8</td>
</tr>
<tr>
<td>SCM 5.0 L</td>
<td>500</td>
<td>1.5</td>
<td>3.8</td>
</tr>
<tr>
<td>SCM 7.50 L</td>
<td>700</td>
<td>1.2</td>
<td>4.5</td>
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<tr>
<td>SCM WM 5.0 M</td>
<td>500</td>
<td>2.2</td>
<td>6</td>
</tr>
<tr>
<td>SCM WM 7.5 L</td>
<td>750</td>
<td>1.5</td>
<td>9</td>
</tr>
</tbody>
</table>

## S-CUBE WIREMESH PACKINGS

S-Cube Wiremesh packing has been successfully used for vacuum column. They are generally used in small to medium diameter columns for separation requiring maximum number of theoretical stages in minimum column height.

### Applications of S-Cube Wire Mesh Structured Packing:
- Ranging from laboratory columns to large scale process systems
- Solvent revival
- Close boiling components distillation
- Azeotropic distillation
- High vacuum process columns
- Appropriate for batch & continuous distillation systems as well

### Laboratory Packing:
- Packings for small laboratory column diameters for preliminary assessment of separation tasks
- Highest number of theoretical stages
- Low pressure drop
STRUCTURED PACKING FOR CORROSIVE ENVIRONMENT

Ceramic Structured Packing

Ceramic surface can generate extremely thin liquid film. Turbulent liquid flow and tortuous vapor flow passages promote mixing of liquid and vapor with a low pressure drop. These are reasons that our ceramic structured packings have the same mass transfer efficiency as metal packings. Meanwhile, they are much more resistant to corrosion and high temperature than metal packings.

The surface structure of ceramic packing can promote its wetting and help maintain liquid hold-up at a minimum. Thus, chance for the system to be overheated, polymerized and coked can be minimized.

These type of ceramic structured packing find applications indeaerators, flue gas coolers, HCL absorber, CL2/SIO2 Scrubbers.

Excellent Features:

• Excellent surface wetting ability, larger mass transfer area, and higher separation efficiency, owing to the special surface structure;
• High compressive strength;
• Available specific surface area between 64m2/m3 and 500m2/m3;
• Little magnifying effect;
• More fields/conditions to be applicable

<table>
<thead>
<tr>
<th>S Cube Structured Packing</th>
<th>Surface Area (SQ.m./CU.m.)</th>
<th>F-Factor</th>
<th>No. of Theoretical Stages Per Meter ht. (NTSM)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>250Y</td>
<td>80</td>
<td>2.5</td>
<td>2.5</td>
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<tr>
<td>350Y</td>
<td>78</td>
<td>2</td>
<td>2.8</td>
</tr>
<tr>
<td>500Y</td>
<td>72</td>
<td>1.5 - 2</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Applications:

• Distillations and Absorption of strong corrosive mixtures
• Distillation of halogenated organic components
PTFE STRUCTURED PACKING

PTFE structured packings have the high mass transfer efficiency as metal packings. Meanwhile, they are much more resistant to corrosion and low temperature than metal packings.

S-CUBE PTFE STRUCTURED PACKING

PTFE Structured Packing used for corrosive application like absorption and distillation columns and chemical reactions. PTFE Structured Packing typically consist of thin corrugated sheet. PTFE sheets arranged in a way that they force fluids to take complicated paths through the column, thereby creating a large surface area for the contact between different phases.

PTFE structured packing is used as a replacement for ceramic saddle, it is high durable and getting more number of stages than ceramic saddle.

Advantages

- It is completely chemically inert material
- It is strong but light in weight
- It gives rise to adequate area for both Gas & Liquid
- Streams without excessive liquid hold up and less pressure drop
- It provides a good contact between liquid and gas
- It is washable and reusable
- It is unbreakable too
- It is energy conserving

The packing is available for column sizes from 50 mm to 500 mm.
The Raschig ring is a piece of tube that is used in large numbers in a packing column. Raschig rings are usually made of ceramic or metals, and they provide a large surface area within the column, allowing for interaction between liquid and gas vapors.

Pall rings are the most common form of random packing. Pall rings have similar cylindrical dimensions but have rows of windows which increase performance by increasing the surface area. They are suited for low pressure drop and high capacity applications. They have a degree of randomness and a relatively high liquid hold up, promoting a high absorption, especially when the rate of reaction is slow. The cross structure of the Pall ring makes it mechanically robust and suitable for use in deep packed beds.
Intalox saddles is mainly designed for distillation operations. After knowing the advantages of intalox metal tower packing in distillation, manufacturer has recommended its other purpose especially in stripping, absorption, liquid-liquid extraction, and in heat transfers as well.

We offer different types of Intalox Saddles like Ceramic Intalox Saddles, Polypropylene Intalox Saddles, PVDF Intalox Saddles. The range consists of Metal Intalox Saddles, IMTP Saddles, Ceramic Intalox Saddles, PVDF Intalox Saddles and PP Intalox Saddles. Chemical, Petrochemical, Fertilizer, Chlor-alkali, Soda Ash, Sulphuric Acid, Pulp and Paper industries are some of the industries where these Intalox Saddles are used.

It has been used successfully as an inexpensive and efficient ways to increase tower capacity and efficiency. There are numerous process advantages that can be realized by using plastic random column packing in many applications. Plastic random column packings are not as bulk as ceramic equivalents and therefore offer higher capacity and lower pressure drop.

**IMTP SADDLE**

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**IMTP Saddle Sizes**

<table>
<thead>
<tr>
<th>Normal Size (mm)</th>
<th>15</th>
<th>25</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Surface Area ($M^2/M^3$)</td>
<td>305</td>
<td>226</td>
<td>151</td>
<td>100</td>
<td>80</td>
<td>60</td>
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<tr>
<td>Void Fraction %</td>
<td>97</td>
<td>97</td>
<td>98</td>
<td>98</td>
<td>98</td>
<td>98</td>
</tr>
</tbody>
</table>

**PLASTIC RANDOM PACKING**

It has been used successfully as an inexpensive and efficient ways to increase tower capacity and efficiency. There are numerous process advantages that can be realized by using plastic random column packing in many applications. Plastic random column packings are not as bulk as ceramic equivalents and therefore offer higher capacity and lower pressure drop.

**Process Advantages of Random Packing’s:**

- Reduced pressure drop through the column.
- Reduced liquid hold up through the column.
- Variety of packing types for different types of processes.
- Higher capacity compared to trays at same efficiency.
- Good performance in fouling conditions.
S-Cube Mass Transfer Pvt Ltd manufactures Column Internals that are used in distillation procedures. We use premium grade raw materials in order to provide you with best performing column internals.

In any column system, packings can give an optimum performance only when complemented with appropriately designed tower distributors, collectors, supports and other column internals for optimum liquid – vapour distribution to the packed beds.

**TYPES OF COLUMN INTERNAL**

**Column Internal - Structured Packing**
- Channel type Distributor
- Liquid Distributor VEP
- Liquid Distributor-Trough type
- Pipe Type Liquid Distributor
- Chimney Tray
- Liquid Distributor Cum Collector

**Column Internals - Random Packing**
- Liquid Distributor
- Channel Type
- Antenna Type
- Pan distributor
- Bed Limiter
- Multi Beam support

**Application Areas of Column Internal**
- Organic chemicals
- Petrochemicals
- Drug And Dye Intermediates
- Pharmaceuticals
- Aromatic And Essential Oils
- Agrochemicals
- Pesticides And Fertilizers
- Alcohols
- Oil And Gas Industries
- Drug Intermediates
- Bulk Drugs
OVERVIEW

Once the process design stage ends, the equipment design begins. This stage of design converts process requirements into actual hardware.

TWO PHASE SEPARATORS

The particular tray selection and its design can materially affect the performance of a given distillation, absorption, or stripping system. Each tray should be designed so as to give as efficient a contact between the vapors and liquid as possible, within reasonable economic limits.

A] SCM Valve Tray

Valve trays are perforated sheet metal decks on which round, liftable valves are mounted. The vapors flows through valves which are installed parallel to the outlet weir.

Vapour flows lifts the caps, thus self creating a flow area for the passage of vapour. The lifting cap directs the vapour to flow horizontally into the liquid, thus providing better mixing than is possible in sieve trays. Valve trays combine high capacity and excellent efficiency with a wide operating range.

Fixed Valve Trays Floating Valve Trays Advantages:

- Excellent liquid/ vapors contacting
- Higher capacity
- Higher flexibility than sieve trays
- Can handle higher loadings
- Low-pressure drop than bubble cap
B] SCM Sieve Tray:

Sieve trays are flat perforated plate in which vapour rises through small holes in tray floor, & bubbles through liquid in fairly uniform manner. They have comparable capacity as valve trays. Vapour passes straight upward through the liquid on the plate. The arrangement, number and size of the holes are design parameters.

SCM Sieve Tray Advantages:
- Simple Construction
- Low Entrainment
- Low Cost
- Low Maintenance Cost
- Low Fouling Tendency

SCM Sieve Tray Disadvantages:
- Less-flexible to Varying Loads Than Liquid
- Vapour
- Riser
- Slot
- Cap
- Liquid
- Tray

C) SCM Bubble Cap Trays:

Riser or chimney fitted over each hole, and a cap that covers the riser. The cap is mounted so that there is a space between riser and cap to allow the passage of vapour. Vapour rises through the chimney and is directed downward by the cap, finally discharging through slots in the cap, and finally bubbling through the liquid on the tray.
OIL AND GAS INTERNALS

OVERVIEW
Separators are utilized to Oil Water Separation from the liquid in a well stream. This allows liquid free gas to be diverted to gas sales and/or to be utilized as fuel. Relatively gas free oil is then dumped to storage or to a treating system for removal of water.

TWO PHASE SEPARATORS
Designed specifically for oil and gas. The well stream enters the separator and strikes an inlet deflector which diverts the liquid and gas downstream to the liquid section where it begins to separate. After adequate retention time, liquid builds up in the bottom of the tank and lifts a float, through a linkage to dump the fluid.

THREE PHASE SEPARATORS
Designed specifically for oil, gas and water. Essentially the same as a two phase except the separator has an internal inlet down comer, which carries the fluid to the bottom of the vessel for added retention and separation time.
VERTICAL SEPARATORS

Vertical separators are designed primarily for intermediate gas-oil ratios, while horizontal separators are suited for high gas-oil ratios and constant flow well-streams. These high-pressure separators are available in vertical or horizontal configurations, with a wide range of sizes and capacities.

We specialize in filling the needs of the petroleum industry, with products designed to withstand the rigors of oil and gas production. We understand that the ability to separate oil, gas, and water in oilfield operations is critical; that's why we provide a wide range of robustly engineered 2 and 3 phase separators.

Part of Separator:

- Vane Inlet device
- Mist Eliminator/ Demister pad
- Baffle
- Vane Pack
- Plate Pack
- Coalescer Packings
Our process specialists can support you with optimally designed stripping columns. We supply first-class components and equipment, or entire plant solutions, providing you with an excellent performance/cost ratio. Stripper Column is a part of zero Liquid Discharge system. Stripper Columns used to reduced COD in effluent.

This basic operation in fluid processing serves to remove one or more lighter components from a liquid mixture. These components can be dissolved gases or lighter chemicals. The purpose of this process is typically to recover products from a liquid phase or to remove pollutants from wastewater. S Cube has extensive experience in the successful design of stripping systems, especially combining a stripping step to remove solvents from wastewater with additional processing steps to purify these solvents.

The design of stripping units is geared to provide you with improved column performance, increased capacity and reduced energy consumption. Design activities are supported by computer simulations and in-house pilot plant testing. Our vast experience and know-how in the field of stripping combined with an in-depth understanding of column hardware ensures we provide you with the optimum solution.

We offer you complete lines of column internals, packing or trays that can satisfy any stripping requirement, together with a basic engineering package and other key equipment such as column shells, column packings & internals, heat exchangers, and decanters. You can also choose the delivery of a complete, often skid-mounted unit including process control and start-up support services.
A wide variety of process applications take advantage of static mixing technology including:

- Static Mixer
- High Efficiency SMX element
- SMV Element

**Laminar Flow:**
- High Viscosity Mixing
- High – Low Viscosity Mixing
- Heat Transfer Enhancement

**Turbulent Flow:**
- Low Viscosity Liquids Mixing
- Gas Mixing
- Dispersion of Immiscible Liquids
- Gas-Liquid Contacting

**INDUSTRIAL APPLICATIONS**

Most fluid processing industries use static mixers with a very broad range of applications including the following short sample listing:

- Chemical Industry
- Food Industry
- Water & Wastewater Treatment
- Oil, Gas & Petrochemicals
- Other Industries
CHEMICAL INDUSTRY

- Dispersing immiscible liquids in washing and extraction operations
- Mix gases with air in front of catalytic reactors such as in the production of Nitric Acid
- Dissolve gases into liquids such as NH₃, SO₂, Cl₂
- Mix Reactive materials in short length
- Heat and Cool viscous materials

FOOD INDUSTRY

- Blend fruit juice concentrates
- Add CO₂ to fruit juices, wine, beer, etc.
- Dilute concentrates
- Heating and cooling chocolate

WATER & WASTEWATER TREATMENT

- pH control of waste water with acids/bases
- Flocculants dilution and addition to waste water
- Dissolving CO₂, O₂, Cl₂, ozone into water
- Mix ground and surface waters
- Aerate drinking water

OIL, GAS & PETROCHEMICALS

- Blend crude oil from various storage tanks to provide uniform feed to refinery
- Contact crude oil and water to optimize desalter performance
- Blend additives into gasoline, fuel oil, lubricating oils
- Mix steam and methane feed to reformer
- Contact used lubricating oils with sulfuric acid for waste oil regenerations

OTHER INDUSTRIES

- Natural Gas Processing
- Pharmaceuticals
- Pulp & Paper Processing
- Cosmetics & Detergents
- Potable Water Treatment
- Power Plants
- Energy
- Catalyst Manufacture and Catalytic Reactors
- Pollution Control
- Minerals & Ore Processing
- Vegetable Oil Processing
- Reverse Osmosis Feed Pretreatment
- Scrub Noxious Gases with caustic