# SUN WEST AIR Washing UNITS Class 2





QUALITY • RELIABILITY • SERVICE



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## **CLASS 2 AIR WASHER WITH FAN SECTION**

## **OPERATING PRINCIPLE**

The Class 2 Air Washer is a device used to cool outside air for many applications. When an air stream is brought into contact with water, the water will evaporate which will remove heat from the air stream. This heat is called the latent heat of evaporation. The heat from the air is absorbed by the water, and the water is mixed with the air. Since no total heat is transferred to or from the mixture, this is called an adiabatic process.

### ADVANTAGES

The Mallory / Sun West Class 2 Air Washer with fan section has many advantages over existing design air washers and evaporative coolers from the standpoint that less space is required for a given volume of air, lower system air friction which will result in reduced fan horsepower, and for any given floor space and fan horsepower a high efficiency can be obtained.

## **EVAPORATIVE COOLING**

Various evaporative efficiencies can be obtained by using the CELdek® media, and further efficiency variations can be obtained by varying the depth of the media pack in direction of air flow.

Two thicknesses of media are available, 6" and 12" giving 70% and 90% efficiency respectively at 400-500 FPM face velocity. CELdek® is made from a special cellulose paper, impregnated with insoluble anti-rot salts, rigidifying saturants and wetting agents. The media is designed with cross fluted configuration which allows for maximum air and water flow without clogging. Its geometry induces highly turbulent mixing between the water and the air which is the driving force for heat and moisture transfer. One cubic foot of media provides 123 sq. ft. of evaporative surface.

The media has internal redistribution of the water in the pad due to the built-in angle. That is, the difference between the  $45^{\circ}$  and the  $15^{\circ}$  degree angles of the adjacent sheets continually directs the



water toward the air entering side of the pad. The media is un-affected by atmospheric dust, even by sand in heavy concentration. When the recirculating water is turned on, especially without airflow, the water will flush off the surfaces. With the builtin angle on the entering side where the debris collects will get more flushing than the rest of the pad. This same cleaning action protects the pad against mineral build-up.

### FORWARDLY CURVED TYPE FC FANS

The type FC forwardly curved blade DWDI Fans whose performances are indicated in this brochure are commonly supplied in equipment of this type that has been manufactured for quite a number of years.

Performances shown represent tests on free standing complete fans, and do not include belt losses. Further corrections to these performances do not include belt losses. Further corrections to these performances are also necessary when they are included as wheels and housings in casings or boxes, just the same as any other fan thus included - they all require some correction dependant upon the style of outside casing in which the fan or wheel and housing is mounted.

In general, forwardly curved blade fans and / or wheels and housings are used in such applications as direct fired heaters, air conditioning assemblies, and other types of equipment because of their inherently low speed operation, large air handling capacity, and general quietness in performance.





**SPECIFICATIONS CLASS 2 AIR WASHERS** (*Shipped complete, factory assembled*)

**<u>Air Washer & Fan Casing:</u>** Fabricated of galvanized steel 22 Ga. through 18 Ga. with flange connection, stiffening and support members as required.

**Tank:** Fabricated from 14 Ga. black iron with welded seams and joints and coated with coal tar epoxy. All supports for casing are welded. Tank shall be leak tested at the factory.

**<u>Fill:</u>** Celdek® - A special cellulose paper impregnated with insoluble anti-rot salts.

**Distribution Headers:** Copper pipe with drilled ports, no nozzles.

**Fan:** Forward curved, DWDI, with ODP motor, rubber in shear isolation.

**Pump:** Vertical submerged, located in tank. Furnished and mounted by factory. Pump cast iron and epoxy coated.

**Pump Discharge Piping:** Copper with sweated fittings and a threaded fitting connected to pump. Pump and piping sized for desired water flow required for each size Class 2 Air Washer with fan section to insure maximum performance. Brass ball valve shall be provided for balancing.

**Exterior:** Degreased, treated with acid vinyl wash primer and painted with acrylic enamel.

Access to Equipment: Two removable panels on each side of the fan cabinet and a removable roof provide ample access passage into the unit. All removable parts are securely held in place by nonrusting screws.

**Options:** • Intake louver

- Interior casing coal tar epoxy coated
- Aluminum constructed fan housing and wheel
- Electrical Package
- Two-speed motors

### AIR WASHER OPERATION

Air Washers are designed to bring into intimate contact with film or drops of recirculation water. Because this process promotes evaporation of a portion of the water, Air Washers have a high effectiveness as evaporative coolers. For evaporation to occur heat must be added. The required latent heat of evaporation is taken from the sensible heat of the air stream. Removal of sensible heat results in lowering the air dry bulb temperature.

Evaporation occurs at water surfaces, where a thin film layer of air may be considered to become saturated with water vapor.

In "spray filled" Air Washers, such as Class 4, 6, and 8, water is atomized by being pumped through spray nozzles. Each water droplet is surrounded by a thin air film. High effectiveness in this type of washer is dependent on nozzle pressure, amount of water circulated, and the length of the spray chamber. Moisture eliminators are required to prevent water drops from being carried through the washer along with the discharged air.

The Sun West Class 2 Air Washer utilizes a wetted surface design. The fill is made up of laminations, each sheet of which is formed with "builtin" angle flutes. Two different angles are used. The angled flutes are sloped in different directions on alternating layers of media.

The flow of water is directed against the direction of air flow. This design feature has the effect of keeping the media surface covered with water. Maximum scrubbing by the air across the wetted surfaces is achieved with low turbulance and minimal resistance to air flow.

Water is continuously recirculated from the Class 2 Air Washer reservoir during operation by means of the internal pump. The pump suction is taken from the reservoir throgh removable track-mounted brass screens. The pump discharge is internally piped to the upper distribution pan and discharged through a perforated header pipe. Water flow from the upper distribution pan is directed onto the 2" deep fill distribution pad, and across the media fill. The pump discharge riser includes a balance valve and pressure gauge for setting recirculation flow rate and tappings for connection to an optional bleed regulating device and to an optional water treatment feeder, if specified.

As water is evaporated, continuous make-up of







fresh water is provided by a ball float controlled make-up valve. This valve also supplies fresh water for dilution. Mallory/Sun West recommends a bleed rate of 10% of the water circulated for average water conditions. Extreme conditions may require the use of a higher bleed rate and water treatment to keep down the build-up of minerals on interior surfaces.

A tee fitting with hose bib is provided for use as a manual quick fill and as a means for periodic manual cleaning and flushing.

## CLASS 2 AIR WASHER MAINTENANCE SUGGESTIONS

The unique design of the Class 2 Air Washer represents a great improvement over previously used equipment such as spray type air washers in that the Class 2 Air Washer requires less maintenance. However, all humidifiers and evaporative coolers that are supplied with water which has a high mineral content require regular maintenance. Problems and maintenance cost can be minimized.

If the equipment is to be supplied with ground water or well water, Mallory/Sun West recom mends that the Class 2 Air Washer user consult with any water treatment company and learn what may be required to control mineral deposits. In certain localities, even the city water has enough minerals to warrant consideration of water treatment.

In a recirculating system, it is necessary that the make-up water float valve be properly adjusted so that the water losses due to evaporation are replaced plus an additional quantity are replaced so that there is a continuous "blowdown" over the overflow connection. In areas of hard water, it is wise to bleed off at least 10% of the recirculated water. As the climatic conditions change, the water evaporation rate may increase, causing the mineral content in the tank water to also increase, so that the amount of blowdown should be increased also. This is a manual adjustment and probably won't be made. Therefore, the make-up water level adjustment should be set for the condition of maximum water evaporation. Non-peak operation will waste a small amount of water.

Repeated drying of the fill will cause the rapid build-up of insoluble mineral deposits in the fill. The surface adhesion and wicking action of the fill is reduced by these deposits, ultimately causing small droplets of water to be carried off the leaving side of the fill.

Excessive pump cycling causes the fill to dry out repeatedly, causing insoluble mineral deposits to develop.





Air Pressure Drop Inches WG



CLASS 2 AIR WASHING UNITS

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2	_	FACE	FAN	MOTO	R H.P.	PUMP		HEAD	AIR	EFFIC	ENCY	SHIPPING	<b>OPER ATING</b>
	MAX.	AREA	SIZE	MIN.	MAX.	H.P.	GPM	(ft.)	PRESSURE	MIN. 6"	MAX. 12"	WEIGHT (Est.)	WEIGHT (Est.)
1.5.7	3,400	5.5	12''	1/2	1	1/40	2.5	10	0.20	70%	%06	490	700
	5,400	10.8	15"	1/2	1.5	1/40	5.4	10	0.20	70%	60%	670	850
<b>`</b>	7,400	14.8	18"	3/4	б	1/15	7.2	10	0.20	70%	%06	995	1250
	0,400	22.4	21"	1	3	1/15	10.4	10	0.20	70%	%06	1205	1550
-	3,400	28.5	24''	2	5	1/6	14.2	10	0.20	%0 <i>L</i>	%06	1505	1900
-	7,400	32.8	27''	3	5	1/6	16.1	10	0.20	70%	60%	1740	2250
2	1,400	39.5	30"	5	7.5	1/6	18.1	15	0.22	%0 <i>L</i>	%06	2070	2600
0	5,400	51.0	33"	5	10	1/6	22.6	15	0.22	70%	90%	2625	3350
$\mathcal{C}$	1,500	57.6	36"	5	15	1/6	27.2	15	0.22	70%	%06	3305	4200

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Make-up water connection 1/2" NPT drain and valve over flow con-

nection 1" NPT float Valve 1/2"

Note:

Supply fan forward curved DWDI mounted on rubber/cork pads

Removable panel on each side of unit for access

All dimensions are in inches.

See fan tables for motor size rated at various static pressures

See fan tables for exact RPM and brake horse power.

Tables based on static pressure at 0.25"

K	9-7/8	13-7/8	12-1/4	21-15/16	20-3/16	24-11/16	21-7/8	25-5/8	30-1/8	
J	16-1/4	20-1/4	23-1/2	28-1/8	31-5/8	34-5/8	40-1/4	44-3/4	47-3/4	
I	9-7/8	13-7/8	12-1/4	21-15/16	20-3/16	24-11/16	21-7/8	25-5/8	30-1/8	
Н	17-3/8	20	22-9/16	24-5/8	27	29-13/16	32-1/4	35-7/16	36-7/8	
G	12-1/2	16-1/8	18-1/2	22-1/8	25	29-1/8	30-3/4	34	38-1/2	
F	6-1/8	11-7/8	18-15/16	13-1/4	20	13-1/16	23	26-9/16	20-5/8	
Е	40	44	44	50	60	66	70	82	06	
D	24	24	24	24	24	24	24	30	30	
С	36	48	48	72	72	84	84	96	108	
В	64	68	68	74	84	90	94	112	120	
A	36	48	60	60	72	72	84	96	96	
MODEL	32-12	43-15	44-18	64-21	65-24	75-27	76-30	87-33	97-36	







Example: 3000 CFM @ 1.6" TSP 1166 RPM 1.56 BHP













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Mallory Manufacturing Company is the choice to make when superior quality and precision count. We pride ourselves in assuring our customers the best quality product, with the least amount of lead time.

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