

## HIGH VACUUM METALLISING PLANTS



Silver, Golden, Rainbow, Metallic Finish  
With Low Cost Vacuum Metalizing Process



Horizontal Vacuum Metallising Plant



Vertical Double Door Vacuum Metallising Plant

### About Ourselves

We are in the field of Vacuum Technology for the last 25 years and are leading manufacturers of Vacuum Equipments and Metallising Plants in India.

We have several plants of varying descriptions working successfully all over the country.

In the field of vacuum metallising, we have contributed a lot. Our R&D efforts have given us new designs of plants to get more production with the same investment and operating expenses.

This means more profit for our customers and good reputation for us.

We are first to introduce in India:

- Vertical, Double Door Plants
- Fully Computerised Plants
- Chromium Coating Plants
- Optical Coating Plants
- Titanium Nitride Coating Plants
- Continuous Roll Metallising Plants
- Large sized systems

## Introduction

COSMIC offers an extensive range of Industrial Vacuum Coating Plants for a wide variety of applications. These plants are comprehensively engineered and incorporate the latest innovations. The outstanding characteristics of these plants are the following :

- Introduction and use of Booster Pump is our exclusive addition which results in fast cycle time. Other plants would find it difficult to match the performance of our plant with Multistage Mechanical Booster Vacuum Pumping System.
- Rugged construction of all mechanical assemblies and use of Stainless Steel as primary construction material results in an exceptionally long life for the plant and also contributes to a faster cycle time.
- Our Baffle Valve is so designed that its closing plate closes towards chamber to prevent roughing/high-vacuum to be done in the Baffle Valve in repetition of cycles which reduces cycle-time a-lot. Also in Baffle Valve, vacuum is always maintained in the range of 10<sup>-6</sup> torr and act as vacuum buffer-tank thus after roughing of chamber upto 10<sup>-2</sup> torr, when Baffle Valve plate is opened, coating vacuum of 10<sup>-4</sup> torr is achieved at much faster speed, even faster than the Diffusion Pump's own speed.
- In Diffusion Pump Jet Assembly, we provide jets angular rings which maintain the shape of jets thus speed of our pump will never reduce. This means same, faster cycle-time forever.

Also, D.P. design is such that in the rainy season, cycle-time will not increase.

- We provide Double copper fins, optically dense chevron to avoid Back-Streaming of D.P. oil in work-chamber which improves brightness & adhesion of coatings.
- In Vertical Plants, we provide compact control panel containing fully functional operational controls for operator's convenience. All the operations of the plant are controlled from the control panel.

Panel is near the viewing window to ease the operations of plant and to save costly floor space.

- Height of biggest plant is about 8 feet. Plant design is compact with pumps and pipe-lines lay-out thus our plant can fit in smaller area.
- Always develops and suggests new technologies.

Only we have experience of making space saving, latest designed Vertical Double Door Plants.

In India, only we can provide U.V. Lacquering technology and M.S. Plants.

- The design provides ease of maintenance which results in long production runs with a minimum of downtime.
- We are with customer to help them in developing their end-product. A faster and prompt after-sales service is available on a phone-call.

Cosmic has many years of experience in building Industrial Coaters and the above exclusive features have been arrived at after extensive R& D and field work.

## Applications

Cosmic Plants in the IVC-Series can be fixtured for the following applications:

- Production of reflectors, auto-headlights, torches, emergency lights etc.
- Production of rear-view mirrors, telescopic mirrors, looking glasses and other type of mirrors.
- Decorative coating of moulded and pressed plastic parts such as toys, knobs, bottle caps, photo frames, bathroom accessories, fan parts, pendants, rackheads, hair pins, beads, novelties and gift articles etc.
- Rainbow, silver, golden and metallic colour effect on decorative articles.
- Lens blooming (anti-reflection coating) and sun goggles.
- And many other sophisticated applications.

## Examples- Vacuum Metallised Products



## Process of Vacuum Metallising

High Vacuum Metallising is used for coating of metals, alloys or chemical compounds on metals, plastics, ceramics, glass and other materials, in batch production. This process is suitable for various applications as described before.

We can classify the job in three types of materials and the process of each is described below :-

### **Plastic and Metals**

The plastic material can be ABS, P.P., Nylon, LDPE, HDPE, Polystyrene, Acrylic etc.

All plastic and metal articles require a base coat of lacquer to provide adhesion. Lacquering can be done by dipping the substrate in tank of lacquer or by spraying the same with the help of spray system. After applying lacquer, it is dried in an heating oven at a suitable temperature or cured by U.V. oven, depending on the lacquer/process used.

After metallising the substrate, a top-coat of lacquer is applied for providing abrasion resistance.

This is again dried and cured in a heating oven or in a U.V. oven.

### **Glass**

Glass articles may not need a base-coat of lacquer if heated above 150 °C in the chamber, or High Tension Discharge Cleaning (HTDC) is done before metallising. For abrasion resistance, a top coat of lacquer or a coat of another material, e.g. silicon monoxide, in the chamber after metallising may be applied using the same process of metallising before breaking the vacuum.

The process of vacuum metallising is done in air free environment i.e. in vacuum of the order of 10<sup>-4</sup> torr to 10<sup>-6</sup> torr. In the absence of reactive or other gases, the evaporated material retains its properties and original luster.

The vacuum metallising process involves loading of substrate on the jigs with the help of spools. It is to be ensured that the substrate is properly cleaned and if lacquered, properly cured before loading.

In horizontal plants, after loading the jig, it is transferred to the process chamber with the help of a trolley, which is provided with the plant. The jig is to be properly locked in the chamber with the lever provided on one side of the chamber.

In vertical plants, jigs are already fitted in the chambers, acting as doors.

After closing the door, chamber is evacuated by the pumps upto the required vacuum level.

After getting the process vacuum, rotation motor is started to revolve the jig (in case of jigs other than static type). A better vacuum level gives better coating in terms of brightness and adhesion.

The coating is done according to the process which depends on the type of coating material and type of coating required, using a variable transformer. The evaporant gets deposited on the substrate and the substrate is then removed from the jigs for further processing to protect the coating and to get the desired results.

## Raw Material

The requirement of raw materials depends upon the nature of the job. Aluminium and lacquer are required for silver effect, and yellow dye for producing golden effect after aluminium coating. Other metallic colours can be achieved by using different coloured dies. For rainbow effect, chemical salts like zinc sulphide, magnesium fluoride, etc. are required. The cost of all these consumables is very small thus, the production cost is negligible compared to the cost of actual silver or golden coatings.

Given above is a general description. For a particular type of coating please contact us for details. However, the actual production of a particular product remains with the customer to try and attain.

## Other Equipments (To be arranged by purchaser)

Other equipments required to be used with the plant depend upon the nature of the job to be carried out. The equipments which are required to operate the plant are :

### **Compressor**

This is required to deliver 6-8 kg/cm<sup>2</sup> of air with a flow of about 15 litres of air in one operation of the plant's electro-pneumatically operated components. The compressor unit is to be fitted with Filter, Regulator and Lubricator (F.R.L). A compressor having 3 H.P. motor is suitable.



Another compressor may be required if the base coat or top coat of lacquer on to the substrate is desired by the spray technique. A spray-gun is also required along with this compressor.

The capacity of the compressor having 3 H.P. motor can serve the purpose. Single compressor of 5 H.P. or bigger capacity may be install for both of the requirements.

### **Water Chiller**

To provide specified quality of water at 20 °C-30 °C to the diffusion pump and to the rotary pump, a water chiller is required.



An FRP cooling tower of 10 T capacity can also serve the purpose

### **Ovens**

Ovens are required if the job demands a base-coat or a top-coat of lacquer



#### **Heating Oven**

For curing the lacquer at 60 °C-250 °C, box or tray type ovens are required. The number and size of the ovens depend upon the nature of job and can be worked out by COSMIC's technical department



#### **U.V. Oven**

This oven is best suitable for articles which demand high finish quality. This is a latest technology and introduced by us, in India.



### Spray Booth

If base-coat or top coat of lacquer is desired by spray process, spray booth is required. This is an enclosure having an arrangement to hold and rotate the spool or substrate. A spray gun is also required to apply the lacquer.



### Lacquering Tank

If base-coat or top-coat of lacquer is desired by dipping process, lacquering tank is required. This is an M.S. box having cover and arrangement to hold the spool at the inner side, and having a handle to provide circular motion from outside.

### Rotator

This is an M.S. Structure capable of holding 12 spools at a time. The spools are revolved at 35-40 RPM with the help of motor. On revolving the spool, loaded with dip-lacquered substrate, the excess amount of lacquer will be removed by centrifugal action.

### Spools

These are made of M.S. and are required to hold the substrate to be vacuum metallised. The quantity, shape and size of the spool depends upon the nature of job.

### Trolley and other fixtures

These are made of M.S. stock and are required to carry the spools or to hold the finished or semi-finished goods during the process of vacuum metallising. The design and quantity is one's own decision. In any case, COSMIC' expert advice is always at your disposal.



### Clean Room Facility

This is required if a sophisticated coating is required. The clean room helps to remove the dust particles from the operating area to turn out an end product which is free from pin holes, saturated dust particles etc., there by improving the quality of the coatings.

The size and class of the unit depends upon the size of the operating area and the type of production.

### Voltage Stabilizer

This is required for the plant and other machines if there are severe voltage fluctuations in the factory.

### Generator

If there is regular electricity failure in the factory area, a generator of suitable capacity is recommended.

## Plant Design

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COSMIC plants are simple and straight forward in design and consist of following main system :

- Work Chamber
- Vacuum System and Pumping Group
- Low Tension Power Supply
- Control Panel
- Work Holders and other Fixtures
- Work Holders Trolley

The Vacuum System is designed to give fast cycle time and trouble free operation. The diffusion pump, baffle valve and chamber are made of Stainless-Steel sheet for a long life and fast cycle time.

All valves are electro-pneumatically operated and the function of all the valves is controlled from the control panel.

## Work Chamber

### Horizontal Plant

The work chamber is a horizontal cylinder made of stainless steel sheet having M.S. flanges with a full diameter door at the front. The material of construction for the door sheet is also stainless-steel. The inner surface of the chamber and all other parts of the plant are buffed giving good finish to avoid degassing.

There is a 105 mm dia. viewing port on the door to inspect the coating process. A set of rails is provided inside the chamber, along the sides of the walls, to carry the jig.

The chamber rear is a stainless steel dished-end welded to the cylindrical body. The rear end has high vacuum current feed-throughs for making electrical connections inside the plant. The low tension current is provided to the bus-bars through these feed-throughs. For bus-bars on the jigs, the electrical contact is provided by spring loaded contacts to carry current upon the entry of the jig in the chamber.

A geared motor is fitted on the rear dished-end to provide revolution to the jig loaded in the chamber. The motor is controlled through the control panel.

The whole unit is properly mounted on a sturdy sheet-metal frame work. This frame-work has all the four sides closed and carries a L.T. transformer.

### Vertical Double Door Plant

The work chamber is a vertical cylinder. It has two half-cut cylinders made of stainless steel sheet having M.S. flanges attached on both sides of one main half cut cylinder, acting as doors. Thus, there is a total of three half cut cylinders which form the work chamber. All the three halves have finished flanges suitable for vacuum purpose.

The stationary half has O' ring in the O' ring carrier and the other two moving halves have plane flanges for perfect sealing. The inner surface of all the three halves and all other parts of the plant are buffed giving well finish to avoid degassing. There are two 105 mm dia meter view ports, one on each half of the chamber, to inspect the coating process.

The rear, stationary half has a port to connect the work chamber to the diffusion pump. Each moving half has a separate jig. One jig can be loaded/unloaded when other half is in process thus saving time in loading/unloading of the substrate. There are high vacuum current feed throughs for making electrical connections inside the plant. The low tension current is provided to the bus bars through these feed-throughs.

There is one set of vertical bus bars in each half cylindrical door, which holds the evaporation sources.

Geared motor is fitted on the top of stationary half cylinder. The rotation drive is given by suitable gear arrangement and motor is controlled through the control panel.

The whole unit is properly mounted on a sturdy frame work. This frame work has all the four sides closed and carries a L.T. transformer.

### Vacuum System

COSMIC vacuum pumping system is the most reliable. The material of construction of Diffusion Pump is stainless-steel. Base of the D.P. is made of M.S. which is the best material for heat conduction. Top flange is made of M.S. An oil economiser is provided at the backing connection of the diffusion pump to prevent oil loss.

The design of the jet assembly is an exclusive COSMIC design which gives much faster speed of pumping compared to other diffusion pumps of the same size. The material or construction of the jet assembly is M.S. which is the best recommended material. This makes the plant to give a faster cycle time.

An optically dense, water cooled chevron baffle is provided at the top of diffusion pump to avoid back-streaming of oil into the work chamber. The material of the body for chevron baffle is M.S. and for the chevron, it is copper.

One electro-pneumatically actuated high vacuum right angle valve (baffle valve) of stainless-steel is provided above the chevron baffle to isolate the diffusion pump from the work chamber, when required at the time of getting the vacuum in the work chamber during recycling process. Closing plate and plate moving mechanism are made of M.S.

Two electro-pneumatically actuated right angle valves of M.S. are provided, one (backing valve) above the fore-line port of diffusion pump and other (roughing valve) above the roughing port of work chamber to isolate the ports as and when required during the process cycle.

One electro-pneumatically actuated right angle valve of M.S. (air admission valve) is provided on work-chamber to introduce air in the work chamber after the coating process.

Pressure pipe-lines of copper are provided to operate the valves. A main nozzle at the F.R.L. (Filter, Regulator, Lubricator) unit is provided to convey treated compressed air to the system from the compressor.

### Pumping Group



### This System is an exclusive feature of COSMIC

Booster Pump and Mechanical Rotary Pump combination is provided with the plant. This system is capable of reducing the cycle-time of the plant to half of what is achievable by conventional belt driven or direct driven rotary pumps.

Detailed specifications are enclosed.

Suitable pipe-lines of M.S. are provided to join Booster Pump combination with roughing and backing valves to make the plant operative.

### Low-Tension Power Supply

Low Tension Power Supply is provided along with the plant. This power supply is used to heat the filaments in vacuum to evaporate the material by thermal resistance heating process. It consists of two electrodes of copper, which is the best material for this application. The electrodes are provided with holders to hold filaments.

For small plants, electrodes are provided inside the work chamber and for larger plants these electrodes are mounted on the jig to enable the operator an easy loading or unloading of evaporation filaments/boats and aluminium /evaporation material.

The low tension power supply is mounted inside the cabinet, below the work chamber to keep the leads to the feed throughs short.

A suitable capacity, motorised auto-transformer (variac) is provided to control the L.T. power supply.



### Control Panel

#### Horizontal Plants

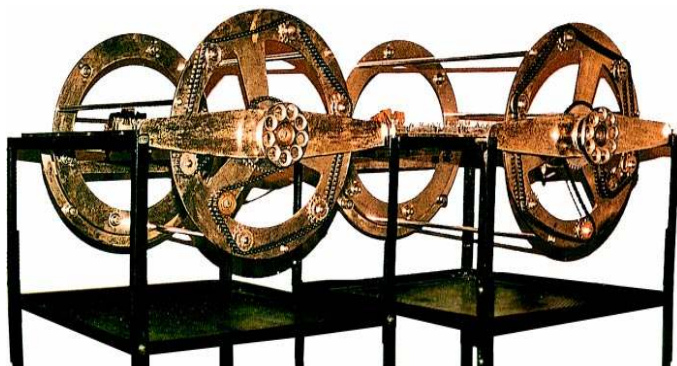
Control panel is a separate cabinet that takes standard 19 inch panels. It has castor wheels for mobility. It contains the mimic diagram to show the status of switches, push buttons, knobs and indicators for proper plant operation. These controls are suitably interlocked for a fail-safe process control.

#### Vertical Plants

Control panel is mounted on the body of the Baffle Valve to save working floor space.

### Work Holder

Several type of work-holders (jigs) are available with COSMIC. The material of construction for these jigs is Nickel-Plated mild steel. Some of the common jigs available with COSMIC are described below.



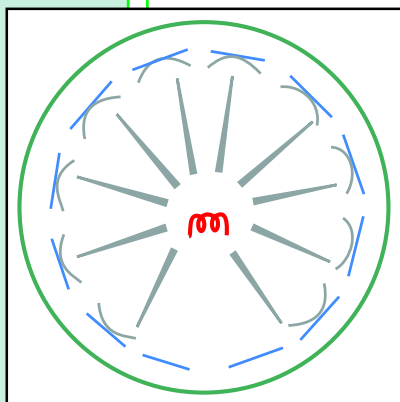
### Horizontal Plants

Two work-holders (jigs) of same kind are supplied with the plant. While one of the work- holders is under process the other can be prepared outside for the next cycle. The work holder carries spools suitable for holding the substrate. The design of the spools depends upon the type of the substrate.



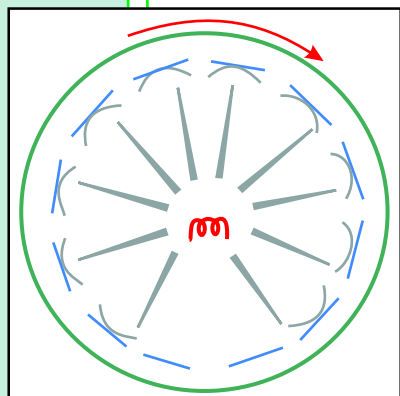
### Vertical Double Door Plants

The work-holders are vertical. Each half cylinder of the work chamber is carrying a separate work-holder.



### Static Work Holder

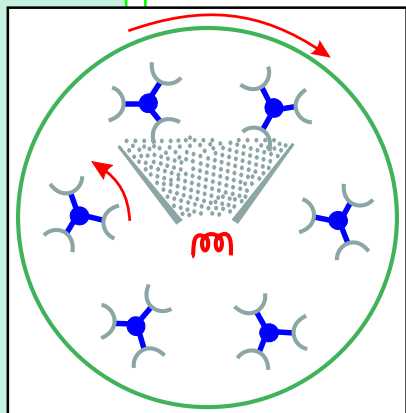
This jig is a frame work having an arrangement to take up the job to be coated. The number of support rods is three unless otherwise required.



### Rotating Work Holder

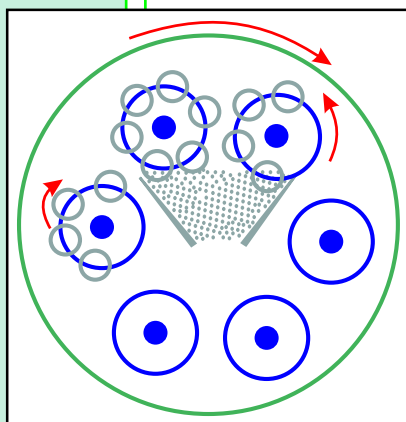
The rotating jig is a frame work fitted to a stationary part. The movement to the rotatable frame is given from the outside through a rotation seal. The rotation motor is fitted outside the chamber.

The arrangement gives coatings on the side facing the evaporation sources. This method gives higher production than the static jig. The jig is designed as per the size and shape of the job to be coated.



### Planetary Work Holder

The planetary jig comprises of a rotating main frame (as already described) which carries six rotating spools. The number of spools, however, can be altered depending upon the size of the work piece. The main frame rotates as do the rotating spools. The whole system is very similar to the planet Earth's rotation about the Sun, hence the name Planetary jig. The planetary jig has even a higher loading capacity than the rotary jig and highly suited for coating jobs such as reflectors, bottle caps, photo-frames, wall clock frames, beads etc. This is the most common type of jig.



### Double-Planetary Work Holder

This is a further refinement of the planetary jig. In this jig there are six rotating members each carrying six/eight spools. These spools also rotate around their own axis. Hence the name Double Planetary. This jig gives a very high capacity for small jobs such as bangles, costume jewellery etc.

COSMIC's expert advice is available to suggest the most suitable jig (work- holder) for a particular job.

N.B. Spools and frames for the jigs is not the part of the scope of supply.



### Work Holder Trolley

The trolley is made of mild steel and facilitates loading, unloading of the work holder for the horizontal plants . The trolley has four rubber wheels for mobility. The work holder can be locked on the trolley and the trolley can be fixed at any particular place via. locking levers provided on the wheels. There is a platform of mesh attached to the trolley to place spools while loading or unloading the same.

These Trolleys are required for Horizontal plants only

For vertical double door plants such trolleys are not required as the jigs are fitted in the chambers, acting as doors.

## Specifications

MODEL		IVC-30H	IVC-36H	IVC-42H	IVC-48H	IVC-54H	IVC-61H	IVC-72H	IVC-42V	IVC-48V	IVC-54V	IVC-61V	IVC-72V
<b>CHAMBER</b>													
Size, diameter	mm	760	915	1065	1220	1370	1550	1830	1065	1220	1370	1550	1830
Depth/Height	mm	760	1000	1220	1500	1500	1500	1500	1300	1500	1500	1500	1500
<b>SPOOL</b>													
Length, usable	mm	630	880	1100	1380	1380	1380	1380	1050	1280	1280	1280	1280
Diameter, maximum	mm	225	275	325	375	425	485	580	340	390	440	500	590
Side, usable (Spool with 4 sides)	mm	145	180	210	250	285	330	395	225	260	295	340	400
Loading in one lot (change is possible)	Nos.	6	6	6	6	6	6	6	6	6	6	6	6
<b>LOADING CAPACITY</b>													
(per cycle)													
Auto Reflectors	90 mm dia	150	360	528	840	960	1120	1332	528	840	960	1120	1400
Auto Reflectors	125 mm dia	42	168	288	528	605	704	834	288	528	605	704	880
Auto Reflector	175 mm dia	21	120	144	288	325	384	456	144	288	325	384	480
Back View mirrors	100 mm dia	150	360	528	840	960	1120	1332	528	840	960	1120	1400
Wall Clock Frames	260 mm dia.	12	36	48	90	100	120	138	114	132	132	132	396
Wall Clock Frames	280 mm dia	8	-	-	-	-	-	-	114	132	132	132	396
Wall Clock Frames	300 mm dia.	-	24	36	90	100	120	138	114	132	132	132	396
Wall Clock Frames	350 mm dia	-	12	24	48	56	64	72	-	132	132	132	132
Wall Clock Frames	450 mm dia	-	-	-	-	-	-	-	-	-	-	132	132
Wall Clock Frames	550 mm dia	-	-	-	-	-	-	-	-	-	-	-	132
Bangles (3 mm wide)	gross	23	96	115	216	240	288	-	-	-	-	-	-
Video Cassettes	set 105x190mm	24	72	120	390	425	520	618	120	390	425	520	650
Fan front	Nos.	42	168	288	528	600	704	834	288	528	600	704	880
Beads (3mm dia)	bunch	19	56	90	140	155	186	220	90	140	155	186	232
(a bunch contains 12 strings of 750 mm length)													
Buttons (15mm dia)	gross	30	75	115	180	210	240	285	115	180	210	240	300
<b>N.B.: Actual production capacity may be different depending on a particular job.</b>													
<b>DIFFUSION PUMP</b>													
Size	dia mm	400	500	610	710	800	800	800	610	710	800	800	800
Speed - Air	Ltr/sec	9000	12500	18000	24500	32000	32000	32000	18000	24500	32000	32000	32000
Stages	Nos.	4	4	4	4	4	4	4	4	4	4	4	4
Heater	KW	6	8	10	14	18	18	18	10	14	18	18	18
D.P. Oil	Ltr.	1.5	2.5	3.5	5	6	6	6	3.5	5	6	6	6
<b>N.B.: Actual pumping speed may be different</b>													

## Specifications

MODEL		IVC-30H	IVC-36H	IVC-42H	IVC-48H	IVC-54H	IVC-61H	IVC-72H	IVC-42V	IVC-48V	IVC-54V	IVC-61V	IVC-72V
<b>ROTARY PUMP</b>													
Speed	Ltr/min.	3000	3000	3000	5000	5000	5000	5000x2	3000	5000	5000	5000	5000x2
(Specifications are enclosed)								=10000					=10000
<b>BOOSTER PUMP</b>													
Speed	Ltr/min.	--	13300	13300	13300	13300	13300	13300	13300	13300	13300	13300	13300
(Specifications are enclosed)													
<b>VALVES</b>													
Baffle	dia mm	400	500	610	710	800	800	800	610	710	800	800	800
Roughing	dia mm	83	96	96	96	120	120	120	96	96	120	120	120
Backing	dia mm	83	96	96	96	120	120	120	96	96	120	120	120
Air Admittance	dia mm	48	48	48	48	48	48	48	48	48	48	48	48
<b>EVAPORATION SUPPLY</b>													
Regular	Ampere	400	600	1200	1200	1200	1200	1200	600	1200	1200	1200	1200
	Voltage	10	10	10	10	10	10	10	10	10	10	10	10
Variac Amp./Phase		20/1	28/1	28/2	28/2	28/2	28/2	28/2	28/1	28/2	28/2	28/2	28/2
(motorised)													
Rainbow Coating	Ampere	600	1200	1800	1800	1800	1800	1800	1200	1800	1800	1800	1800
(optional)	Voltage	10	10	10	10	10	10	10	10	10	10	10	10
Variac (motorised) Amp./Phase		28/1	28/2	40/2	40/2	40/2	40/2	40/2	28/1	40/2	40/2	40/2	40/2
Evaporation Source													
Holders	Nos.	5	7	9	11	11	11	11	9	11	11	11	13
Material of Bus-Bar		Copper	Copper	Copper	Copper	Copper	Copper	Copper	Copper	Copper	Copper	Copper	Copper
Position of Bus-Bar		In chamber	On Jig	On Jig	On jig	On jig	On jig	On jig	On jig	On jig	On jig	On jig	On jig
<b>OTHERS</b>													
<b>GAUGE</b>													
Pirani & Penning with two Pirani and one Penning head,													
	range torr	1x10-6	1x10-6	1x10-6	1x10-6	1x10-6	1x10-6	1x10-6	1x10-6	1x10-6	1x10-6	1x10-6	1x10-6
Drive Motor	H.P.	0.5	0.5	0.5	0.75	0.75	1	1	0.75	0.75	0.75	1	1
<b>CYCLE TIME</b>													
Clean, de-gassed and empty chamber													
atm to 1 x 10 <sup>-1</sup> torr	min.	1-2	1-2	1-2	2-3	2-3	2-3	3-4	1-2	2-3	2-3	2-3	3-4
atm to 5 x 10 <sup>-4</sup> torr	min.	2-3	2-3	2-3	3-4	3-4	3-4	4-5	2-3	3-4	3-4	3-4	4-5



## Specifications

MODEL		IVC-30H	IVC-36H	IVC-42H	IVC-48H	IVC-54H	IVC-61H	IVC-72H	IVC-42V	IVC-48V	IVC-54V	IVC-61V	IVC-72V
<b>TO BE ARRANGED BY PURCHASER</b>													
Water at 20° C - 30° C	Ltr./min	15	20	25	25	25	35	40	25	25	25	35	40
Power-3 phase(max.) (for Plant only)													
Regular / Rainbow	KVA	10/16	17/29	21/37	23/41	27/45	29/47	37/55	19/--	23/--	27/--	29/--	37/--
<b>Compressed Air</b>													
-Pressure	kg/cm2	6	6	6	6	6	6	6	6	6	6	6	6
-Quantity	Ltr/charge	15	20	25	30	30	35	35	25	30	30	35	35
Working Floor area (plant/pumps)	Sq. Mtr.	5	10	20	20	25	40	45	15	20	25	30	35
Height (Approx)	mtr.	1.75	2	2	2	2	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Weight (plant/pumps)	kgs.	1200	1700	2300	3000	3200	4000	4300	3000	3500	4000	4500	5500

**N.B.: These figures are an approximate only.**

### Optional Accessories (At Extra Cost)

#### HTDC

##### Horizontal Plants

IVC - 30H	5000V(open circuit) 200 mA 1KVA Power.
IVC - 36H	
IVC - 42H	
IVC - 48H	
IVC - 54H	5000 V (open circuit)
IVC - 61H	1000 mA Max.
IVC - 72H	5 KVA Power

This facility is required for cleaning glass articles prior to Vacuum Metallising. It removes surface impurities from glass surfaces and heats it up to 100 °C and thus provides better adherent coatings.

Suitable discharge electrodes, safety devices, feed-throughs etc. are provided along with HT transformer.

##### Vertical Plants

IVC - 42V	
IVC - 48V	
IVC - 54V	5000 V (open circuit)
IVC - 61V	1000 mA Max.
IVC - 72V	5 KVA Power

#### Substrate Heaters

##### Horizontal Plants

IVC - 30H	4 KW
IVC - 36H	6 KW
IVC - 42H	9 KW
IVC - 48H	9 KW
IVC - 54H	12 KW
IVC - 61H	12 KW
IVC - 72H	12 KW

It is required for heating substrate in the chamber for jobs without base-coat. It raises the temperature of the substrate above 150 °C.

Chamber cooling coil is required along with this facility.

##### Vertical Plants

IVC - 42V	9 KW
IVC - 48V	9 KW
IVC - 54V	12 KW
IVC - 61V	12 KW
IVC - 71V	12 KW

A temperature indicator/controller is provided along with heaters of suitable rating.

### Extra Rated LT-Power Supply

LT power supply for higher current and desired output voltage can be provided as an option. The power-supply helps in multilayer/rainbow coatings and also enables evaporation of such materials which require more current to heat up and to evaporate. Generally, when using tungsten, molybdenum or boats of any other material which draws more current, this power supply is required. A third bus bar and a pneumatic change-over is also provided along with this facility to enable sequential evaporation of two materials without breaking the vacuum.

A suitable matching variac, water cooled LT electrodes, cables etc. are provided along with the extra current rated power transformer.



### Mild steel Plant

The complete plant made of mild-steel can also be provided on specific request. This saves the investment cost of the customer.

### Automatic Coating Process

Automatic coating process helps in evaporating aluminum by preset timing of the L.T. dimmer/variatic and getting same quality of coating, everytime. A manual over-ride is also provided.

### Sequence Controller

This controller helps to run the plant automatically. The function of controller is based on vacuum level reading. Once the cycle-ON button is pressed, the sequence controller operates all the valves automatically to achieve the desired coating vacuum and then coating will also be done automatically. A manual over-ride is also provided to operate the valves/coating manually.

### Computer Set-up

The installation of computer in the plant facilitate complete automatic operation of the plant including the coating process. A colour mimic diagram displays the status of the plant's operation on colour monitor. Any number of different types of coatings can be programmed and stored in the memory of the computer. If there is any fault in the plant, it is flashed on the screen of colour monitor.

The scope of supply Includes complete computer system including a PC, 14" V.G.A. colour monitor, key board, related hardware, programme cards and customized software.

## Safety Devices/Features

Following are the safety devices/extra features normally incorporated in the design-

### **D. P. Temperature Controller**

A temperature indicator-cum-controller is provided to control the heating of the diffusion pump oil. This prevents the back-streaming and fall in vacuum level due to over heating of the diffusion pump oil.

### **Rotary Pump Vent Valve**

A Vent-Valve is provided at the mouth of the rotary pump which prevents out-flow of rotary pump oil by introducing the air in the pump, automatically in case of stopping of the pump or sudden power failure.

### **Roots Pump Auto Switch**

A vacuum sensor is provided over the Roots Pump which facilitate automatic start of the Roots Pump after achieving desired Rough Vacuum. Also in case of sudden pressure rise, it automatically stops the Roots Pump and prevents pump/motor damage.

### **Filter, Regulator, Lubricator Unit**

A F.R.L. unit is provided at the compressed air inlet port to the valves of the system. This unit filters the air and regulates the pressure of air to the valves. It also lubricates the cylinder of valves for smooth operation.

### **Isolation Valves**

In case of plant with two Rotary Pumps or two Roots Pumps combination, we provide two Isolation Valves over each Rotary Pumps/Roots Pumps to provide choice of operating any of the system or both, any time.

### **Air Filter**

Suitable filter is provided at Rotary Pump to prevent entrance of any foreign particles in it.

### **Vacuum Switch**

This is intended as a safety device for the operator of the unit. This isolates the HT supply to the unit when chamber is open to atmosphere. This is incorporated if HTDC facility is included in the plant.

## General Interlocks

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- Plant's functions will not start if any Rotary Pump is not ON.
- Baffle Valve will not OPEN if D.P. is OFF.
- HTDC will ON only when roughing is ON and LT is OFF.
- Panel switches supply OFF in AUTO-mode except RE-RUN switch.
- Sequence controller/CPU supply OFF in Manual-mode.
- Air Vent Valve will not OPEN if Roughing/Baffle Valve is OPEN

## LT Evaporation

- LT will be ON only when HTDC is OFF and Baffle Valve is OPEN.
- LT supply to the evaporation sources cut off immediately and Variac comes to zero position, automatically, when LT-OFF switch is pressed.
- LT will ON again only when Variac is at zero position.

## Spares

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The scope of supply includes a first set of spares which consists of :

- All the O'rings and gaskets (fitted in plant).
- One charge of (filled in pumps)-
  - COSMIC Rotary Pump Oil, ROTOMAX
  - COSMIC Booster Pump Oil, Gear Oil Grade 90
  - COSMIC Diffusion Pump Oil, DURAOIL

## Facilities To Be Provided By The Purchaser

The following are excluded in the offer and are to be provided by the purchaser at his own cost.

1. Electrical power supply for the plant (normally 3 phase, 440 volts) including provision for:
  - a) Proper grounding of equipment.
  - b) Mains isolator (switch) to disconnect the plant from the mains.
2. Compressed air and water supply (with Filters) necessary to operate the plant.
3. The purchaser should also make provision for pipe-work to
  - a) Convey compressed air to the plant.
  - b) Convey water to and from the various components of the plant.
  - c) Carry the exhaust of the mechanical pump, away from the process area.
4. The customer should also ensure that suitable job and process materials is available at the time of plant installation so that COSMIC engineers are able to demonstrate the operation of the plant with respect to its vacuum performance and correct working of its evaporation process. This demonstration however does not cover the complete process know-how for a particular application.

## Acceptance Test

Following are the acceptance test for the unit:

1. Verification of all major items mentioned in the specification for their physical presence.
2. Check the vacuum performance i.e.  $5 \times 10^{-4}$  torr, within the specified time and conditions on recycling, in clean, empty, degassed chamber.
3. Check the operation of the system and of the accessories supplied with the system.























The acceptance tests do not include demonstration of production of actual final product.

On account of continuous R & D activities, COSMIC reserves the right to modify the specifications any time without prior notice.

Unit to suit specific applications are possible. Please contact us for details.

## Our Products

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-  Horizontal Vacuum Metallising Plants
-  Vertical Vacuum Metallising Plants
-  Titanium Nitride Coating Plants
-  Chromium Coating Plants
-  Optical Coating Plants
-  Roll Metallising Plants
-  Vacuum Furnaces
-  Vacuum Ovens
-  Space Simulation Systems
-  UHV Systems and Chambers
-  Sputtering Systems
-  Inert Gas Storage Chambers
-  Laboratory Coating Units
-  High Vacuum Stands
-  Electron Beam Sources
-  Film Thickness Monitors
-  Diffusion Pumps
-  Rotary Pumps
-  Booster Pumps
-  Tungsten, Molybdenum, Tantalum-boats, filaments
-  Valves, Gauges, Components, Consumables etc.
-  Custom Built Systems.



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