UNIVERSIDAD NACIONAL DE INGENIERÍA

FACULTAD DE INGENIERÍA MECÁNICA

"INSTALACIÓN, PRUEBA, PUESTA EN MARCHA Y MANTENIMIENTO DE UN CONDENSADOR EVAPORATIVO EN UNA PLANTA DE EMBOTELLADO"

INFORME DE SUFICIENCIA

PARA OPTAR EL TÍTULO PROFESIONAL DE:

INGENIERO MECÁNICO

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LIMA – PERÚ

2 002

DEDICATORIA

Dedico este informe a mis queridos Padres quienes son sus desvelos y sacrificios; supieron orientarme durante todos los años de estudio que he requerido para lograr tener éxito en mi destino.

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INSTALACIÓN, PRUEBA, PUESTA EN MARCHA Y MANTENIMIENTO DE UN CONDENSADOR EVAPORATIVO EN UNA PLANTA DE EMBOTELLADO

PROLOGO

El presente informe describe la instalación, prueba y puesta en marcha de un Condensador Evaporativo marca Baltimore modelo CXV-253 para la Corporación José R. Lindley en la Planta de Inca Kola, se indica también la importancia que cumple durante el proceso de embotellado. Asimismo se desarrollara un Programa de mantenimiento preventivo para el equipo instalado, así como el detalle de sus costos involucrados durante la instalación.

En el primer capítulo se ha escrito una breve reseña de la empresa, sobre su origen, desarrollo y mejoras en los productos que fabrica, en el segundo capitulo se narra sobre el proceso de embotellado, ahí, se explica las diferentes etapas del embotellado. En el tercer capitulo se ha escrito de cómo fue la instalación y puesta en marcha, que consideraciones se tuvieron durante el proyecto. En el cuarto capítulo narraremos sobre el mantenimiento del equipo, con un desarrollo de un plan de mantenimiento preventivo y en el quinto capitulo explicaremos los costos que incurrieron desde la compra hasta los costos por la instalación.

CAPÍTULO 1

1. INTRODUCCIÓN

1.1. RESEÑA HISTÓRICA DE LA EMPRESA

En 1910, en el distrito del Rimac, junto al río del mismo nombre, en el mismo jirón Cajamarca N° 371, teniendo como marco el Puente, el Paseo de Aguas, la Alameda de los Descalzos y el Cerro San Cristóbal; el matrimonio británico formado por Don José Robinson Lindley y Doña Martha Stoppanie de Lindley y sus hijos: Martha, Victoria, Ana, José, Nicolás, Alfredo, Antonio e Isaac, establecieron una empresa destinada a elaborar y procesar aguas gasificadas, que se le conoció como la fábrica de aguas gasificadas "Santa Rosa", de José R. Lindley e Hijos S.A.

La empresa se inició en un terreno de 200 metros cuadrados de extensión, realizando el embotellado en forma manual. Entre las innovaciones hechas se encuentra el haber cambiado el antiguo sistema de tapa de corcho o botella de bola por la moderna e higiénica tapa corona y actualmente la tapa rosca de plástico.

La primera máquina semi-automática fue adquirida por la familia Lindley en el año 1918, ella permitió aumentar el ritmo de una unidad/minuto de entonces a un promedio de 15 botellas/minuto. En el año 1928, la empresa

familiar se transforma en Sociedad Anónima, ampliando sus instalaciones a un área de 1,414 metros cuadrados y renovando sus equipos procesadores.

Con motivo del IV Centenario de la Ciudad de Lima, en 1935, la organización Lindley lanza al mercado el producto INCA KOLA, que ha constituido un acontecimiento en la historia de las bebidas identificándose como la "BEBIDA DE SABOR NACIONAL". La familia Lindley mostró por primera vez en el rubro bebidas una campaña publicitaria coordinada y de carácter masivo, empleando para ello las posibilidades de comunicación de los medios existentes en aquella época.

La primera máquina totalmente automática, fue adquirida por la organización Lindley en 1948, la misma que permitió llegar a un promedio de 36 botellas / minuto. En 1952 se cambia las botellas con etiqueta por una propia con la marca de alto relieve, para su envase de vidrio de 296 ml. y se acuña otra gran frase publicitaria; "Inca Kola solo hay una y no se parece a ninguna". En 1960 cumpliendo las Bodas de Oro la empresa realiza cambios en su slogan publicitario "Inca Kola La Bebida de Sabor Nacional". En 1961 se cambia este envase de 296 ml. por uno nuevo con logotipo vitrificado, el cual existe hasta la actualidad. En 1969, debido a la proyección de la empresa, se lanzó al mercado la línea de refrescos BIMBO, en diferentes sabores, tales como: Frutilla, Piña, Naranja-Mandarina, Lima-Limón, Manzana y Cola.

A partir de 1972, INCA KOLA está en la totalidad del territorio nacional, imponiendo su rico sabor, lo cual incentivó a la organización Lindley a seguir modernizando su proceso industrial, adquiriendo nuevas maquinarias, aplicando tecnología de punta en sus procesos críticos e incrementando su capacidad instalada.

En 1983 salen al mercado los envases plásticos PET y en 1985 el agua de mesa Seltz. En 1989 Johnny Lindley Taboada asume la Presidencia de Directorio de José R. Lindley e Hijos.

En Julio de 1994 se lanza al mercado la botellas ½ litro gigante en envase de vidrio retornable acompañado de una nueva y bien planificada campaña publicitaria. En Diciembre de 1995 entró a operar una nueva línea de envasado para la botella de 1litro y en 1996 entró a operar la nueva Línea Krones para el envasado de la botella mediana. En Diciembre 1997 se lanza al mercado Inca Kola Diet y en 6 meses se convirtió en la líder del mercado dietético.

En estos últimos años se ha avanzado en reestructurar las áreas de Comercialización y Distribución perfeccionando el sistema y logramos atender a cerca de 90,000 puntos de venta en la Gran Lima.

Actualmente desarrolla sus operaciones productivas en un área de 20,000 metros cuadrados, cuenta con líneas de embotellado que alcanzan

velocidades de 1000 bot/minuto, siendo su proyección inmediata posicionarse en el mercado internacional.

1.2. POLÍTICA DE CALIDAD

El Comité de Gerencia ha definido la siguiente Política de Calidad, como una orientación de la Corporación concerniente a la calidad:

1. Producir y comercializar productos de la más alta calidad.
2. Satisfacer las necesidades de los clientes en oportunidad y servicio; y a los accionistas con la rentabilidad adecuada.
3. Mejorar continuamente nuestros productos, procesos y servicios con el compromiso de nuestros trabajadores, provistos de las herramientas y el entrenamiento necesarios."

1.3. JUSTIFICACIÓN DEL PROYECTO.

En la compañía embotelladora el departamento de Planeación y control de la Producción (PCP) determinó que la capacidad instalada de la planta no iba a ser suficiente para cubrir el aumento de la demanda, que se presentaría en los años venideros. PCP determinó pues entonces, desarrollar un proyecto para ampliar la capacidad de producción; adquiriendo paulatinamente nuevos equipos, reparando equipos guardados en los almacenes (llenadora, unidad de preparación de bebida) y modificando y/o adecuando las instalaciones. Esta ampliación no sólo se aplicaría a tener nuevos equipos (transportadores, termoencogibles, envolvedoras), si no que también, implicaba varios aspectos como: tener personal capacitado que opere adecuadamente las máquinas, tener un área donde colocar las maquinas, desarrollar y/o modificar documentos normativos tales como; procedimientos, registros, instrucciones, cartillas de verificación, manuales, etc., ya que la embotelladora está dentro de un Plan de implementación ISO 9000. Dentro de todos los aspectos mencionados, se contempló también ampliar la capacidad de refrigeración con una nueva torre evaporativa.

El proyecto de ampliación de la planta de embotellado seria pues ejecutado en varias etapas tales, como los mencionados anteriormente; debido a temas financieros y de ejecución de otros proyectos durante estos años. Se iniciaría con la instalación de la nueva torre de enfriamiento, ya que

la torre que fue desinstalada era de menor capacidad, tenia años de uso, presentaba algo de deterioro y se aprovechó para ser instalada en otra Planta de menor envergadura que también iba a ampliar su capacidad de refrigeración (Frutos del País).

1.4. OBJETIVO

El presente informe tendrá como objetivo detallar solo el proyecto de la instalación del Condensador Evaporativo y el desarrollo de un plan de mantenimiento preventivo. No se abarcará aspectos de modificación en las tuberías o instalación de otros equipos (compresores, equipos de embotellado) ya que estos comprenden modificaciones futuras que realizará en las otras etapas de ampliación de la Planta.

CAPÍTULO 2

2. DESCRIPCIÓN DEL PROCESO DE ENVASADO Y REFRIGERACIÓN

2.1. Proceso de envasado

2.1.1. Generalidades

En la Corporación José R. Lindley S.A. la Planta de Inca Kola del Rimac se envasa bebida gaseosa en dos tipos de botella; en vidrio retornable y en plástico no retornable. A continuación explicaremos las diferentes etapas que incurre en un proceso de envasado. Tanto en las líneas de embotellado de plástico no retornable como en vidrio retornable, detallando parcialmente la diferencia con las líneas de vidrio y plástico. En CJRL- Rimac el envasado se realiza en cuatro líneas de producción, la cual dos de ellas se produce en botellas de vidrio y en las otras dos se envasa en botellas de PET (PET: Pereftalato de polietileno). Las líneas de producción son las siguientes N-60 y N-40 en botellas PET, N-120 y N-132 en botellas de vidrio.

Las líneas N-40, N-60, N-132 cuentan con Llenadoras de 40, 60 y 132 válvulas respectivamente y la línea N-120 cuenta con 2 Llenadoras de 60 válvulas c/u.

El proceso de elaboración de la bebida y de elaboración del jarabe no se contemplará en el presente informe.

A continuación mostraremos los diagramas de los procesos de envasado de N40 y N60. **Ver diagrama 1 y 2** respectivamente.

2.1.2. Etapas de envasado

El envasado de la gaseosa en las líneas N-40, N-60, N-120 Y N-132 se pueden agrupar en las siguientes etapas:

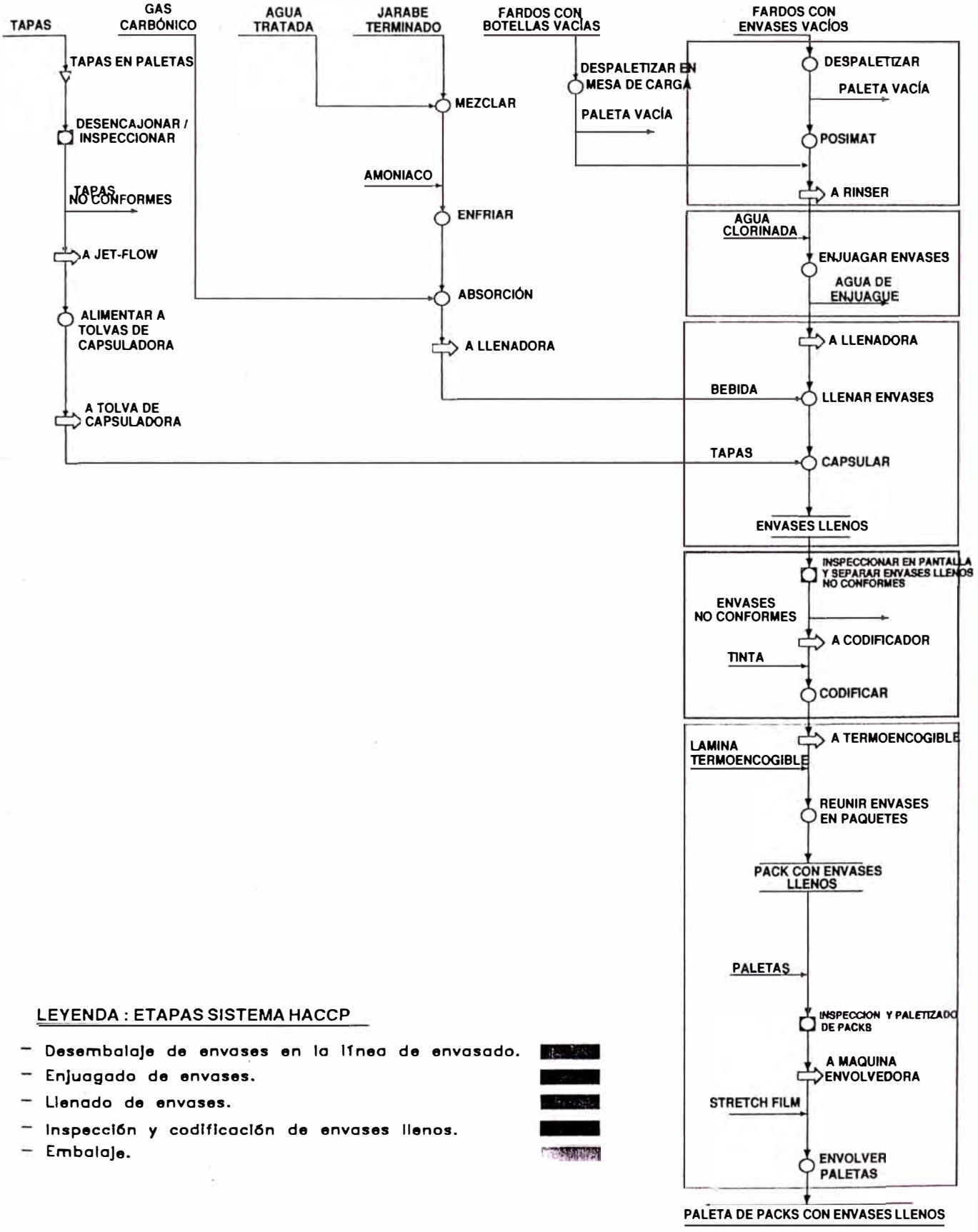
2.1.2.1. Despaletizado

Los camiones que ingresan a la planta van a la zona de descarga, donde, con la utilización de montacargas, bajan las paletas cargadas con botellas de plástico nuevas hacia la zona de despaletizado de c/u de ellas. Ya que estas botellas de plástico son "no retornables", el tiempo que permanece en línea no es extenso. Se inicia cuando el personal toma los fardos de botellas de plástico y descarga las botellas nuevas en una mesa de descarga (caso de la N-60), o una tolva de un Posicionador de botellas llamado POSIMAT (caso de la N-40), El POSIMAT es un equipo que gira sobre un eje y aprovechando la fuerza centrífuga, las botellas se alínean y ordenan descargándolas hacia un transportador neumático. Alternativamente también se dispone de una

DIAGRAMA DE ANÁLISIS DE PROCESO: ENVASADO LÍNEA N-40 PET

LAS OPERACIONES EMPIEZAN CUANDO: DESPALETIZAN FARDOS CON ENVASES VACÍOS

LAS OPERACIONES ACABAN CUANDO: SE PALETIZAN PAQUETES CON ENVASES LLENOS



LEYENDA : ETAPAS SISTEMA HACCP

- Desembalaje de envases en la línea de envasado.
- Enjuagado de envases.
- Llenado de envases.
- Inspección y codificación de envases llenos.
- Embalaje.

DIAGRAMA DE ANÁLISIS DE PROCESO: ENVASADO LÍNEA N-40	Nombre del Archivo: DIAGRAMA 1

DIAGRAMA DE ANÁLISIS DE PROCESO: ENVASADO LÍNEA N-60 PET

LAS OPERACIONES EMPIEZAN CUANDO: DESPALETIZAN FARDOS CON ENVASES VACÍOS

LAS OPERACIONES ACABAN CUANDO: SE PALETIZAN PAQUETES CON ENVASES LLENOS

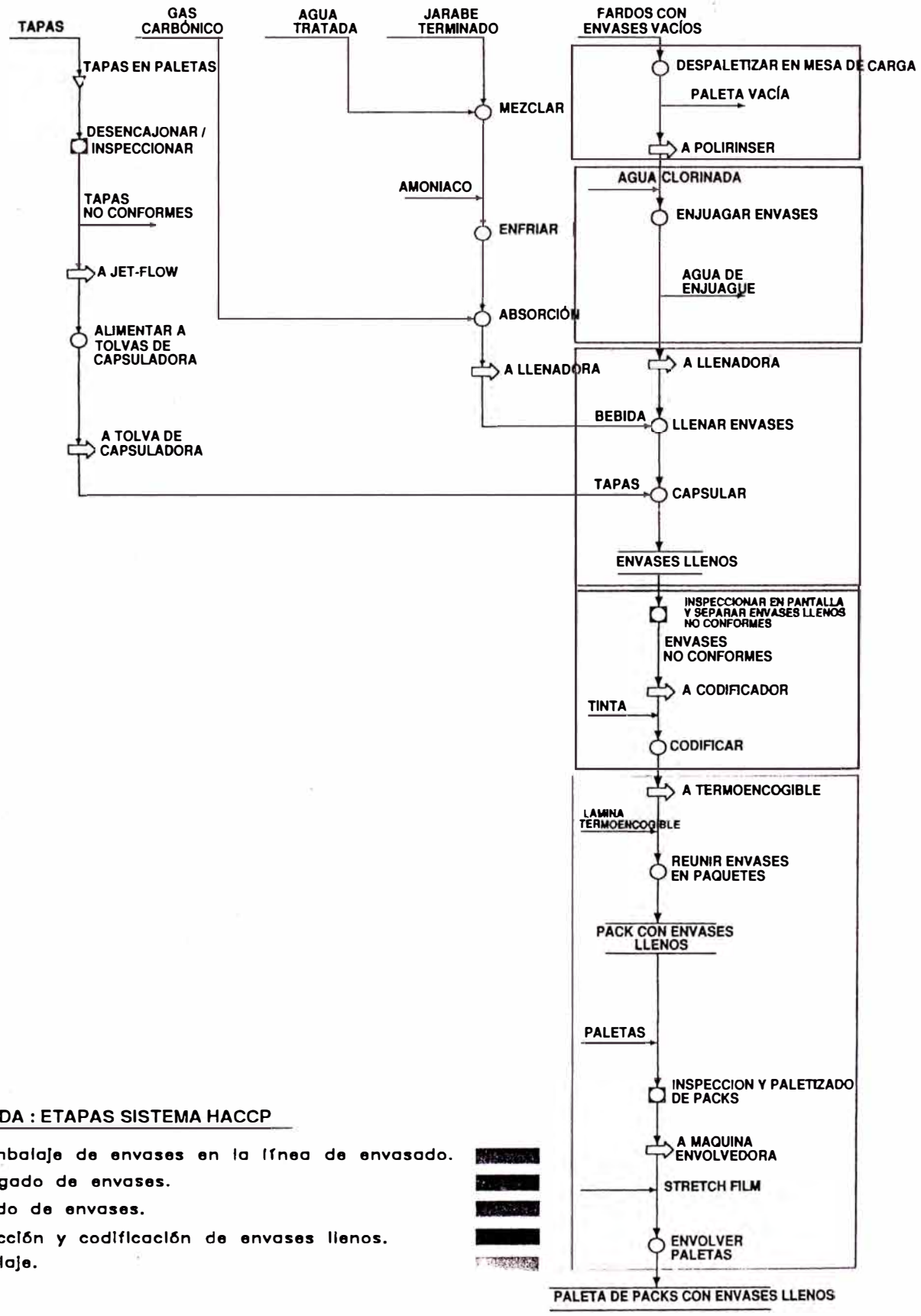


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DIAGRAMA DE ANÁLISIS DE PROCESO: ENVASADO LÍNEA N-60 PET	Nombre del Archivo: DIAGRAMA 2

mesa de descarga (opcional N-40) que se utiliza para los formatos grandes como 2 litros, 2.25 lt y 3 litros. .

Aquí se muestra un ejemplo de un equipo Posicionador de botellas de plastico. **Ver gráfico 1**

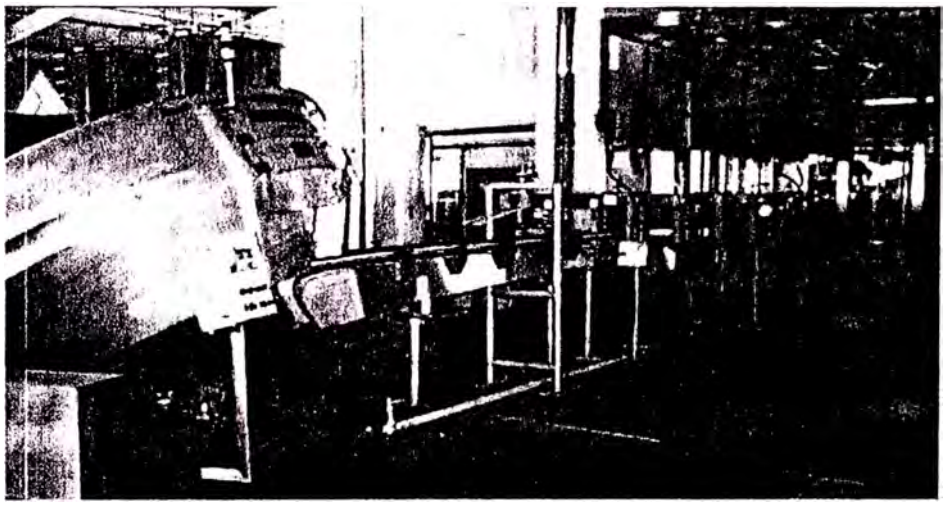


Gráfico 1: Posicionador de Botellas

Para el caso de vidrio se cuenta con un equipo similar al mostrado. **Ver grafico 2.**

Para las líneas de vidrio las botellas son desencajonadas para lo cual se cuenta con un equipo similar al mostrado. **Ver grafico 3.**

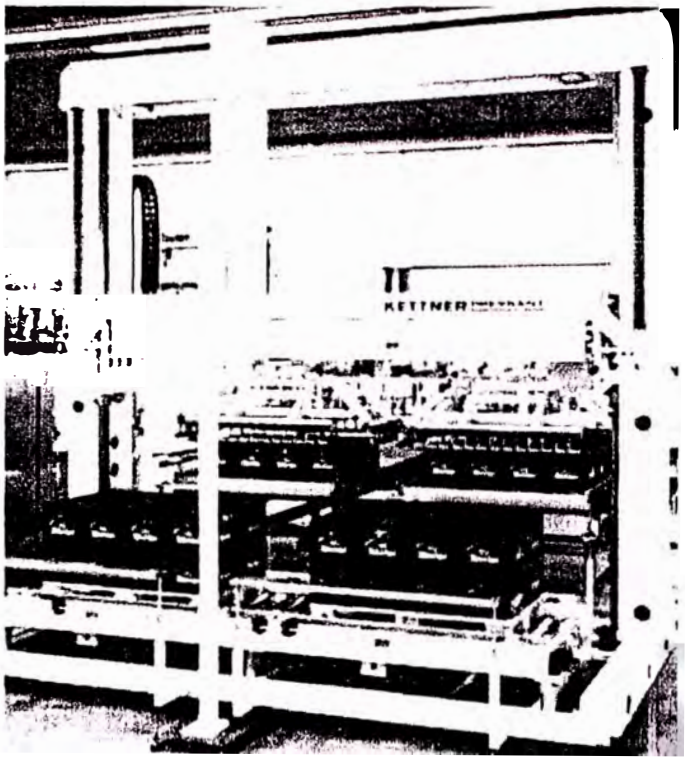


Grafico 2· Despaletizadora

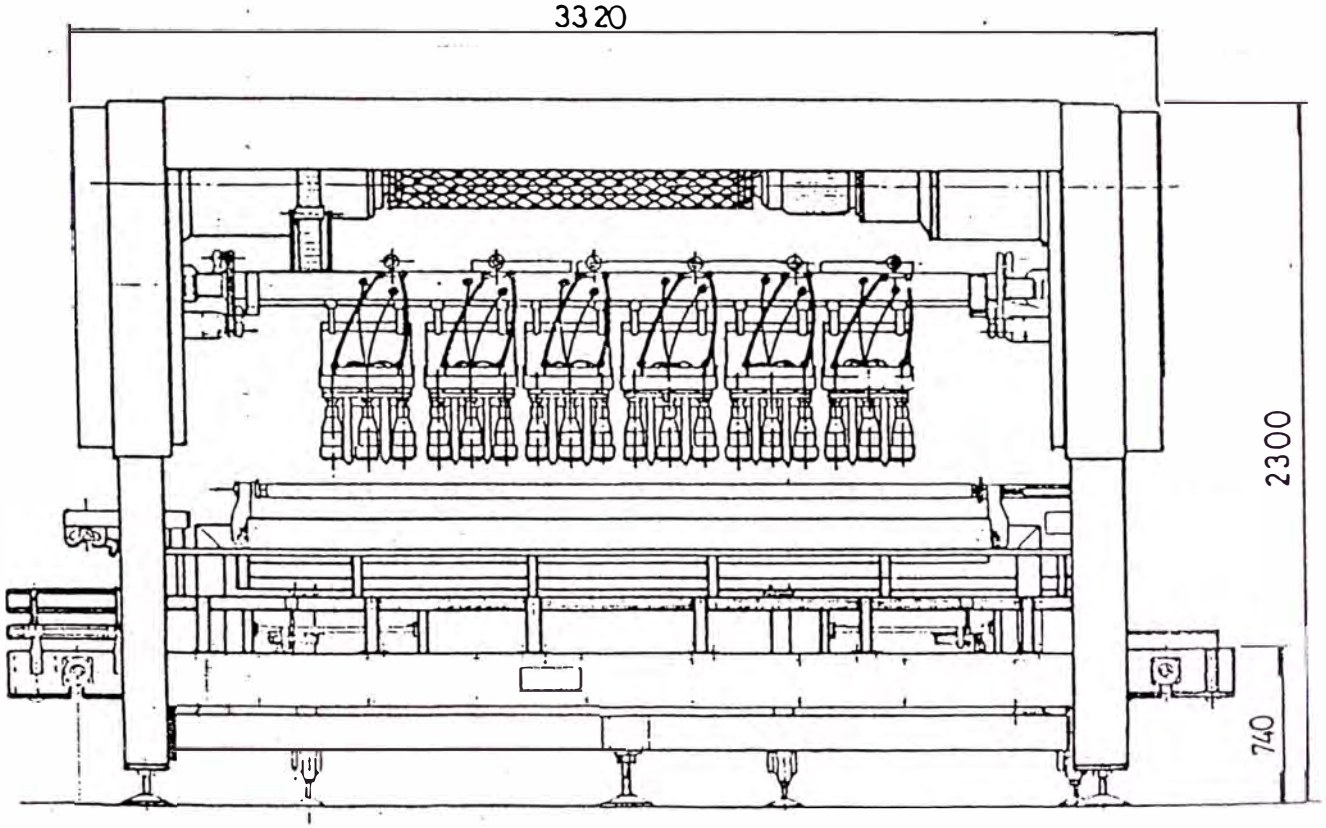


Grafico 3: Desencajonadora

2.1.2.2. Lavado-enjuague

En esta etapa las botellas que son transportadas por transportadores neumáticos (N-40) o transportadores de tablillas (N-60) ingresan a un equipo que se llama RINSER en la N-40 o POLIRINSER en la N-60. Según la línea de producción, aquí las botellas son lavadas mediante unos enjuagadores que inyectan al interior un chorro de agua a presión. Las botellas provenientes del POLIRINSER y RINSER son conducidas por un transportador hacia la zona de llenado.

En la producción de vidrio tenemos algunas diferencias. En las líneas de embotellado de vidrio se necesita personal que separe las botellas muy sucias y elimine las que están deterioradas durante el transporte. Las botellas ingresan a las lavadoras de botellas en donde son sumergidas y lavadas en una serie de tanques llenos de agua y soda.

Aquí se muestra un ejemplo de lavadoras de vidrio. **Ver grafico 4.**

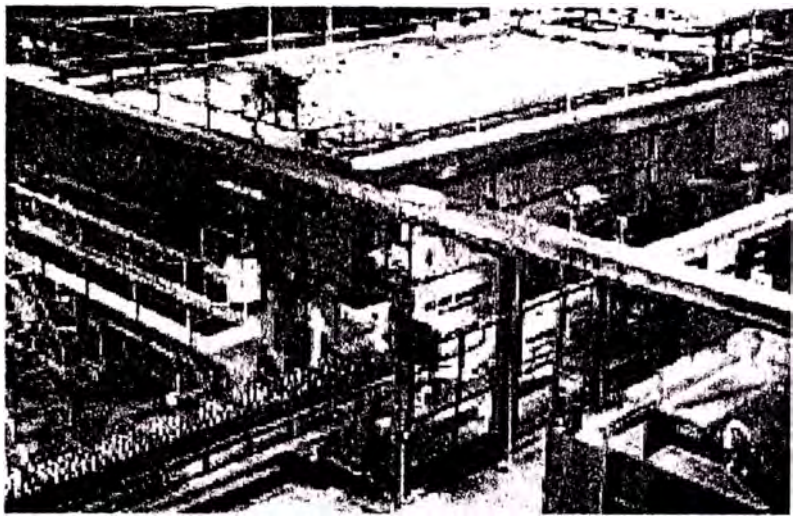


Grafico 4: Lavadora de Botellas

2.1.2.3. Inspección

Todas las botellas de vidrio luego pasan a través de un INSPECTOR ELECTRÓNICO en donde estos equipos detectan defectos y suciedad en las botellas. Las inspecciones que realizan estos tipos de equipos son: inspección en pico. en rosca, pared interna, pared externa, base de botella y presencia de soda.

Aquí se muestra un ejemplo de inspector electrónico. **Ver grafico 5**

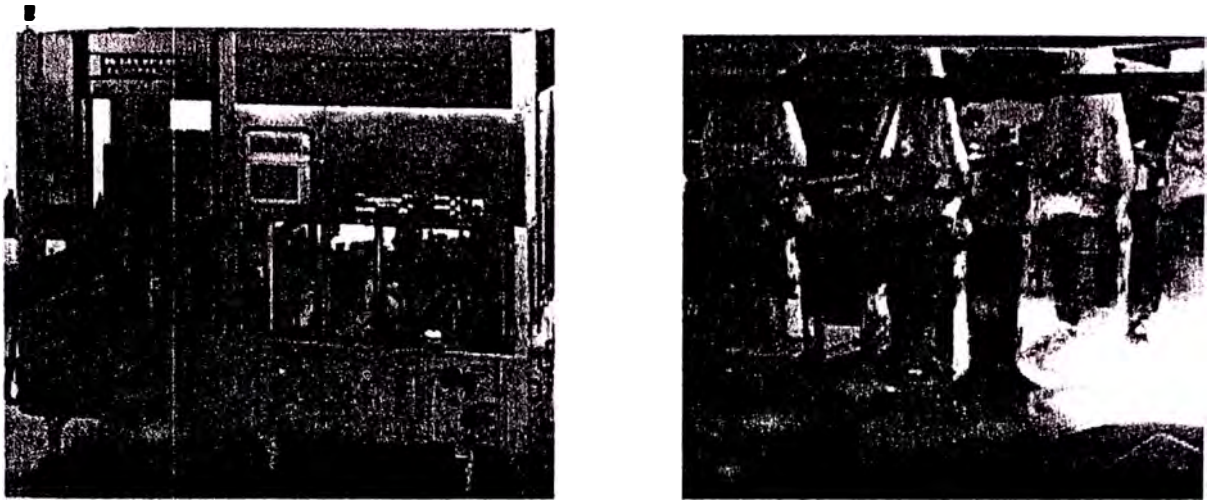


Grafico 5: Inspector Electrónico

2.1.2.4. Llenado-capsulado-coronado

En esta etapa las botellas ingresan a la llenadora de botellas. La operación de llenado se realiza mediante un sistema de válvulas de llenado. Al momento de ser elevadas por un cilindro elevador son presurizadas con CO2. Luego mientras realizan un recorrido circular, las botellas son llenadas con bebida gaseosa, con el producto recién lleno ingresa inmediatamente a una capsuladora, donde son tapadas. Las tapas previamente calentados a unos 25°C son introducidas a un ALIMENTADOR DE TAPAS, donde son transportadas a través de un ducto de transporte neumático hacia una tolva sobre cada CASPULADOR.

En las líneas de vidrio el proceso es similar. La diferencia es que las botellas una vez llenas pasan a una coronadora. La nueva línea de

embotellado (N-132) llega a producir hasta 60000 bot/hr lo cual requiere que su pieza y regulaciones sean precisas.

Aquí se muestra un ejemplo de llenadora-coronadora-capsuladora. **Ver grafico 6.**

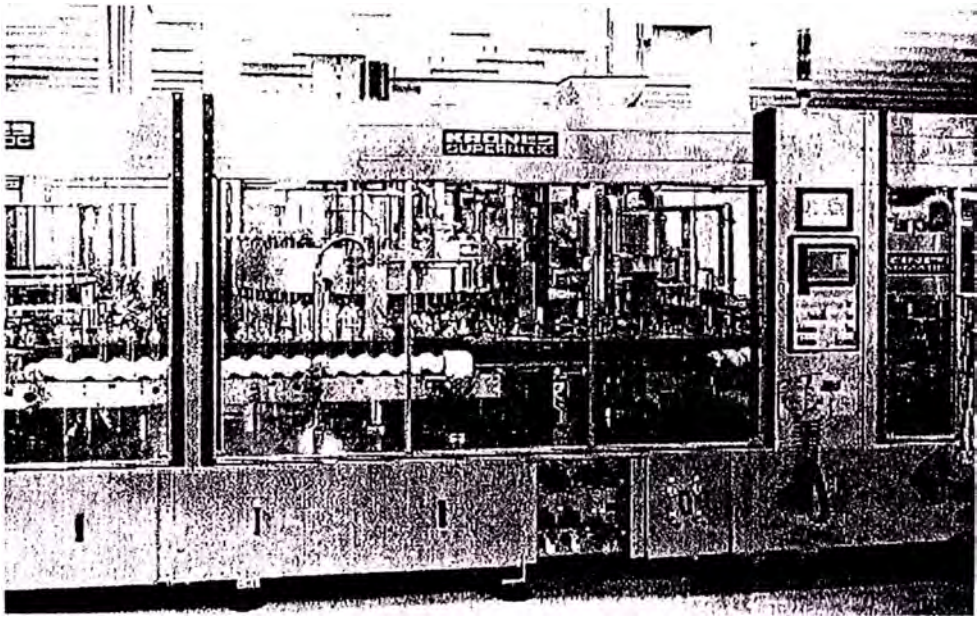
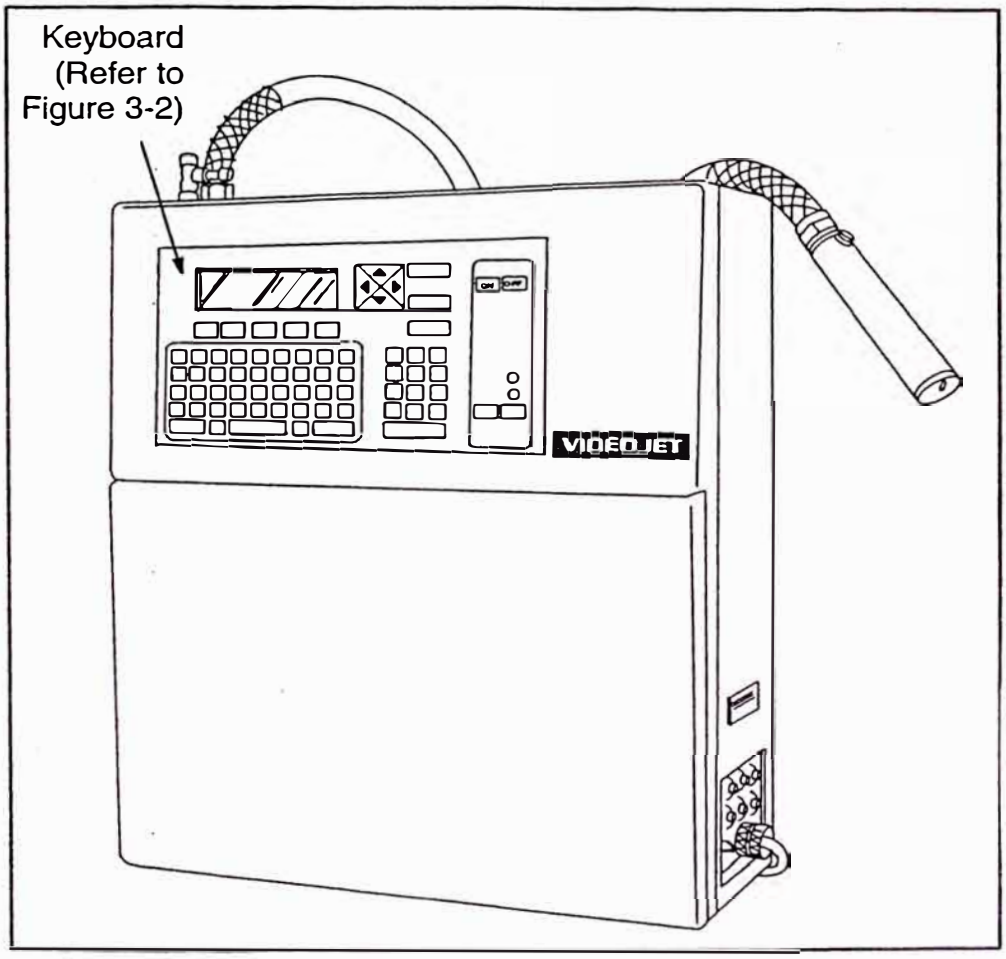


Grafico 6: Llenadora de Botellas

2.1.2.5. Codificación

Las botellas llenas y selladas son conducidas por un transportador en donde justo después de las salidas de las CAPSULADORAS son secadas por un chorro de aire a presión y luego son codificadas. Esta codificación es útil para poder hacer seguimiento de cuando y donde fueron producidos. **Ver grafico 7.**



VIDEOJET EXCEL 170i Printer

Grafico 7: Codificador

2.1.2.6. Inspección

Sobre los transportadores mismos, tanto en la parte previa al llenado, como después del mismo, se tienen sitios iluminados para que los operadores observen a través de las botellas y controlen la limpieza de las mismas, su contenido, así como para que retiren aquellas que no cumplan con el nivel de llenado o torque.

2.1.2.7. Empaque

Luego de ser codificadas las botellas de plástico pasan a través de un equipo que las empaca. Los equipos utilizados para el empaque se llaman termoencogibles ya que agrupan y las envuelven en un plástico de tipo termocontraible según el formato preestablecido, pueden ser agrupadas de 3x2 , 4x4 y 2x2; e ingresan luego a un horno a 120°C en donde el plástico se contrae y se enfría al momento de la salida quedando las botellas empaquetadas. **Ver grafico 8.**

Luego de salir por la TERMOENCOGIBLE el personal de producción agrupa los paquetes sobre unas paletas de cartón en donde luego son envueltas en un equipo denominado ENVOLVEDORA DE PALETAS. **Ver grafico 9.**

Luego los montacargas toman las paletas y cargadas a los camiones donde son enviadas hacia los distribuidores.

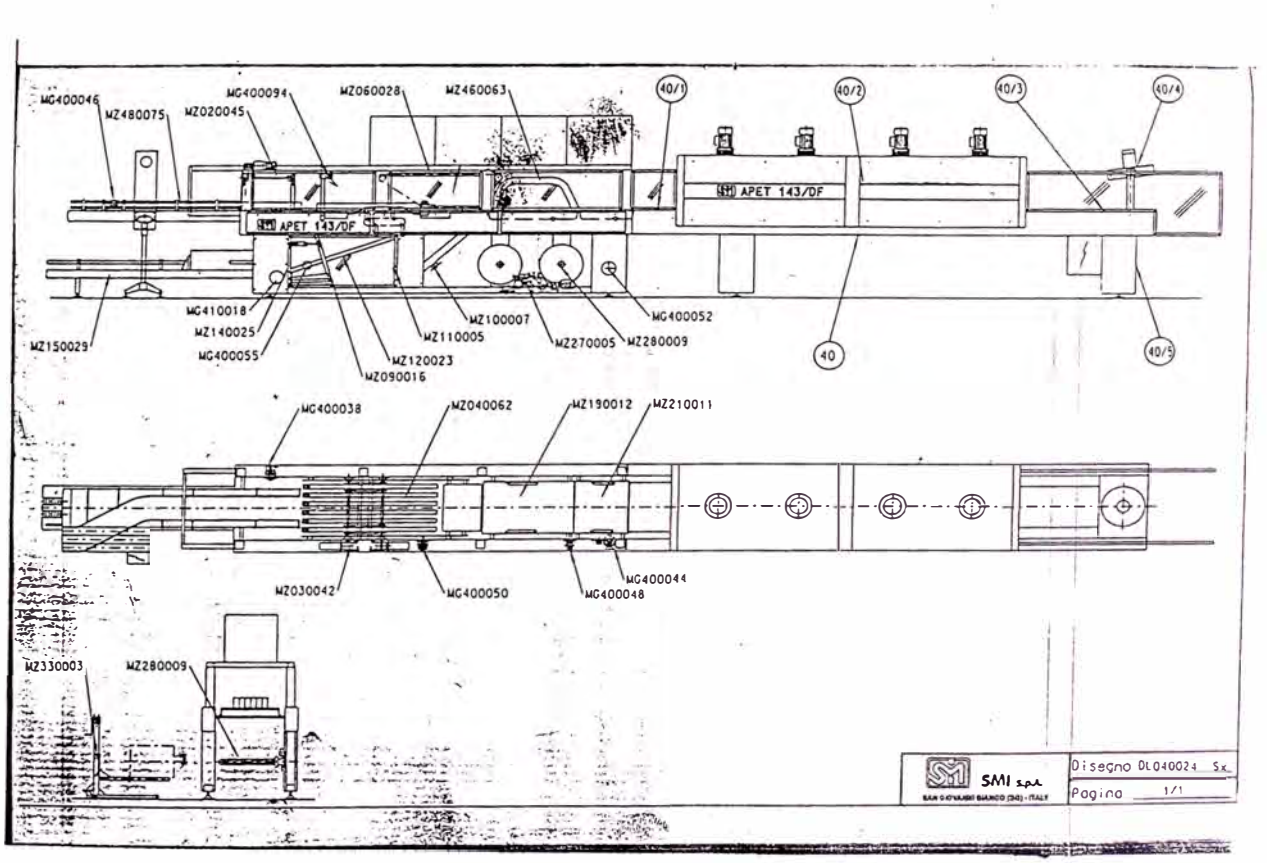


Grafico 8: Termoencogible

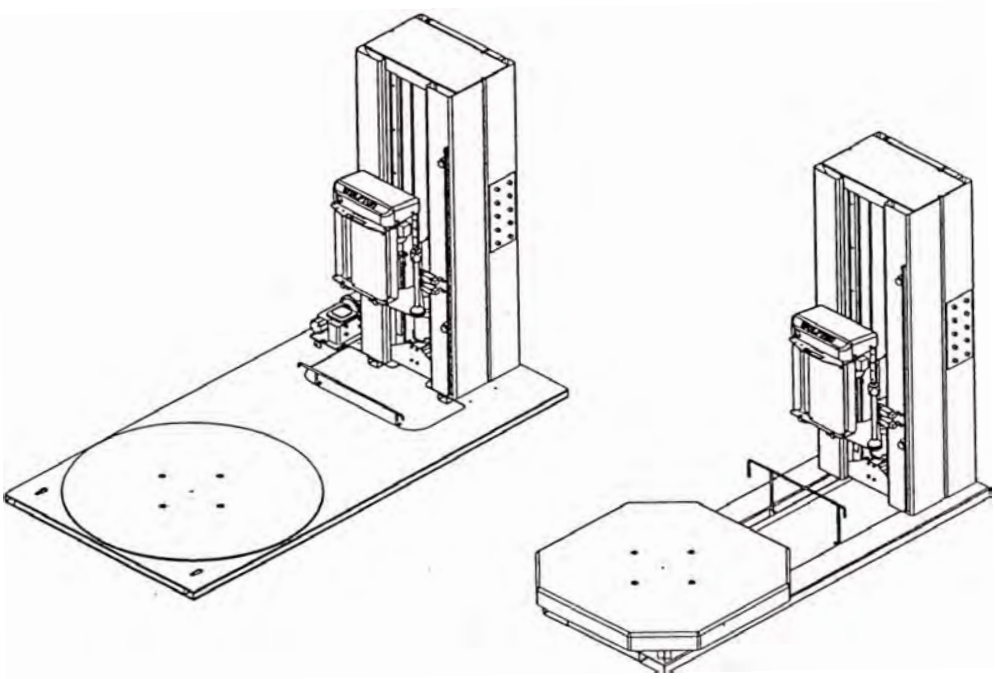


Grafico 9: Envolvedora

2.2. Proceso de refrigeración

2.2.1. Descripción

En el proceso de refrigeración intervienen los siguientes equipos instalados en planta:

a. Compresores de amoniaco

b. Tanques de almacenamiento y separadores (recibidores)

c. Torres evaporativas o condensadores evaporativos

d. Cortinas de enfriamiento.(Evaporadores)

Mediante un sistema de tuberías se transporta el agua y jarabe hacia unos equipos denominados UNIDAD DE PREPARACION DE BEBIDA que consiste en una unidad de mezcla, una unidad de enfriamiento y una unidad de saturación. En la primera unidad es mezclada el agua con el jarabe en proporciones según el sabor y luego la bebida una vez mezclada ingresa a la unidad enfriadora (Cortina de Enfriamiento o evaporador). Aquí la bebida cruza por una serie de placas de enfriamiento hasta una determinada temperatura. (4-5°C), luego pasa a través de un sistema de carbonatación en donde se inyecta el CO_2 para luego dirigirse a las Llenadoras de botellas.

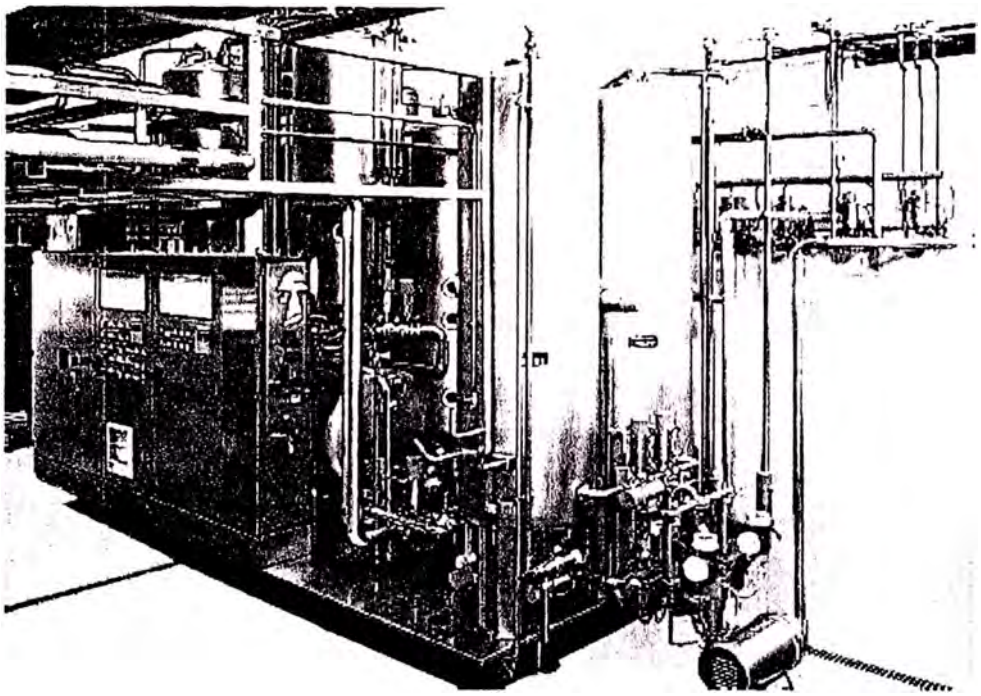


Grafico 10: Unidad de Preparación de Bebida

Las cortinas de enfriamiento cumplen la función de evaporadores, su forma constructiva es de un compartimiento cerrado con una serie de placas nidadas por dentro con amoniaco cuya función es enfriar la bebida. Consta de un tanque recibidor cuya función es actuar asimismo como separador y aquí el gas retorna hacia la línea de alta presión.

El sistema de refrigeración para la zona de embotellado de plástico esta constituido por tres compresores de amoniaco y dos torres de enfriamiento instalados en paralelo. **Ver diagrama 3.**

2.2.2. Equipos de refrigeración

Datos Técnicos de los Equipos de refrigeración.

Compresor Amoniaco A y B

Marca compresor:	Vilter
Modelo compresor:	456
Serie compresor	46090-91
Potencia Motor	100 HP
Marca motor	Lincoln
Tensión	440 V

Compresor Amoniaco C

Marca compresor:	Vilter
Modelo compresor:	4412
Serie compresor:	405T
Año construcción:	1970
Potencia Motor	125 HP
Marca motor:	Lincoln
Tensión	440 V

Unidad de Preparación de Bebida N-40 (Evaporador)

Marca	Crown Cork
Modelo	BM 100

Año de construcción	1998
Lugar de procedencia	Mexico
Capacidad	6000 GPH

Unidad de Preparación de Bebida N-60 (Evaporador)

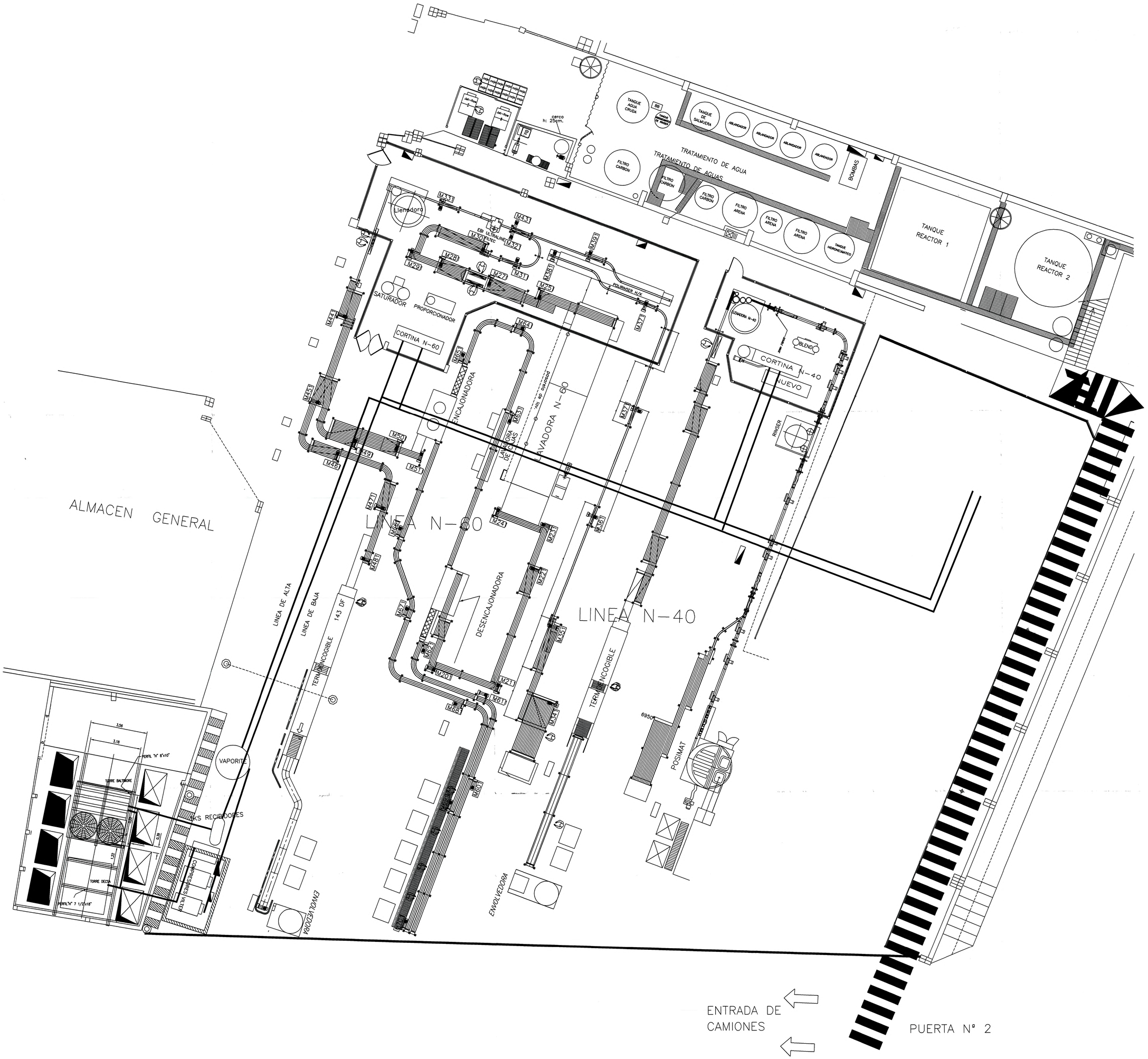
Marca	Crown Cork
Modelo	BM 200
Capacidad	12000 GPH

Torre Condensador Evaporativo

Marca	DECSA
Modelo	CFR-A-042
Procedencia	Italia
Refrigerante	NH3
Capacidad	268 TR (944 KW)
Potencia de Bomba	1.5 KW
Potencia de Ventilador	2x4 KW
Flujo de aire	17.22 m^3/s
Peso	3350 kg (sin carga) / 3850 kg (en operación).
Dimensiones	3680mmx1480mmx3565mm

Torre Condensador Evaporativo (a desmontar)

Marca	Baltimore AirCoil
Modelo	C1-842-K



PLANO GENERAL DE PLANTA					
Alumno:	Profesor:	Fecha:	Escala:	Version	PLANO:
M.Ortiz	M.Casas	Marz-03	S/E	1	PLANO 01

Serie	87100725
Refrigerante:	R717 (NH3)
Año de fabricación	03 de Febrero de 1987
Capacidad	110.00 TR
Potencia de motor	15 HP
	230 / 460 V
Velocidad ventiladores	1800 RPM / 3 fases, 60 Hz
Potencia de bomba	1.5 HP
	230 / 460 V
Velocidad bomba	3450 RPM / 3 fases, 60 Hz

Torre Condensador Evaporativo (a instalar)

Marca	Baltimore Aircoil
Modelo	CXV-253
Serie	U014037301
Capacidad	325 TR
Temperatura de condensación:	35°C
Temperatura de bulbo humedo:	24.4°C
Potencia Bomba	5 HP
Flujo de agua	715 GPM
Potencia Ventilador	15 HP
Refrigerante:	R717 (NH3)
Peso	11830 lb (sin carga) /18720 (en operación)
Dimensiones	3690mmx3600mmx4840mm.

Cuadro 1: Cuadro resumen de las capacidades de refrigeración.

Equipo	Cap. de Refrig.(TR)
Torre Decsa CFR-A-027	268
Torre Baltimore C1-842-K (antes)	110
Torre Baltimore CXV 253 (nueva)	325

2.2.3. Definiciones

Condensadores. El condensador es una superficie de transferencia de calor. El calor del vapor refrigerante caliente pasa a través de la paredes del condensador para su condensación. Como resultado de su pérdida de calor hacia el medio condensante, el vapor refrigerante es primero enfriado hasta saturación y después condensado hasta su fase de estado liquido.

Aun cuando la salmuera o algunos refrigerantes de expansión directa se les usa como medios condensantes en aplicaciones de baja temperatura, en general, para la gran mayoría de los casos, el medio condensante empleado es aire o agua o una combinación de ambos.

Los condensadores son de tres tipos generales: (1) enfriados con aire, (2) enfriados con agua y (3) EVAPORATIVOS. Los condensadores enfriados con aire, emplean al aire como medio condensante, mientras que los condensadores enfriados con agua, emplean agua para condensar al refrigerante. Para ambos condensadores enfriados con aire y enfriados con

agua, el calor cedido por el refrigerante condensante aumenta la temperatura del aire o del agua usados como medio condensante.

Los condensadores evaporativos emplean tanto aire como agua. Aún cuando se tiene algún aumento en la temperatura del aire que esta pasando a través del condensador, la condensación del refrigerante en el condensador se efectúa principalmente por la evaporación del agua rociada o atomizada sobre el condensador. La función del aire, es aumentar la razón de evaporación sacando el vapor de agua que resulta del proceso de evaporación.

El calor total rechazado en el condensador incluye tanto el calor absorbido en el evaporador como la energía equivalente del trabajo de compresión. Cualquier sobrecalentamiento absorbido por el vapor de succión del aire de los alrededores, también forma parte de la carga del condensador.

Condensadores evaporativos. Esencialmente un condensador Evaporativo es una unidad empleada para conservar el agua y, en efecto, es una combinación de condensador y torre de enfriamiento en una sola unidad. Tanto el aire como el agua se utilizan en un condensador Evaporativo. El agua es bombeada desde el deposito inferior de la unidad hasta el cabezal de atomización, (toberas) la atomización se efectúa hacia abajo pasando sobre los serpentines refrigerantes hasta el deposito inferior

de la unidad. El aire es tomado del exterior por la parte inferior del condensador utilizando un soplador, el aire es descargado al exterior por la parte superior del condensador. En algunos casos, tanto la bomba como el soplador son impulsadas por el mismo motor, en otros casos se usan motores separados. Los eliminadores se instalan en la corriente de aire arriba del cabezal atomizador, esto para evitar la entrada del aire al soplador.

Aun cuando el proceso termodinámico real que tiene lugar en el condensador Evaporativo es algo complicado, fundamentalmente es un proceso de enfriamiento Evaporativo. El agua es evaporada debido a la atomización y al paso del aire a través de la superficie humedecida del condensador, siendo la fuente de calor vaporizante el refrigerante condensante en el serpentín condensador. Eventualmente todo el calor cedido por el refrigerante en el condensador sale del mismo, ya sea, como calor sensible o calor latente (humedad) en la descarga del aire. Ya que tanto la temperatura del bulbo húmedo del aire que entra al condensador. A menor temperatura del bulbo húmedo se tendrá condensador Evaporativo más efectivo.

Con objeto de facilitar la limpieza y eliminar las incrustaciones, el serpentín del condensador se hace de tubo descubierto en vez de tubo aleteado. Generalmente, la capacidad de los condensadores evaporativos se aumenta al aumentar la cantidad de aire en circulación a través del

condensador. Como una cosa practica, la cantidad máxima de aire que puede circular a través del condensador esta limitada por los requerimientos de potencia del ventilador y por la velocidad máxima de aire que puede admitirse a través de los eliminadores sin que se transporten partículas de agua.

La cantidad de agua que circule sobre el condensador deberá de ser la necesaria para conservar lo bastante humedecida la superficie de los tubos a fin de obtener la eficiencia máxima de las superficie del tubo y tener el mínimo de incrustaciones. **Ver diagrama 4.**

2.2.4. Funcionamiento del circuito de refrigeración.

Los condensadores evaporativos, tiene un serpentín donde circula el amoniaco. La bomba inyecta a través de toberas un chorro de agua. El agua llega a una tina en la parte superior, en donde sale en forma de chorro y enfría al serpentín de amoniaco. El agua enfría el serpentín y 2 ventiladores extraen el vapor generado.

Una vez que el amoniaco es enfriado en el serpentín esta pasa a un tanque de almacenamiento o recibidores en donde el liquido se dirige hacia los domos de las cortinas.

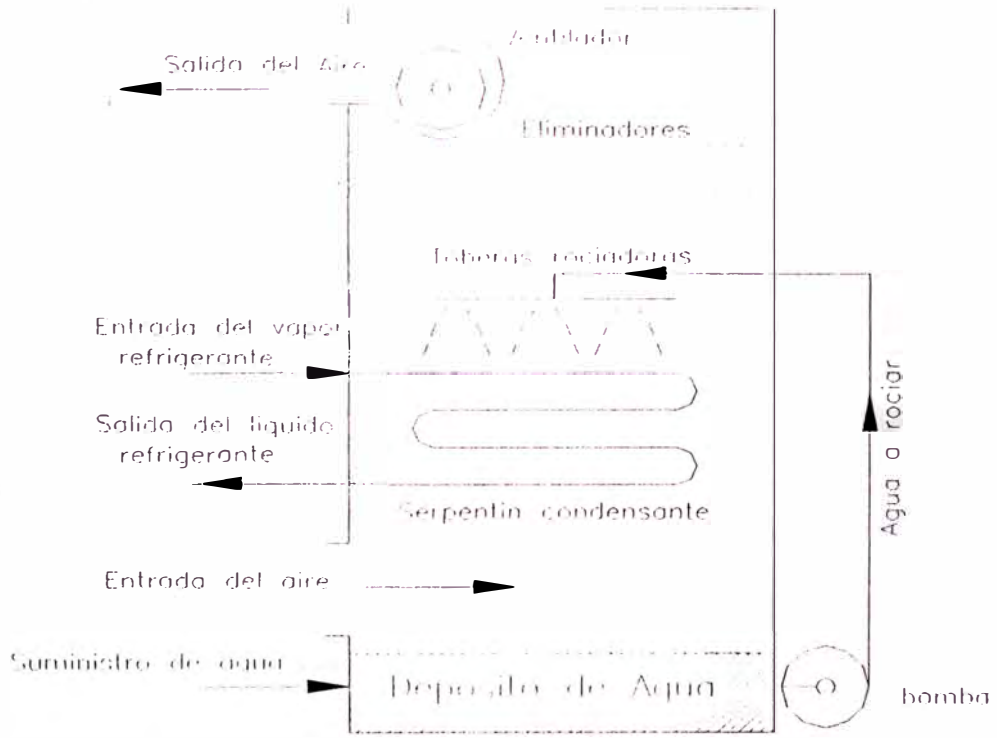
Aquí como se había explicado antes los domos (cortinas de enfriamiento) inundan las placas de las cortinas de enfriamiento con el

amoniaco liquido. Estas placas de enfriamiento son de material de acero inoxidable.

La bebida circula por las paredes exteriores de las placas en donde se enfría y el amoniaco que se evapora dentro de las placas retorna hacia la línea de alta presión.

Luego ingresa hacia los compresores de amoniaco en donde se repite nuevamente el ciclo.

DIAGRAMA 4



CAPÍTULO 3

3. INSTALACIÓN, PUESTA EN MARCHA

Para antes de la instalación de una nueva torre de enfriamiento, se tuvieron algunas consideraciones iniciales; tales como, la ubicación, posición, dimensionamiento o capacidad, etc. Las cuales se indica en este capitulo.

3.1. Montaje e instalación

3.1.1. Cálculos de capacidad de refrigeración

Uno de los puntos más importantes es el calculo de la capacidad máxima de refrigeración. Esto se refleja en la capacidad de enfriamiento de cada unidad de preparación de bebida. (Cortina de enfriamiento)

Las capacidades de enfriamiento requeridas para cada cortina serian las siguientes:

Cálculo de carga térmica en la línea N-60

Calor específico de la bebida: 3.948 KJ/kg-K

Densidad: 1.038 Kg/l

Temperatura de ingreso: 25°C

Temperatura de salida: 1°C

En cada línea de embotellado existen diferentes formatos de botellas. Según sea el formato existen diferentes velocidades de producción. Mas adelante se muestra el calculo del flujo de bebida para los diferentes formatos de botella.

Formato de botella	Velocidad (BPM) Botellas/min	Flujo de Bebida (lt / min)
625 VRE-IK	300	187.5
237 PSH	300	71.1
296 PSH	300	88.8
600 PSH	300	150
1,0 PFM	170	170
1,5 PFM	140	210
350 PET	300	114
592 PET	300	177.6
1,5 PET	140	210
2,0 PET	120	240

Cuadro 2.

El flujo de bebida se calcula de la siguiente manera:

Flujo masico = densidad x velocidad (bpm) x volumen de botella

Bpm = botellas por minuto

Flujo = litros por hora

Ahora se calcula la carga de refrigeración máxima, tomando como flujo máximo lo siguiente 240 lt /min

Carga de refrigerante = flujo x densidad x Calor especifico x Variación de temperatura

Carga de refrigerante = 240 lt/min x 1.038 kg/lt x 3.948 kJ/kg-K x (25 – 1)°C

Carga de refrigerante = 23604.6 kJ / min = 1416277.1 kJ / hr

Sabemos que 1 TR = 12000 BTU = 12670 kJ / hr = 3.51 kW

En toneladas de refrigeración será: 112.86 TR **(h evap. 1)**

Reemplazando estos datos en los cuadros tenemos:

Formato de botella	Capacidad de enfriamiento requerida (TR)
625 VRE-IK	88.17
237 PSH	33.43
296 PSH	41.76
600 PSH	84.64
1,0 PFM	79.94
1,5 PFM	98.75
350 PET	49.38
592 PET	83.51
1,5 PET	98.75
2,0 PET	112.86

Cuadro 3.

Cálculo de carga térmica en la línea N-40

Repitiendo el mismo procedimiento para la otra línea de embotellado (N-40) obtenemos lo siguiente:

Formato	Velocidad (BPM)	Flujo de Bebida (l/min)	Capacidad de enfriamiento requerida (TR)
296 PSH	220	65.12	30.62
500 PSH	220	110.00	51.72
500 PFM	240	120.00	56.42
380 PET	240	91.20	42.88
592 PET	240	142.08	66.81
1.5 PET	140	210.00	98.75
2.0 PET	140	280.00	131.66
2.5 PET	140	350.00	164.58
3.0 PET	88	308.00	124.14

Cuadro 4.

La carga de refrigeración requerida será la siguiente, tomando como flujo máximo lo siguiente 420 lt /min será 164.58 TR **(h evap. 2)**

Asimismo debido al futuro aumento en la demanda se ampliaría a una nueva línea de embotellado con una llenadora para 50 válvulas. **Ver plano 01 en anexos.**

Por lo que la capacidad de enfriamiento de la zona seria la siguiente

Datos iniciales:

Capacidad de la nueva línea de embotellado 50 Válvulas

Velocidad de producción de la llenadora 140 botellas por minuto para formato de 2.5 litros tomaremos como referencia la misma capacidad de refrigeración.

Con lo que reemplazando los datos obtenemos una capacidad de refrigeración 164.58 TR **(h evap. 3)**

Existían dos torres evaporativas con las siguientes características

Torre Decsa	268 TR
Torre Baltimore (antes)	110 TR

Cuadro 5.

Como la Torre Decsa es relativamente nueva y la torre Baltimore es antigua. Esta última seria destinada para la Planta de Frutos del País.

Capacidad total de refrigeración requerida:

- Trabajo entregado por compresión.

W = Pot motor.

W =21.22 TR (100 HP) + 21.22 TR (100 HP) + 26.53 TR (125 HP)= 68.97 TR

- Calor entregado (ΔH) **(h evap. 1+ h evap. 2 + h evap. 3)**

Cap N-40 + Cap N-60 + Cap N-50 = 112.86+164.58+164.58 = 442.02 TR

- Calor total requerido: (W + ΔH)

Q = 442.02+68.97 TR = 510.99 TR

Capacidad torres (antes de la instalación): 268+110 = 378 TR

Capacidad torres (con nueva instalación): 268+325 = 593 TR > 510.99 TR

3.2. Cronograma de la instalación.

3.2.1. Consideraciones generales

Para la instalación del condensador se tuvo que tomar en consideración varios aspectos indicados a continuación:

a. **Lugar en ensamble**; uno de los principales inconvenientes que se tuvo fue la necesidad de disponer de un lugar cercano para el ensamble de la torre. Se tuvo en cuenta varias alternativas. Una de ellas fue de ensamblarlo en un lugar destinado para el almacenaje de las paletas y cajas. Se solicito espacio al área de Patio pero no se podía porque no había otro lugar donde dejar las cajas que ocupaban ese sitio. La otra ubicación fue de usar la zona de envasado pero no se pudo debido al transito del personal de producción, otra alternativa era de ensamblarlo en otra planta de la compañía ubicado en el distrito de Zarate, pero esto incrementaba los gastos por transporte ya que la torre tenia que ser transportada en 2 secciones. Otra opción y mas factible fue de ensamblarla dentro de los almacenes de insumos ubicado al frente de la fabrica. Se opto por la ultima opción por ser seguro, sencillo y de rápido transporte.

b. **Programa de producción;** durante el verano el programa de producción de las líneas de envasado, no permitía que se pudiera realizar la instalación sino hasta mediados del mes de agosto del 2002, justo cuando la producción se encontraría a su máxima disponibilidad para mantenimiento, para esa epoca se necesito realizar vacío al sistema de amoniaco en toda la zona, además de realizar el trabajo de instalación de nuevas tuberías, por lo que se aprovechó primero a ensamblarlo durante Julio – Agosto frente a los almacenes, ya que la producción estaba sujeta a la demanda, el tiempo disponible fué en las 2 primeras semanas de Agosto.

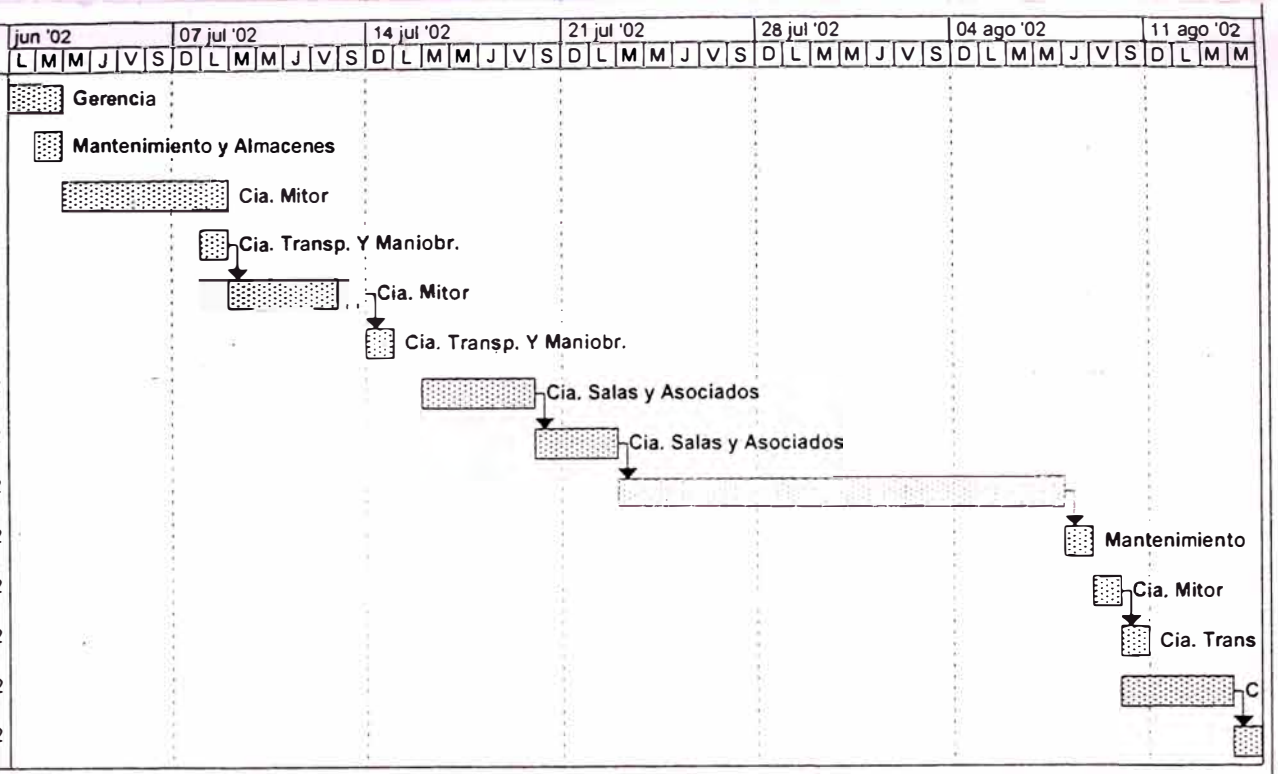
c. **Repuestos**. Durante el ensamble se tuvo el inconveniente que las toberas y los conductos de la bomba no habían sido suministrados por el proveedor por lo que se tuvo que solicitar inmediatamente la reposición de los repuestos faltantes. Una de las observaciones fue de que se debió haber revisado el packing list al momento de recepcionar el paquete.

Luego de haberse ensamblado la nueva torre evaporativa, se reajustó el programa de producción, y se solicitó al departamento de Planeación y Control de la Producción (PCP) 3 días disponibles, para instalar la nueva torre. Básicamente se tuvo que coordinar bien la fecha de instalación debido a que no solamente se tenia que tener disponible las lineas, si no que

también en el otra area existian 2 lineas de embotellado donde habia producción, justo ese dia no habia mucha producción por lo que el transito de montacargas fue reducido.

A continuación se presenta el siguiente cronograma de instalación y producción. **Ver cuadro 6 y 7 respectivamente.**

Id	Nombre de tarea	Duración	Comienzo	Fin
1	Aprobacion de Presupuestos	2 días	lu 01/07/02	ma 02/07/02
2	Coordinaciones lugar ensamble	1 día	ma 02/07/02	ma 02/07/02
3	Ensamble de Parte Inferior	4 días	mi 03/07/02	lu 08/07/02
4	Traslado a una ubicación temporal	1 día	lu 08/07/02	lu 08/07/02
5	Ensamble de Parte Superior	4 días	ma 09/07/02	sá 13/07/02
6	Ensamble completo en Patio N-60	1 día	do 14/07/02	do 14/07/02
7	Modificacion de Vigas	4 días	ma 16/07/02	vi 19/07/02
8	Preparacion de techo	2 días	sá 20/07/02	lu 22/07/02
9	Periodo de espera	12 días	ma 23/07/02	mi 07/08/02
10	Purga de amoniaco	1 día	ju 08/08/02	ju 08/08/02
11	Corte de tuberias	1 día	vi 09/08/02	vi 09/08/02
12	Montaje	1 día	sá 10/08/02	sá 10/08/02
13	Conexión de tuberias	3 días	sá 10/08/02	ma 13/08/02
14	Prueba, arranque inicial	1 día	mi 14/08/02	mi 14/08/02



Proyecto: Cronograma de Instalacion
Fecha: ma 15/04/03

Tarea
División
Progreso
Hito
Resumen
Tarea resumida
División resumida
Hito resumido
Progreso resumido
Tareas externas
Resumen del proyecto

PLAN DE PRODUCCIÓN SEMANAL - Semana N° 32-2002 (Cajas físicas)

(Del 04 al 10 de Agosto 2,0002)

Fecha: 02-Ago-02
Hora 12:48 p.m.

VERSIÓN: 1

	Domingo			Lunes			Martes			Miércoles			Jueves			Viernes			Sábado		Domingo		
	1ro.	2do.	3ro.	1ro.	2do.	3ro.	1ro.	2do.	3ro.	1ro.	2do.	3ro.	1ro.	2do.	3ro.	1ro.	2do.	3ro.	1ro.	2do.	1ro.	2do.	3ro.
	Agosto 4, 2002			Agosto 5, 2002			Agosto 6, 2002			Agosto 7, 2002			Agosto 8, 2002			Agosto 9, 2002			Agosto 10, 2002		Agosto 11, 2002		
N-132 Vidrio Ret.			COMPENSA-CION DE HS.	IK 296 VRC CJX24 16,000	IK 237 VRC CJX24 12,000	IK 1.0 VRR CJX12 15,000	IK 1.0 VRR CJX12 6,000	IK 296 VRC CJX24 LAV. ENV 15,000					MANTENIMIENTO GENERAL DE LINEA											
N-128 Vidrio Ret.			IK 1.5 VRR CJX8 7,000	IK 1.5 VRR CJX8 7,000	IK 625 VRR CJX12 10,000																		
N-60 No Ret.									IK 2.25 PET PQX8 8,000	IK 2.25 PET PQX4 3,000													
N-40 PET						CRNA 3.0 PET PQX4 8,000	DIET 1.5 PFM PQX8 6,000	DIET 1.5 PFM PQX8 6,000	DIET 500 PFM PQX12 9,000				CRNA 500 PFM PQX12 8,000	CRNA 3.0 PET PQX4 8,000	CRNA 3.0 2,000 CRUZ 3.0 4,000	CRNA 3.0 PET PQX4 4,000								

Observaciones:

N-132: **Produccion IK 237 y 296 VRC - En funcion a la disponibilidad de envases.**
Saldo de Produccion IK 237 se realizara en Planta ELSA el Viernes 9/8/02

N-40:

N-60: Prueba de llenado Lunes 5/8/02

DISP: en adelanto requerimiento de Crush NJ: Pre = 72 bal y Pre=72 bal.

Leyenda
V. Ret.
PET

	IK 237 VRC CJX24	IK 296 VRE CJX24	IK 625 VRE CJX12	IK 1.0 VRE CJX12	IK 1.5 CJX8	IK DIET 500 PET PQX12	IK DIET 1.5 PFM PQX8
Pedido	20,000	30,000	18,000	21,000	20,000	8,000	10,000
Programado	12,000	30,000	20,000	21,000	24,000	8,000	10,000
	DIET 1.5 PFM	IK 500 PFM	IK 1.5 PFM	IK 2.25 PET	CRUSH 500 PFM	CRUSH 2.25 PET	CRUSH 2.25 PET
Pedido	3,000	8,000		8,000	16,000		8,000
Programado	3,000	8,000		8,000	16,000		8,000

Dispenser (Balones)		Lun 05-Ago-02	Mar 06-Ago-02	Mié 07-Ago-02	Jue 08-Ago-02	Vie 09-Ago-02	Sáb 10-Ago-02	Total
250066	IK PRE		240			180		420
250068	IK DIET PRE		84					84
250077	LL PRE		105					105
250129	IK POST MCD	80						80
250067	IK POST	180			180			360
250069	IK DIET POST MIX		12					12
250166	CO2 20 LBS					98		98
250167	CO2 50 LBS					12		12

INSTALACION DE CONDENSADOR EVAPORATIVO

ADVERTENCIA: Prohibido modificar o alterar sin la autorización de la Jefatura

CUADRO 7

3.2.2. Secuencia de eventos

Se narra un resumen de la instalación

Ensamble de intercambiador en almacén 3

Aquí se muestra que ensamble del serpentín con la estructura superior en los Almacenes.

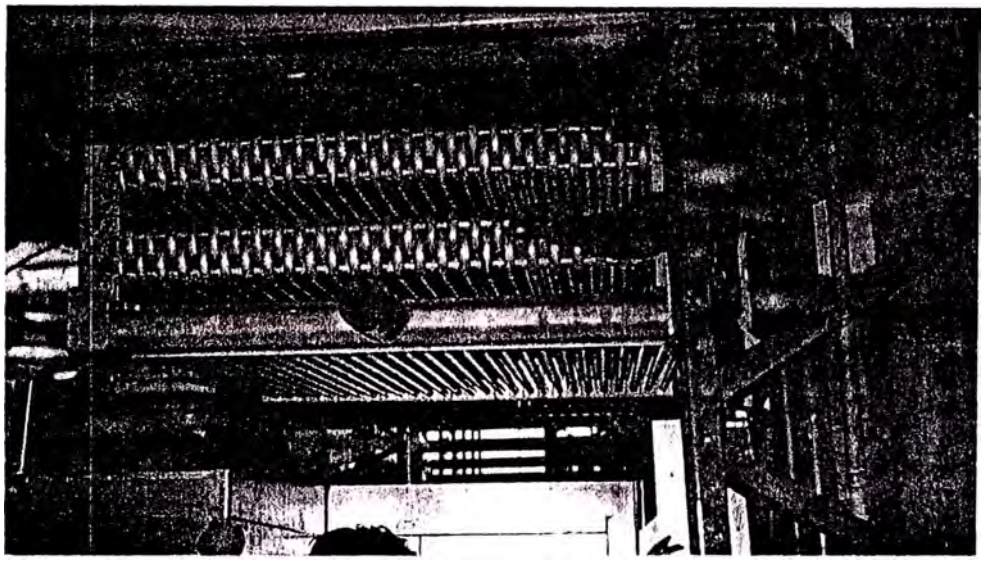


Grafico 11

Transporte de torre a ubicación temporal.

Se muestra el transporte con un personal especializado en maniobras, la parte inferior de la torre es transportada hacia una ubicación temporal dentro de la Planta (altura N-60), porque no se disponía de mucho espacio en los almacenes. Mientras se ensamblaba la parte superior en los mismos los Almacenes. Ver Grafico 12

Otra razón fue que el techo no permitiría elevar fácilmente el serpentín para la segunda sección durante el ensamble, por lo que también se opto por sacar la primera sección de los almacenes de insumos.

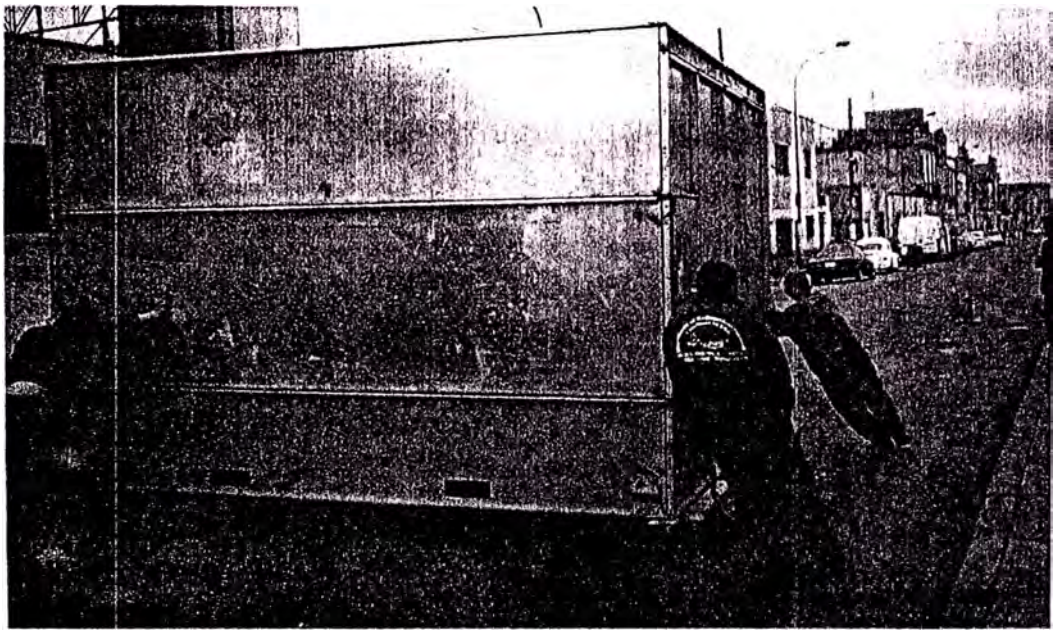


Grafico 12

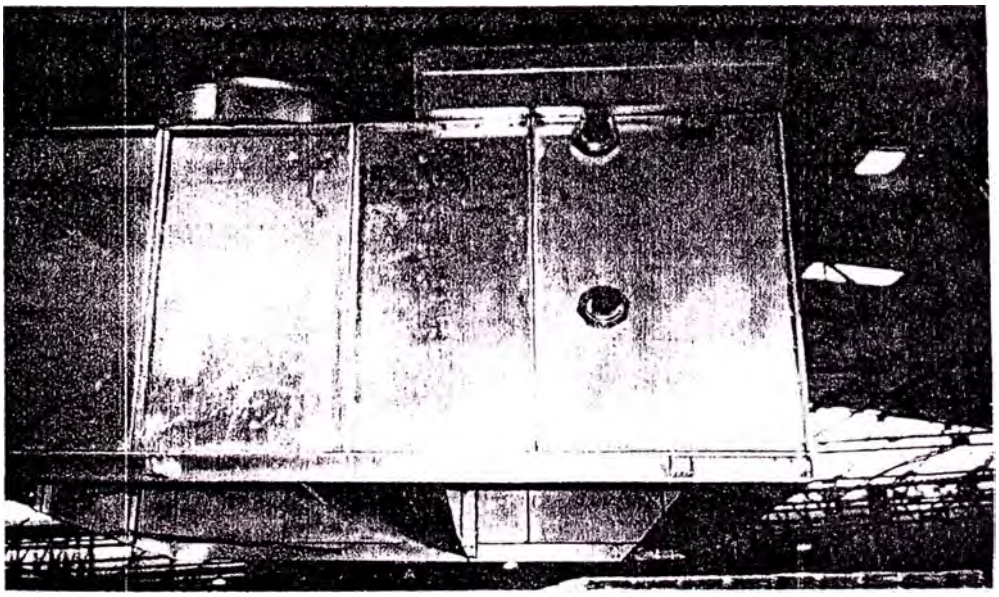


Grafico 13

Ensamble de la parte superior con la inferior

Una vez culminado el ensamble de la parte superior en los almacenes, se transporto la segunda sección al Planta, se contrató una grua, la cual ensamblo las dos secciones dentro de la Planta.

Aquí se aprecia el ensamble de la sección superior con la inferior. Ver grafico 13.

Levantamiento de parte superior

Aquí se muestra la grúa que fue utilizada para el ensamble de la torre dentro de la planta. Ver grafico 14

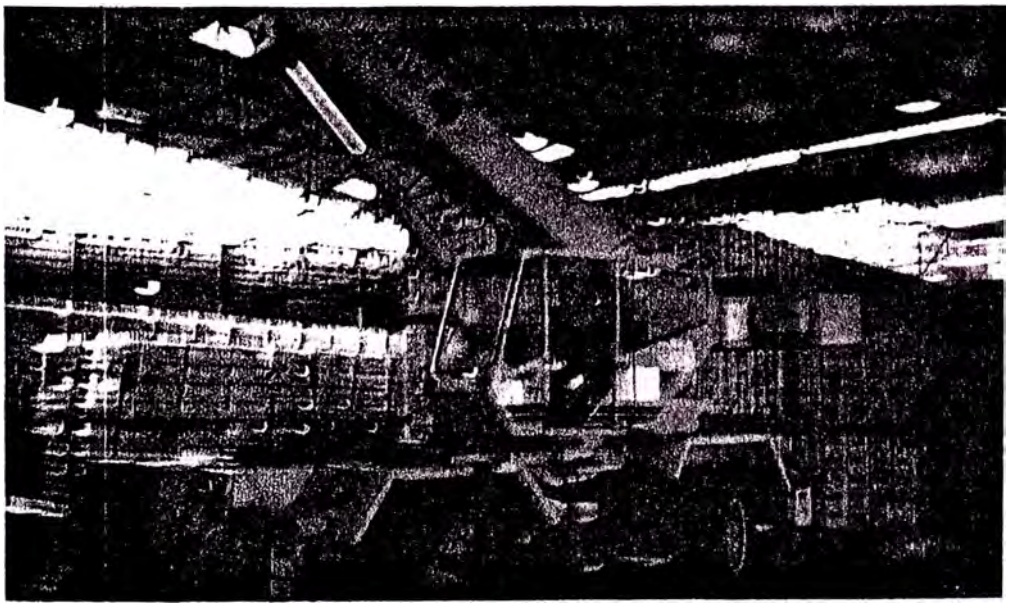


Grafico 14

Se coordinó con la sección de Patio para que ningún camión y montacarga transitaran en esta zona por medida de seguridad. Ya que justo esta area era zona de despacho a los camiones.

Preparación de techo para ubicar nueva torre

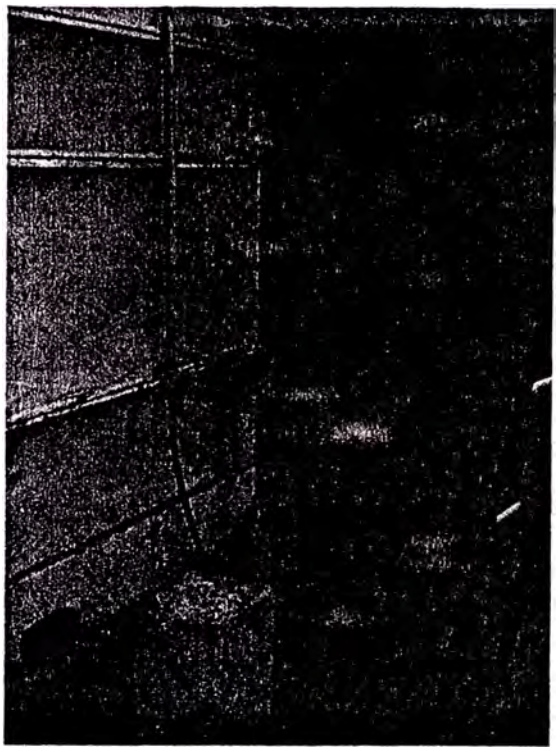


Grafico 15.

Antes del ensamble se revisó la zona donde se iba a realizar el intercambio de torres, en la foto de arriba se muestra la parte posterior de la torre antigua, con una columna saliente en el piso, esta columna fue retirada para evitar cualquier obstrucción durante la instalación. Asimismo se procedería a modificar la posición de las vigas transversales debido a que la nueva torre era más ancha y la antigua era angosta, las vigas transversales no iban a sostener todo el peso, asi que se tuvo que modificar la posición.

Modificación de viga y preparación de superficie

Aquí se muestra la nueva posición de la viga tal como se puede comparar con la anterior, con el tratamiento con pintura anticorrosivo.

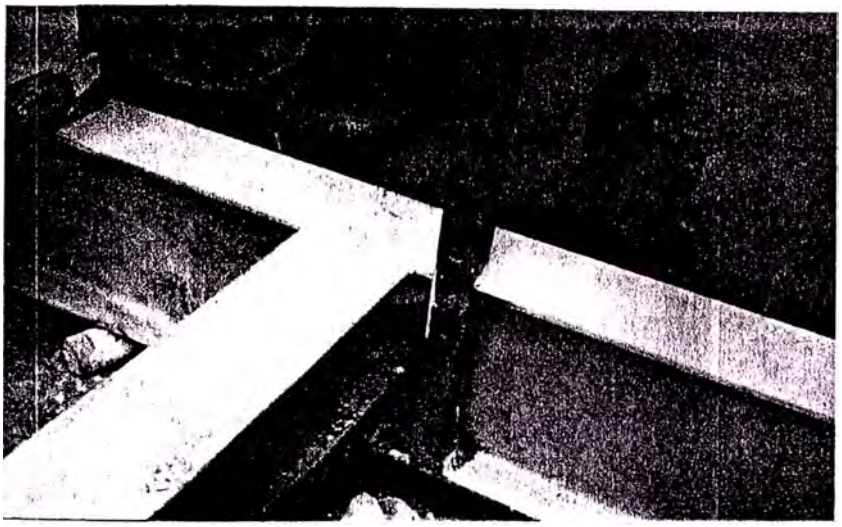


Grafico 16

Ya que la viga presentaba oxidación debido al ambiente, se protegio toda la viga con pintura anticorrosiva.

Preparación de viga con recubrimiento anticorrosivo.

Aquí se muestra la otra posición de la viga del otro extremo en su nueva posición. Esta se encuentra en preparación para su pintado con anticorrosivo. Ver grafico 17

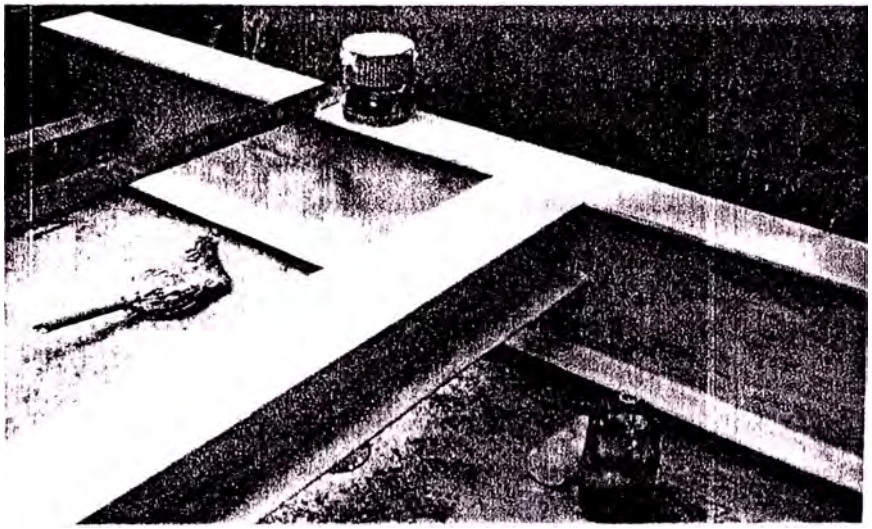


Grafico 17

Vista de la torre Baltimore anterior.

Aquí se observa la torre que fue desmontada. Exteriormente presentaba ya un deterioro en el galvanizado en los paneles. Grafico 18

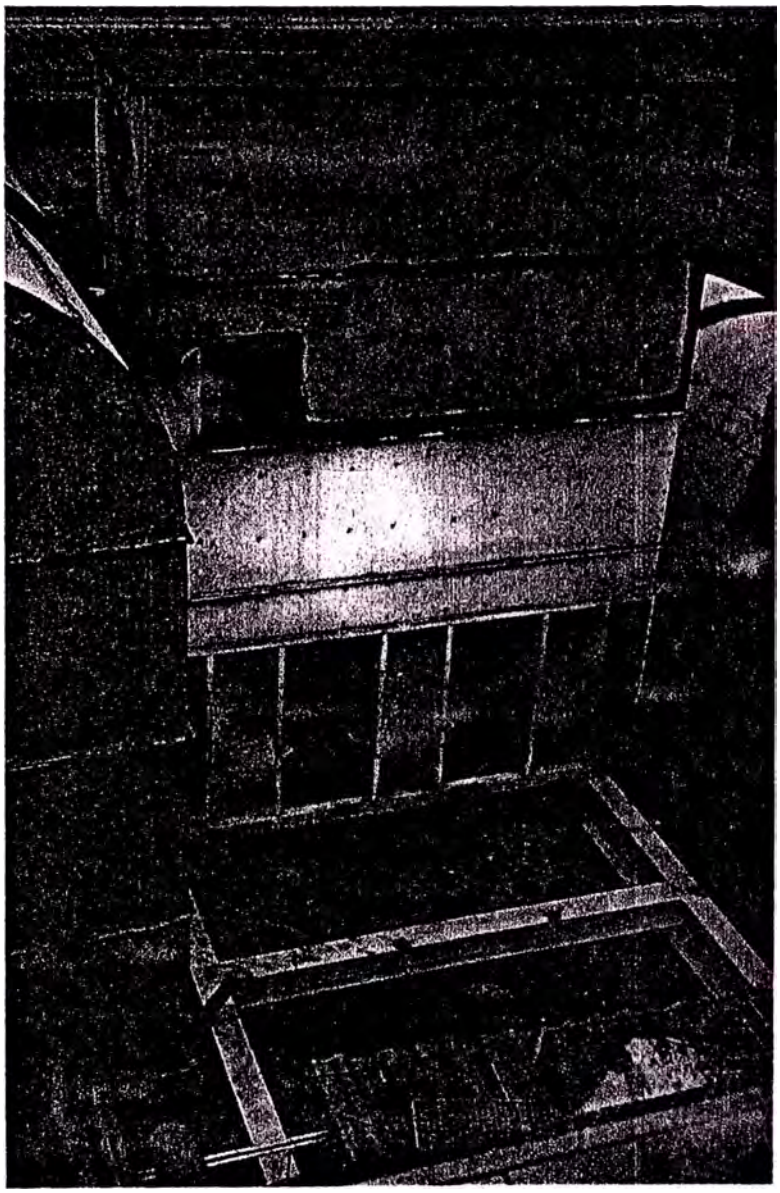
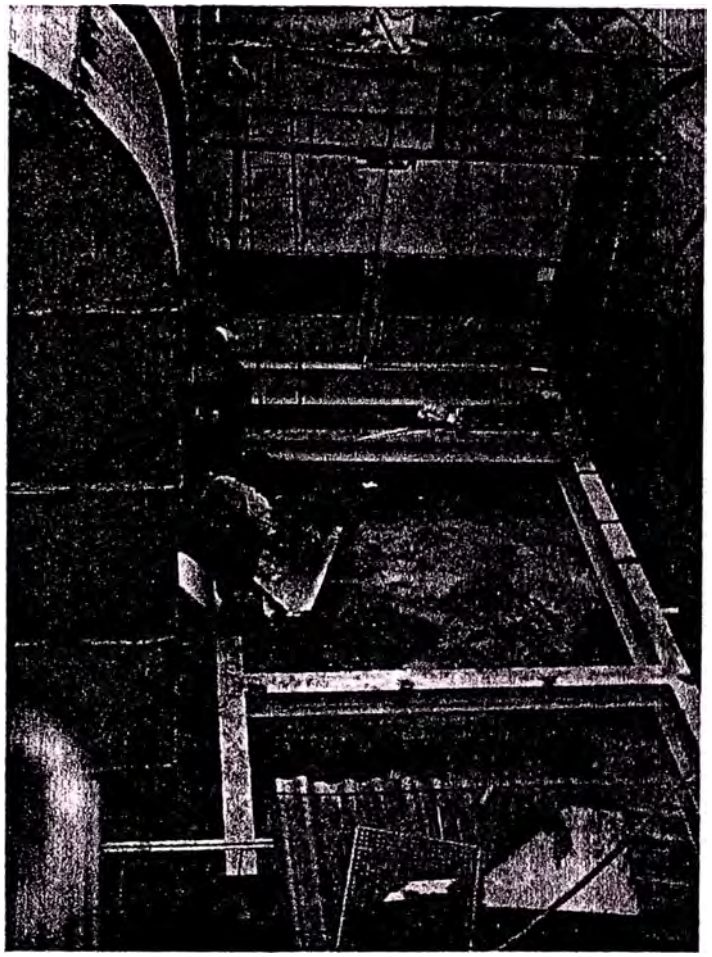


Grafico 18

Torre Baltimore desmontada



Arriba se muestra cuando la torre antigua ya fue desmontada, aquí seria la nueva ubicación en que la torre Baltimore CXV-253 fue instalada, también podemos apreciar al fondo a la torre DECSA, esta fue instalada unos años antes. Grafico 19

Nueva torre en el lugar del ensamble

Aquí se muestra la torre ensamblada en una ubicación temporal (justo al lado de la línea de embotellado N-60) en espera de ser instalada. Grafico 20

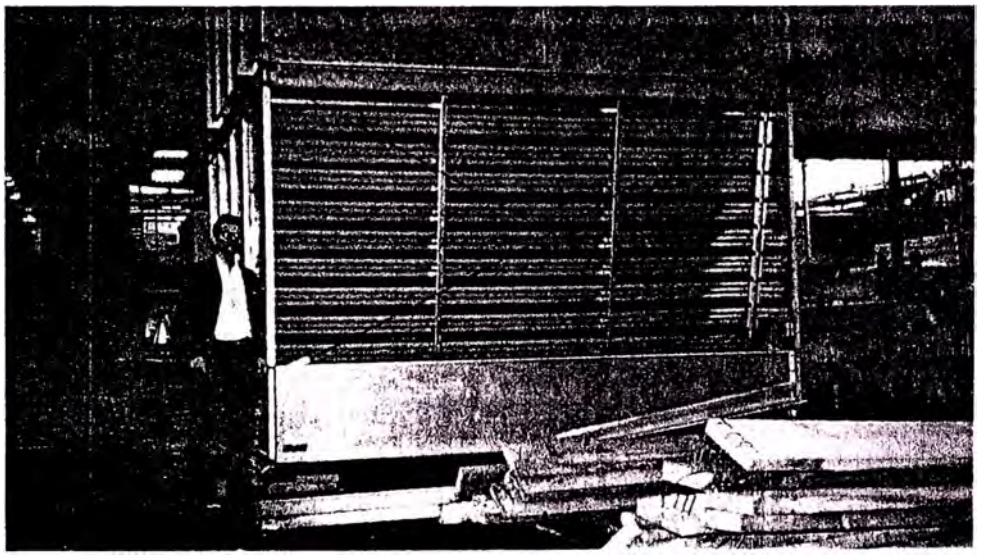
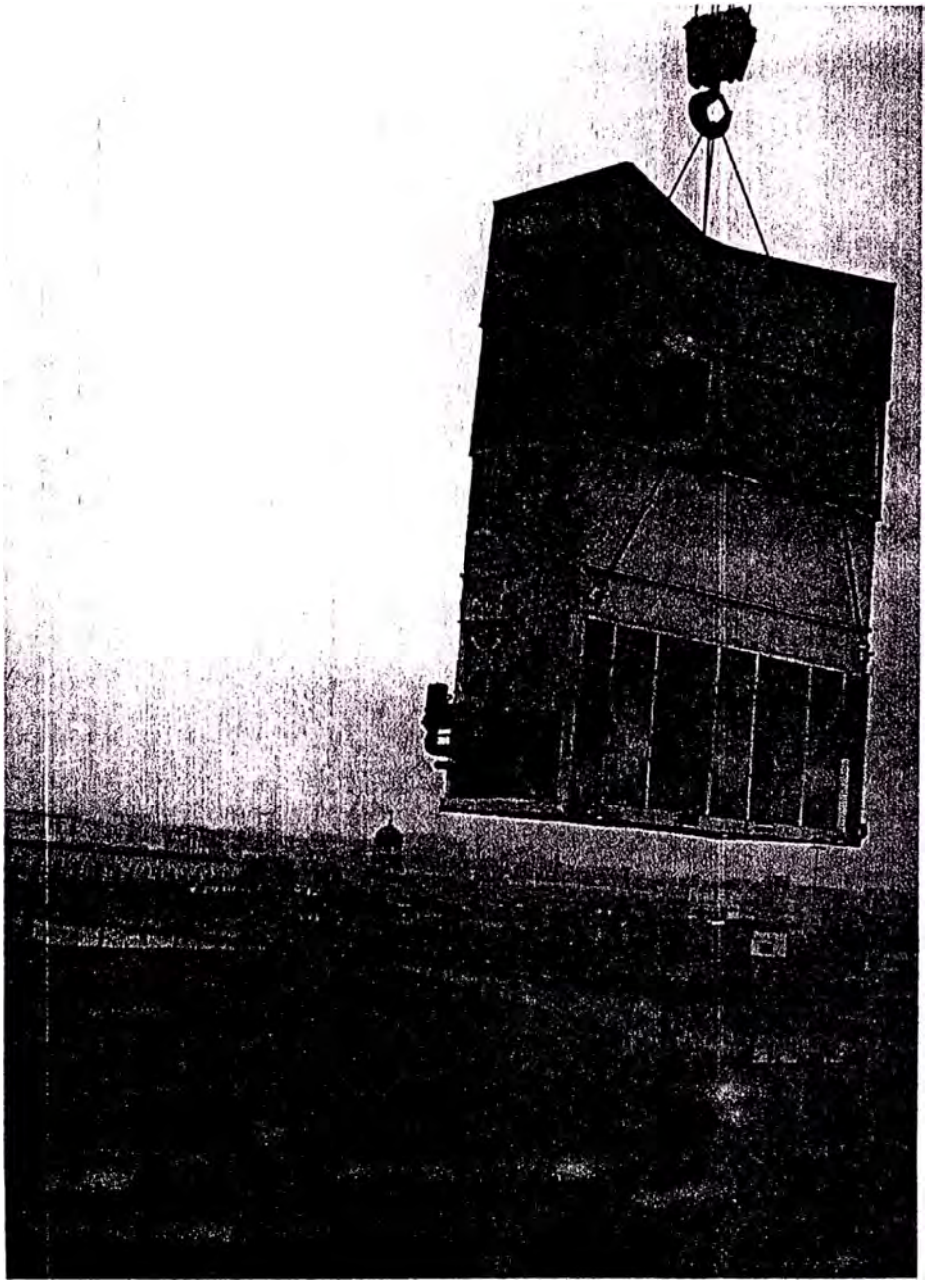


Grafico 20

Torre en pleno izaje

Aquí se muestra la torre antigua en pleno izaje. Se podra observar que las planchas se doblaron debido a que el cable presionaba sobre estos paneles al momento del izaje. Ver Grafico 21.



Antigua torre en pleno descenso

Aquí se muestra la torre al momento del descenso en el patio de la Planta. Grafico 22

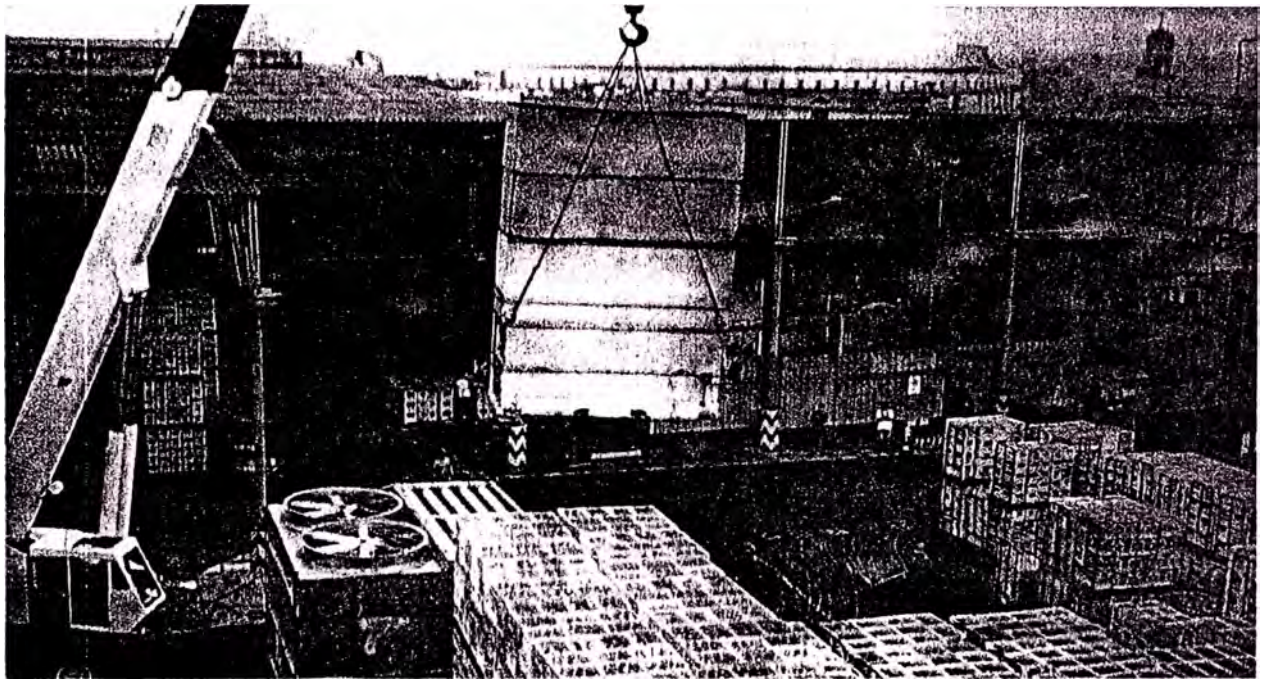
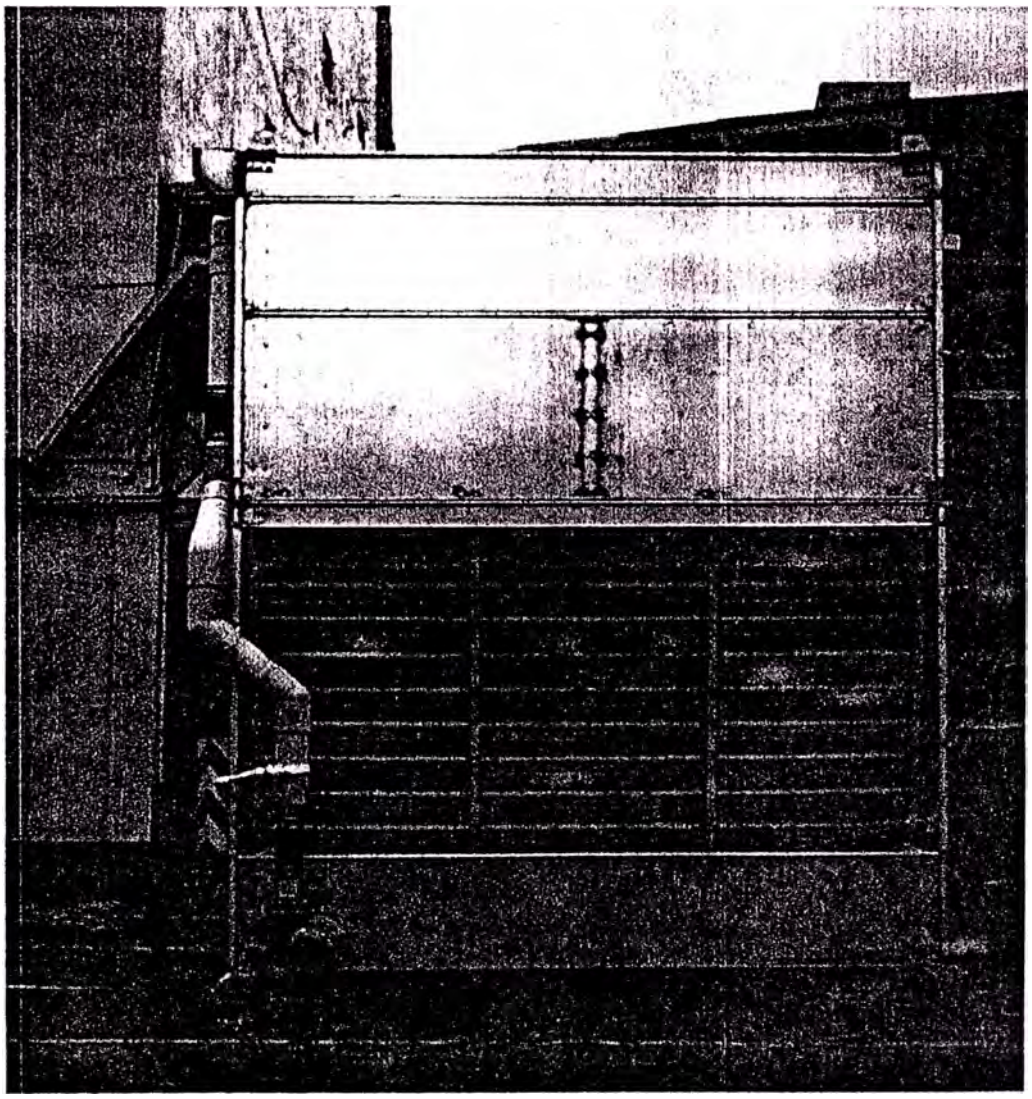


Grafico 22

Esta zona denominada patio, fue una de las alternativas para el ensamble de la torre pero no se pudo disponer de este sitio debido a que se iba a consumir de un buen espacio donde se iban a depositar las paletas de botellas.

Nueva torre antes del izaje

Aquí se muestra la nueva torre antes del izaje. Grafico 23



Momentos del izaje

Aquí se muestra la nueva torre durante el izaje La torre fue sujetada por 8 orejas salientes en las esquinas del mismo. A su vez se opto por sujetar también la parte inferior con los mismos cables, tensándolos a los mismos debido a que la parte superior pesaba como unas 3 toneladas, ya que contenía el serpentín de enfriamiento y la parte inferior unos 2 toneladas. Y quería evitarse que se separe ambas partes. Grafico 24.

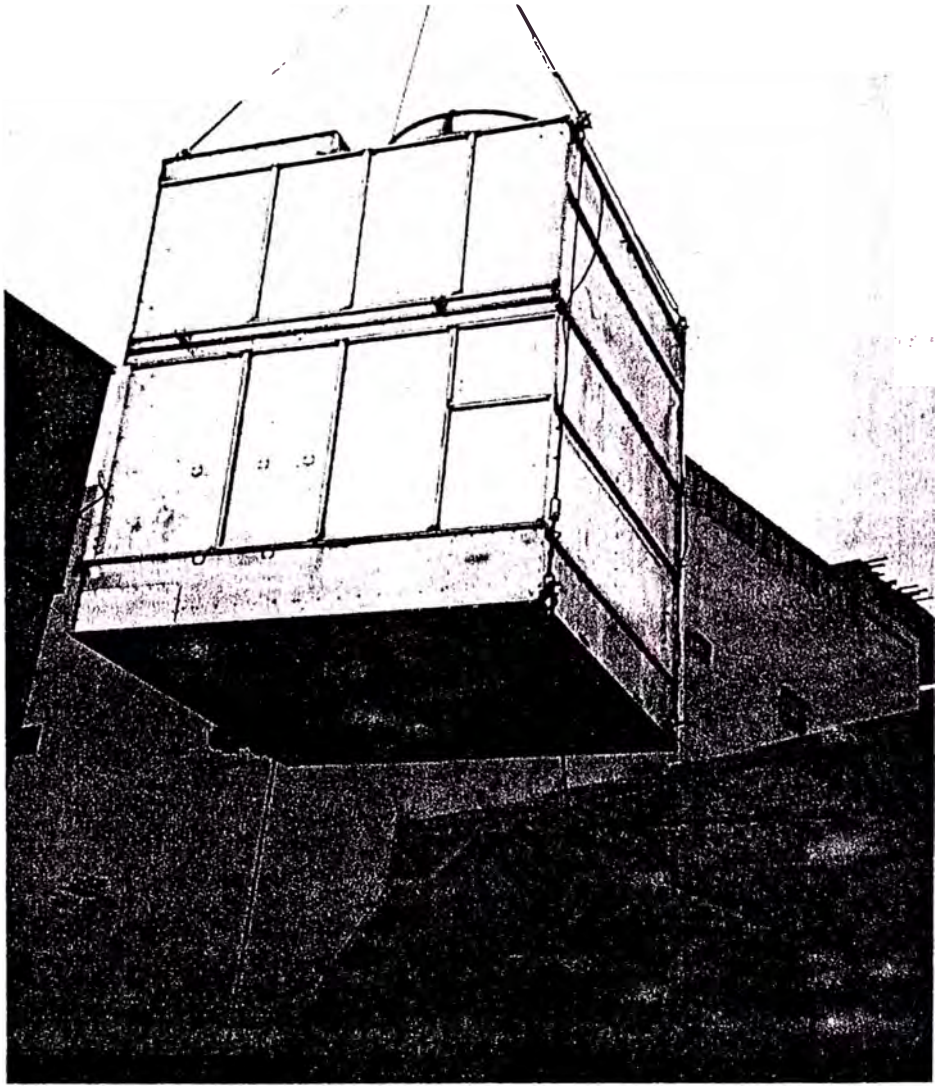


Grafico 24

Torre antes de posición final.

Aquí se ve el descenso de la torre para su ubicación final. Grafico 25

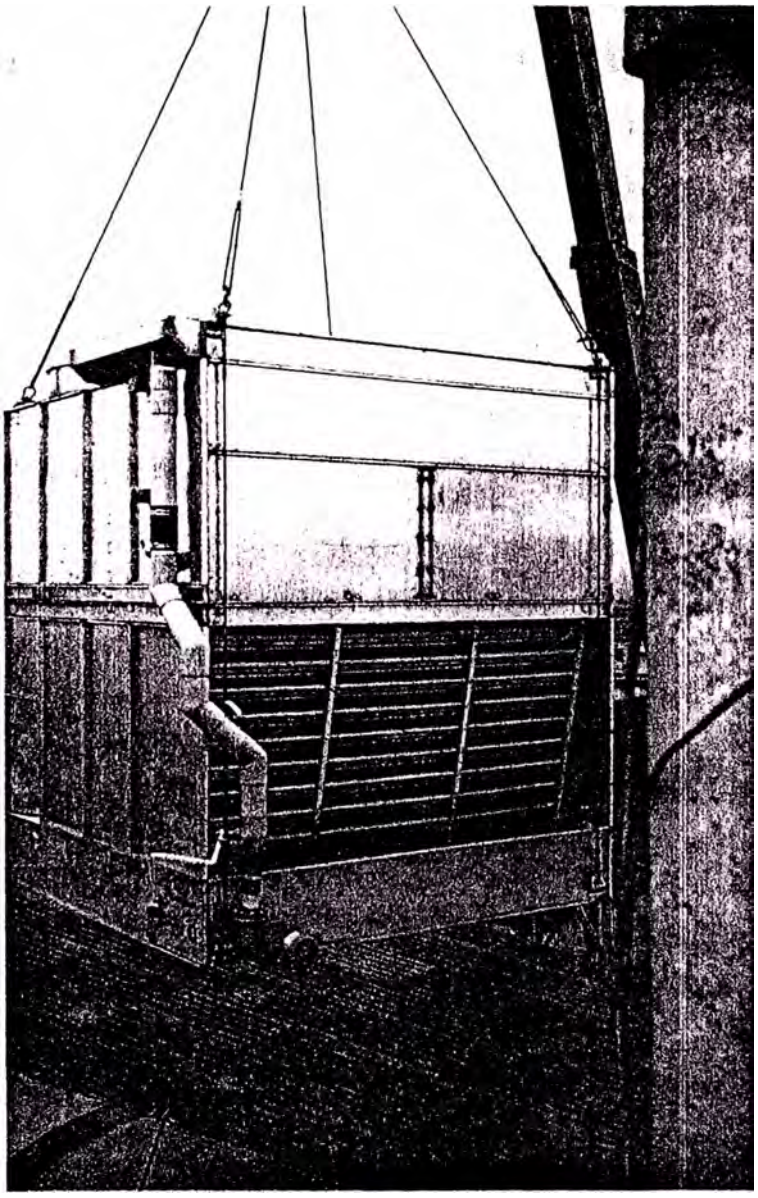


Grafico 25

CAPÍTULO 4

4. MANTENIMIENTO

La frecuencia para el mantenimiento va a depender principalmente a la calidad del aire y del agua de lugar donde se ha instalado. Las peores condiciones atmosféricas están dadas en por el humo de las industrias, chimeneas de las industrias químicas, la excesiva suciedad y salinidad del ambiente.

Las impurezas son transportadas hacia la unidad y absorbida con la recirculación del agua formándose soluciones corrosivas. Asimismo cuando el agua se evapora debido a los ambientes cálidos estos dejan los sólidos en el depósito formando posiblemente soluciones ácidas y alcalinas produciendo corrosión. La cantidad de impurezas en el aire y agua determinara la frecuencia del mantenimiento desde una simple toma de muestras y control biológico.

4.1. Partes constitutivas de la torre evaporativa

A continuación denominaremos las siguientes partes de la torre.

- Tina de toberas de agua.
- Ventiladores, cubierta de ventilador y rejilla de ventilador
- Puerta de Acceso
- Válvula y línea de Purga

- Bomba de recirculación
- Persianas de ingreso de aire
- Válvula de suministro
- Sumidero o deposito de agua fría
- Toberas o boquillas de rocío
- Rejilla de succión
- Paneles separadores de humedad.
- Tubería de agua
- Motor Ventilador
- Estructura

4.2. Consideraciones para el arranque y operación

Antes de iniciar un arranque o después de un periodo de inactividad, los condensadores deberían ser inspeccionados y limpiados completamente

1. Revisar la unidad si esta montada sobre resortes para vibración o rieles para vibración.
2. Limpie todas las rebabas, como las hojas y suciedad, del dentro de la unidad y las persianas de la aire-entrada.
3. Drene el sumidero de agua fría a través de un ducto instalado, para quitar la suciedad acumulada.
4. Quite la rejilla de succión, limpie, y reinstale.
5. Inspeccione las toberas de rocío y el serpentín de amoniaco.

6. Gire el ventilador con la mano para asegurarse que en la rotación no se presenta obstrucciones.
7. Arranque el motor de los ventiladores y verifique la rotación.
8. Para arranques ocasionales ajustar la tensión de la faja del ventilador.
9. Chequear el flotador o boya, y la válvula de suministro de agua. Que estos operen libremente.
10. Antes de un arranque prolongado deberá lubricar la maquina previamente.
11. Regular el flotador de tal manera que aproximadamente a la mitad del nivel de rebose, la válvula de suministro se encuentre cerrada.
12. Arrancar la bomba y revisar el sentido de giro de rotación de la bomba, según una flecha indicada en la carcasa de la bomba. Revisando que el manómetro no indique presiones mayores a 10 PSI ya que puede dañar las toberas.
13. Abrir la línea de retorno para regular la presión.
14. Verifique el voltaje y corriente en las 3 fases del ventilador. La corriente no debe exceder el valor de placa. Después tener inoperativo el equipo, el aislamiento de motor debe verificarse con un "meghometro".

Luego de 24 horas de funcionamiento con carga, debe realizarse:

1. Verifique cualquier ruido extraño o vibración en la unidad.
2. Verifique el nivel de agua en el sumidero de agua fría. Ajuste la válvula de flotador de suministro si es necesario.

3. Reajuste la tensión de la faja.
4. Revisar la coladera de succión.
5. Inspeccione boquillas de rocío y sección de transferencia de calor.

Durante el funcionamiento, la unidad debe inspeccionarse, debe limpiarse, y debe lubrificarse en la base.

Durante un periodo de inactividad se deberá:

1. Limpie todas las rebabas, y suciedad que se encuentren dentro de la unidad y en las persianas de aire-entrada.
2. Drene el sumidero de agua y retirar la suciedad acumulada.
3. Quite la coladera de la succión, limpie, y reinstale.
4. Cubra la descarga de los ventiladores para mantenerlo libre de la suciedad y deterioro.
5. Lubrique los ejes del ventilador y el tornillo de regulación del motor.
6. Cierre la válvula de suministro y drene todo el agua de los ductos de agua.
7. Inspeccione la integridad del sistema de protección contra la corrosión.

4.3. Mantenimiento preventivo

A continuación se detalla el mantenimiento preventivo en la torre evaporativa. Conformada en varios grupos constructivos.

4.3.1. Sumidero de agua fría y las rejillas de succión

El sumidero de agua frío debe inspeccionarse regularmente. Cualquier basura o suciedad que se acumula en el sumidero o en la rejilla debe retirarse y, si necesario, ajustar el nivel de operación del flotador.

Trimestralmente, o más a menudo si es necesario, el sumidero de agua fría debe vaciarse completamente, y ser limpiado con agua y retirar el sedimento acumulado. Si no se retira periódicamente, este sedimento puede ponerse corrosivo y deteriorar la protección galvánica. Después de que el sumidero ha sido vaciado, la rejilla debe retirarse, debe limpiarse, y debe colocarse antes de rellenar con agua el sumidero.

4.3.2. Válvula de suministro

La válvula de suministro es operada mecánicamente por el flotador, esta se ubica en la parte interior dentro del sumidero justo al lado del ingreso de aire.

Esta válvula es de material de bronce y esta conectada a un brazo flotador de poliestireno lleno de plástico. El nivel de agua en el sumidero de agua fría puede ajustarse recalibrando el flotador regulable.

El conjunto debe inspeccionarse mensualmente y si es necesario deberá regularse. Anualmente la propia válvula debe inspeccionarse el asiento de la

válvula y reemplazar si necesario, cuando gotee. Por recomendación la válvula deberá mantener una presión entre 15 y 50 psig para un funcionamiento apropiado.

Para hacer una regulación inicial del sumidero. Se deberá regular el flotador de tal manera que la válvula de suministro está completamente cerrada cuando el nivel de agua en el sumidero de agua fría esta 1/2" debajo de la tubería de rebose. Según el nivel de carga térmica y la presión de agua de la ciudad (15 a 50 psig) a la válvula, la regulación deberá producir un nivel de operación de 7" (desde el fondo).

Si la carga térmica es menor que la carga térmica de diseño entonces se puede producir mayores niveles de operación (7") por lo que se recomienda regular la válvula. La válvula de flotador de suministro puede tener que ser ajustada para lograr el nivel que operación recomendado. El sumidero de la unidad debe supervisarse detenidamente y debe regularse durante las primeras veinticuatro horas de funcionamiento.

El correcto funcionamiento del nivel de agua asegurará que el sumidero de la torre evaporativa mantenga suficiente nivel para prevenir el ingreso de aire a la bomba durante el arranque y tener suficiente nivel de agua para continuar operando la bomba.

4.3.3. El motor del ventilador

El motor del ventilador usado para estas unidades es el tipo encapsulado, con un motor lubricado permanentemente por rodamientos de bolas con una

protección especial sobre los rodamientos, y con una protección especial sobre los ejes y bobinados. Durante la operación, la superficie externa del motor debe limpiarse por lo menos trimestralmente para asegurar el motor trabaje apropiadamente fresco. También se deberá verificar el aislamiento del motor con un meghometro.

4.3.4. Rodamientos del eje del ventilador

El eje del ventilador se apoya por dos asientos de rodamientos, cada uno equipado con puntos de lubricación y una grasera protegida para mantenerse libre de humedad. Los ejes del ventilador deberán ser lubricados con una pistola o engrasadora manual. No se deberá usar graseras de alta presión porque pueden romper los sellos de los rodamientos.

La lubricación deberá ser como sigue:

Al arranque: La Lubricación normalmente no se requiere ya que los rodamientos han sido lubricados por fabrica. Sin embargo, si la unidad se ha almacenado por más de un año, deben purgarse la grasa antigua y lubricar con nueva grasa los rodamientos.

Arranques ocasionales: cambiar la grasa de los rodamientos antes del arranque.

Operación: Lubricar los rodamientos cada 2,000 horas de funcionamiento o una vez cada tres meses, lo que venga primero.

Durante un periodo de inactividad: los rodamientos deberán ser limpiados con nueva grasa cuando se encuentre fuera de servicio por tiempo prolongados. Sólo lubrique los rodamientos con grasas resistentes al agua y cuyas temperaturas ambientes que van de -53°C a +121°C.

Grasas recomendadas:

Mobil: Mobil #28

Shell: Alvania #3

4.3.5. Base regulable del motor

La base de motor que ajusta el tornillo debe cubrirse dos veces por año con grasa que inhibe la corrosión, de aquellos que se recomienda para lubricar el eje del ventilador.

4.3.6. Tren de fajas, poleas y ventiladores

Consiste en una faja especialmente diseñada, con resistencia a la corrosión, ventiladores de aluminio y motores veloces. Las helices de aluminio extienden la vida de la faja, minimizando cualquier posibilidad de óxido o corrosión. Hay que verificar el estado de la faja periódicamente y, cuando necesario, ajustar la tensión.

4.3.7. Boquillas o toberas y serpentín

Deben inspeccionarse las toberas de rocío y el serpentín, limpiándose cada mes. El procedimiento de la inspección es como sigue:

1. Verifique para ver si las boquillas están produciendo un chorro en forma de cono.
2. Limpie cualquier boquilla obstruida. Si necesario, retirar la boquilla y el empaque de caucho para poderlo limpiar.
3. Inspeccione el serpentín. Deben corregirse cualquier corrosión, daño, u obstrucción.
4. Durante los periodos de baja temperatura ambiental, estas unidades pueden poder trabajar a menores velocidades del ventilador. Puede trabajar hasta solo con la bomba.

4.3.8. Protección contra la corrosión

En el circuito cerrado las torres de enfriamiento y condensadores evaporativos, son enfriados en parte por la evaporación de una porción del agua en forma de rocío recirculante que fluye a través de la unidad. Cuando este agua se evapora, las impurezas permanecen en el agua recirculante. La concentración de sólidos disueltos aumenta rápidamente y puede alcanzar los niveles inaceptables. Además, se introducen a menudo las impurezas aerotransportadas en el agua recirculante, mientras se intensifica el problema. Si estas impurezas y contaminación no se controla eficazmente, estos pueden causar corrosión, y acumulaciones de lodo que reducen eficiencia de transferencia de calor y aumento los costos que operación.

El grado de sólidos y otras impurezas que permanece en el agua recirculante puede definirse como los ciclos de concentración. Específicamente, ciclos de concentración son la proporción de sólidos

disueltos (por ejemplo: los Cloruros, los sulfatos, etc.). Para una buena eficiencia de transferencia de calor y prolongar la vida del equipo, los ciclos de la concentración debe controlarse según la tabla mostrada abajo.

	Con protección Baltibond	Con protección Galvanizada
PH	6.5 a 9.0	7.0 a 9.0
Dureza (CACO2)	30 a 500 ppm	30 a 500 ppm
Alcalinidad (CACO2)	500 ppm max	500 ppm max
Total de solidos disueltos	1200 ppm max	1000 ppm max
Cloruros	250 ppm max	125 ppm max
Sulfatos	250 ppm max	125 ppm max

Las unidades de acero galvanizado y con un pH de agua de 8.3 o superior exigirá una pasivación para prevenir "el óxido blanco," la acumulación de productos de corrosión de cinc blancos.

4.3.9. Control biológico

Además del tratamiento químico para el control biológico, el tratamiento químico puede ser necesario controlar la corrosión y mantener la calidad de agua dentro de las pautas recomendadas. Los programas de tratamiento de agua químicos deben reunir los requisitos siguientes:

1. Los químicos deben ser compatibles con el acero galvanizado así como todos los otros materiales usaron en el sistema (la cañería, etc.).

2. Deben agregarse químicos para inhibir la corrosión. Los químicos deben alimentarse en el sistema a la descarga de la bomba. Ellos no deben ser alimentados directamente en el sumidero de agua fría.
3. El tratamiento de agua con ácidos no se recomienda a menos que la unidad se ha acondicionado con serpentines de acero limpios y se ha protegido con el Sistema de la Protección de BALTIBOND.

El crecimiento de algas, limos y otros microorganismos, con descontrol, reducirá la eficacia del sistema y puede contribuir al crecimiento de microorganismos potencialmente dañosos, incluso Legionella, en el sistema de agua recirculante. De acuerdo con, un programa de tratamiento de bacteriológico específicamente diseñado para dirigirse al control biológico debe comenzarse cuando el sistema está primero lleno con el agua y se administra después pueden agregarse los biocidas líquidos al sumidero de la unidad. Si es una forma sólida de biocida, debe agregarse al sistema vía un alimentador. Si se usa tratamiento de agua con ozono, las concentraciones de ozono no deben exceder 3-4 ppm para asegurar la vida de equipo. El control se realiza entregando concentraciones bajas de yodo a través de la línea de agua,

Para minimizar el riesgo de contaminación biológica luego de un periodo que el equipo se encontrara apagado, se recomienda que el sumidero se vacie. Y al reiniciar su funcionamiento, limpiar todas las suciedad, como las hojas y polvo, se completa el sumidero con agua fresca.

4.3.10. Limpieza del serpentín

El interior y fuera del serpentín este puede requerir una limpieza ocasional. Los químicos usados deben ser compatibles con los materiales a tratándose (en serpentín estándar por ejemplo: la parte exterior esta galvanizada; y la parte interior es de acero al carbono)

4.3.11. Cronograma de mantenimiento preventivo

A continuación se adjunta cronograma de mantenimiento preventivo incluyéndose las instrucciones de mantenimiento: Ver cuadro 8

4.3.12. Lista de repuestos

Ya que estos equipos no requieren de mucho mantenimiento básicamente los repuestos utilizados no serian muchos.

Cuadro 9: Lista de repuestos para tener en stock

Descripción	N°parte	N°Plano
Paneles de fibra tipo A	6E337FP1	9C4208
Paneles de fibra tipo B	6E337GP1	9C4208
Faja de motor	3V	9C4217
Paletas de PVC	281111P1	9C4216
Toberas		
Rodamientos	6208 2 RS	
Grasa	Shell Alvania EP2	

4.3.13. Herramientas y equipo a utilizar.

Las herramientas a utilizar serian las siguientes. **Ver cuadro 10**

	Parte sistema	Detalle	Actividad	Frecuencia	Tiempo estimado	ENERO		FEBRERO		MARZO		ABRIL		MAYO		JUNIO		JULIO		AGOSTO		SEPTIEMBRE		OCTUBRE		NOVIEMBRE		DICIEMBRE	
1	Estructura	Inspeccionar la unidad en general	Inspeccion	Mensual	15	15		15		15		15		15		15		15		15		15		15		15		15	
2	Deposito de agua	Inspeccionar y limpiar/ reemplazar si es necesario																											
		La malla de succion	Inspeccion	Mensual	10	10		10		10		10		10		10		10		10		10		10		10		10	
		La boya de suministro	Inspeccion	Mensual	10	10		10		10		10		10		10		10		10		10		10		10		10	
		Persianas de succion	Inspeccion	Mensual	20	20		20		20		20		20		20		20		20		20		20		20		20	
3	Deposito de agua	Chequear y ajustar el niveL del agua con la boya de suministro	Inspeccion	Mensual	15	15		15		15		15		15		15		15		15		15		15		15		15	
4	Deposito de agua	Chequear el funcionamiento de la válvula de boya	Inspeccion	Mensual	10	10		10		10		10		10		10		10		10		10		10		10		10	
5	Motor y polea	Chequear el estado de la faja y poleas , asi como la tension.	Inspeccion	Quincenal	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
6	Motor y polea	Lubricar los rodamientos de los ejes de los ventiladores	Lubricar	Quincenal	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
7	Motor y polea	Lubricar el tornillo que ajusta la base del motor	Lubricar	Quincenal	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
8	Motor y polea	Limpiar externamente el motor del ventilador	Limpieza	Quincenal	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
9	Estructura	Limpiar la estructura de la torre	Limpieza	Bimensual	120			120				120				120				120				120				120	
10	Intercambiador	Inspeccionar la zona de transferencia de calor (intercambiador)	Inspeccion	Mensual	45	45		45		45		45		45		45		45		45		45		45		45		45	
11	Intercambiador	Inspeccionar las toberas	Inspeccion	Mensual	45	45		45		45		45		45		45		45		45		45		45		45		45	
12	tuberias	Chequear drenaje y tuberias	Inspeccion	Mensual	15	15		15		15		15		15		15		15		15		15		15		15		15	
13	Estructura	Revisar la proteccion zincada	Inspeccion	Mensual	30	30		30		30		30		30		30		30		30		30		30		30		30	
14	Motor y polea	Control vibracion motor (rodamientos)	Predictivo	Mensual	30	30		30		30		30		30		30		30		30		30		30		30		30	
15	Motor y polea	Revisión del aislamiento y consumo	Predictivo	Mensual	45	45		45		45		45		45		45		45		45		45		45		45		45	
16	Bomba	Control vibracion motor (rodamientos)	Predictivo	Mensual	45	45		45		45		45		45		45		45		45		45		45		45		45	
17	Bomba	Revisión del aislamiento y consumo	Predictivo	Mensual	45	45		45		45		45		45		45		45		45		45		45		45		45	

PERSONAL: 1 OPERARIO

Total

Costo mano obra (S/hr.5.00)	8.83	2.50	10.83	2.50	8.83	2.50	10.83	2.50	8.83	2.50	10.83	2.50	8.83	2.50	10.83	2.50	8.83	2.50	10.83	2.50	8.83	2.50	10.83	2.50	8.83	2.50	10.83	2.50
	44.17	12.50	54.17	12.50	44.17	12.50	54.17	12.50	44.17	12.50	54.17	12.50	44.17	12.50	54.17	12.50	44.17	12.50	54.17	12.50	44.17	12.50	54.17	12.50	44.17	12.50	54.17	12.50

Costo mano obra total anual S/. 740.00

HERRAMIENTAS

	Detalle	Actividad	Herramientas e Instrumentos	Cantidad
1	Inspeccionar la unidad en general	Inspeccion		
2	Inspeccionar y limpiar/ reemplazar si es necesario	Inspeccion	Destornillador	1
	La malla de succion		gafas de proteccion	1
	La boya de suministro		guantes	1
	Persianas de succion			
3	Chequear y ajustar el niver del agua con la boya de suministro	Inspeccion	Llave mixta	1
4	Chequear el funcionamiento de la válvula de boya	Inspeccion		
5	Chequear el estado de la faja y poleas , asi como la tension.	Inspeccion	Gafas de proteccion	1
6	Lubricar los rodamientos de los ejes de los ventiladores	Lubricar	Pistola de engrase	1
7	Lubricar el tornillo que ajusta la base del motor	Lubricar	Pistola de engrase	1
8	Limpiar externamente el motor del ventilador	Limpieza	Trapo industrial	12
			Solucion dielectrico	2
9	Limpiar la estructura	Limpieza	Trapo industrial	12
			Manguera para agua	1
10	Inspeccionar la zona de transferencia de calor (intercambiador)	Inspeccion	Guantes	1
11	Inspeccionar las toberas	Inspeccion	Guantes	1
12	Chequear drenaje y tuberias	Inspeccion	Llave mixta	1
13	Revisar la proteccion.	Inspeccion		
14	Control vibracion motor y bomba (rodamientos)	Predictivo	Vibrometro	1
15	Revisión del aislamiento y consumo	Predictivo	Meghometro y Pinza amperimetrica	1

CUADRO 10

CAPÍTULO 5

5. COSTOS

5.1. Costos del proyecto

5.1.1. Costos de adquisición o suministro.

Por lo que se presentaron los siguientes presupuestos para una nueva torre. (Ver anexos 1: Presupuestos de venta en Precio F.O.B.)

CIA ISF - VILTER	CIA TECPRO	CIA ISF – VILTER 2
$19,850.00	$19,500.00	$21,990.00
Baltimore CXV-249	Baltimore VXC-S403	Baltimore CXV 253-K
Maryland – E.E.U.U.	Bélgica	Maryland – E.E.U.U.
320 TR	323 TR	325 TR

Cuadro 11.

La nueva torre tenia que cumplir un requisito, no debería ser mayor al ancho mostrado en el plano ya que en la zona existían ductos de ventilación para los grupos electrógenos ubicados en el primer piso.

La CIA que ganó la buena pro para la venta fue ISF Vilter.

Costo de Venta: $21,990.00 U.S.D.+ 40% aproximadamente por precio F.O.B.= $30,786.00 U.S.D.

Observaciones:

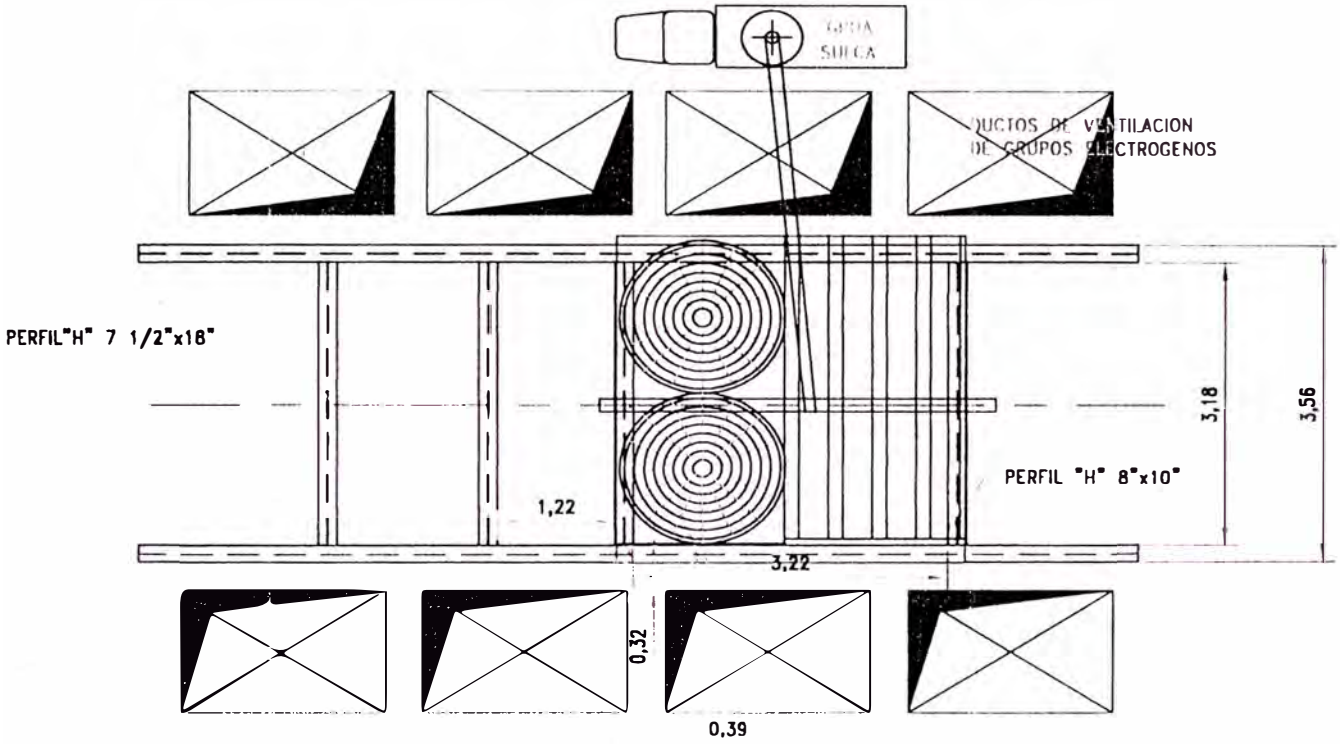
No se consideró la primera alternativa debido a que hubo un comunicado de la CIA Baltimore que la Torre Baltimore CXV-249 durante el periodo de compra (**Ver anexo 01**) y fabricación de la torre se mejoró el diseño de la torre por lo que el modelo CXV-249 salía fuera del mercado, indicándonos que se desarrolló un nuevo modelo CXV-253.

La segunda opción que se tomó en cuenta fue por las dimensiones ofrecidas ya que el espacio disponible era de máximo 4.20 metros, y la torre VXC no cumplía con este principal requisito. (**Ver plano 02**)

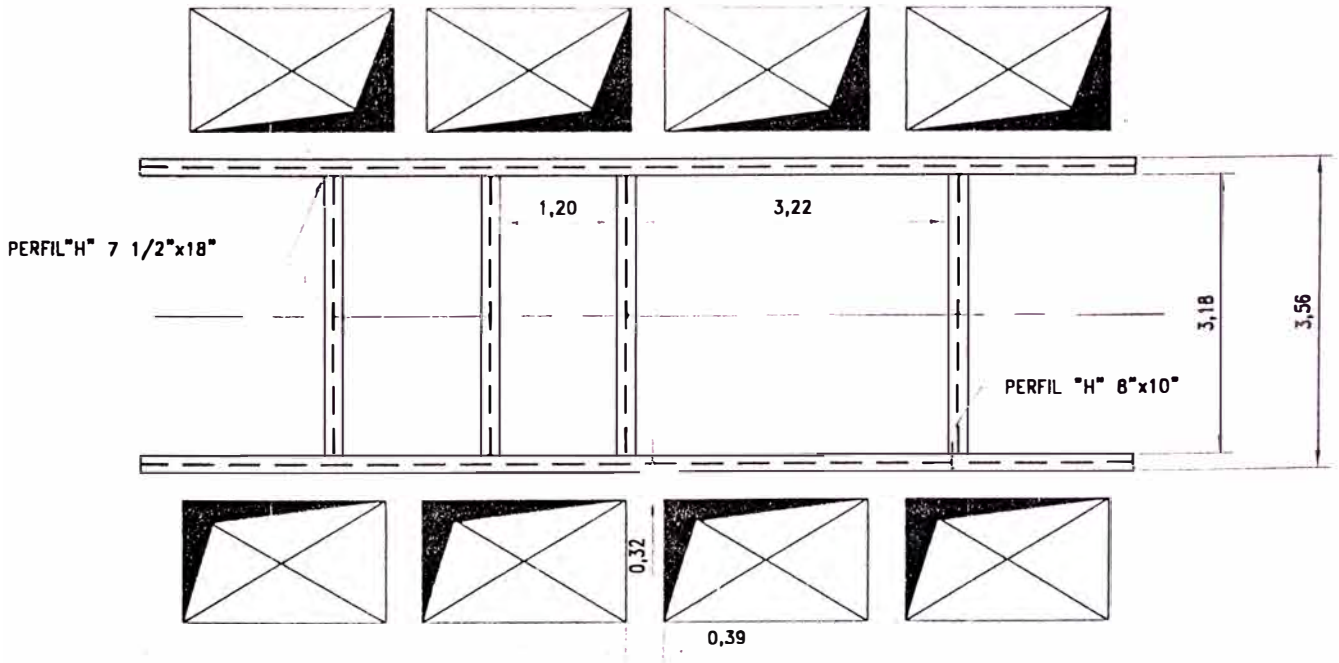
Se consideró retirar la antigua torre evaporativa con menor capacidad de 105 Toneladas de refrigeración fabricada en 1987, ya que la otra torre DECSA era nueva instalada anteriormente en 1995. (**Ver Plano 02)**

5.1.2. Costos de ensamble e instalación

La nueva torre fue vendida desarmada, por lo que la Corporación José R. Lindley tenia que invertir para ensamblarla e instalarla. Presentándose varios presupuestos (Ver anexos 2: Presupuestos de Instalación).



BASE CON TORRE DE ENFRIAMIENTO



BASE DE TORRE DE ENFRIAMIENTO

ZONA N° 1 BASE DE TORRE DE ENFRIAMIENTO		
Revisado	Escala	Nombre Del Archivo
	S/E	PLANO 2

La compañía que realizó la instalación fue Mitor Ings. Con un costo de: $2,650.00 USD+I.G.V. =$3,127.00 USD

CUADRO 12: CUADRO DE COSTOS-RESUMEN

Compañía	Costo de Instalación y puesta en marcha
ISF	$7,890.00
MITOR	$2,650.00
TECPRO	$3,500.00

5.1.3. **Costos de obras civiles**

Los presupuestos no incluían modificación en las obras civiles ni maniobra, por lo que se realizaron los siguientes gastos

a. Por la reubicación de viga soporte de condensador y mejoramiento del piso: $/.1,035.39 U.S.D.

b. Por el mantenimiento de viga soporte de Torre de evaporativa que incluye pintado y recubrimiento: $/.480.25

Sub total: $/1,035.39 + $/480.25 + I.G.V = $/1,793.20 U.S.D.

c. Por la maniobra de retirar la torre e izar la nueva torre: $/.2,200.00 + I.G.V. = $/2,596.00 U.S.D.

(Ver anexos 03: Presupuestos obras civiles)

5.2. Costos mano de obra por mantenimiento

Los costo de mano de obra por mantenimiento anual: S/. 740.00

Los costos por mantenimiento son relativamente bajos ya que estos equipos no son tan complejos y o sujetos al desgaste por piezas móviles.

Ver cuadro 08.

Cuadro Resumen de costos de Instalación de condensador Evaporativo

Costos de adquisición:	$/.30,786.00 U.S.D
Costos de instalación:	$/. 3,127.00 U.S.D
Costos de obras civiles	$/. 1,793.20 U.S.D
Costos por maniobras	$/. 2,596.00 U.S.D
Total costo del proyecto	**$/.38,302.20 U.S.D.**

CONCLUSIONES

He ganado mucha experiencia con la instalación del condensador Evaporativo ya que estos trabajos de ingeniería no solo implican cálculos, si no también se aprende muchos aspectos relacionados con la administración, las relaciones personales, toma de decisiones, etc. Me encontré con varios problemas durante la instalación, que tuvieron solución, supervise el ensamble y aprendí a desarrollar un programa de mantenimiento preventivo para dicha instalación.

Durante la instalación se tuvo que coordinar en forma continua con todas las áreas relacionadas tales como Mantenimiento, Logística, PCP, producción, distribución. De tal manera, que no se afecte, ninguna de las actividades de Producción y distribución del producto en Patio.

Se tuvo que comparar presupuestos, buscar un lugar del ensamble, tener las herramientas adecuadas e inclusive tomar las medidas de seguridad para el personal y la infraestructura.

Se justifica la compra de la torre, porque había necesidad de ampliar la capacidad de refrigeración debido a la futura instalación de una nueva línea de embotellado. No siempre la alternativa más económica es siempre la mejor solución, ya que hay que considerar otras condiciones tales como;

la zona de la instalación, programa de producción, disponibilidad del personal, etc. La torre escogida estuvo básicamente limitada por el espacio.

Al haber estado realizando el seguimiento del ensamble de estas torres evaporativas, observé que su forma constructiva y principios de operación son relativamente prácticos y asimismo el mantenimiento es sencillo.

Cuando se instaló el nuevo equipo, se desarrolló un programa de mantenimiento preventivo para conservar en buenas condiciones del equipo, tomando las recomendaciones del fabricante y adecuándolo a nuestras condiciones de trabajo y ambiente.

Posteriormente para la continuación del proyecto de ampliación de Planta se deberá tener en cuenta las modificaciones en las dimensiones de tuberías, la ampliación de un nuevo compresor y así como un nuevo control automático de funcionamiento de los compresores debido a que existiría diferentes requerimientos de amoniaco según su funcionamiento.

BIBLIOGRAFÍA

Manual de Cálculos para las Ingenierías	Tyler G. Hicks
Manual de Ingeniero Mecánico	Marks
Principios de Refrigeración	Roy J. Dossat

ANEXOS

ANEXOS 01: PRESUPUESTOS DE VENTA

Authorized VILTER Distributor

NGENIERIA DE SISTEMAS DE FLUIDOS S.A.C

PR- **487A -2001**

allao, 15 de mayo del 2001

eñores:
ORPORACIÓN J.R.LIDLEY S.A.
resente.

Ing. Roberto Ráez
ef. Condensador Evaporativo

stimados Señores:

or medio de la presente nos es grato someter a vuestra consideración nuestro resupuesto por el suministro de:

ANTIDAD	DESCRIPCION
	Condensador evaporativo marca **BALTIMORE®** del tipo axial – central, modelo **CXV-249** con una capacidad de condensación de 320TR (calor total a retirar de los compresores y motores eléctricos de la etapa de alta) a una temperatura de condensación 95°F y una temperatura de bulbo húmedo de 76°F. Incluye un ventilador de 15HP y una bomba de agua de 5HP (Total = 20HP)

ALOR DE VENTA TOTAL EX-FABRICA, BALTIMORE-MARYLAND **US$ 19,850.00**

Tiempo de entrega	**10 @ 12** semanas ex - fábrica
Forma de pago	**30 días**, luego de entregado el equipo en la fábrica
Validez de la oferta :	**30 días**
Garantia	**Cinco años** los ventiladores **Un año** las demás partes

Cualquier consulta al respecto, por favor no dude en contactarnos

Atentamente,
Victor Figueroa
Gerente de Ventas
visión de Refrigeración Industrial

B.A.C. Condenser Selection/Evaluation Program
Release 6.0

Copyright 1994 Baltimore Aircoil Company, Inc.
All rights reserved.

********** Local B.A.C. Representative **********
NAME: Baltimore Aircoil Company, Inc.
ADDRESS: P.O. Box 7322
Baltimore, MD 21227

PHONE: (410) 799-6200
FAX: (410) 799-6416

TO: INKA KOLA
ATTN:
FRM:

INQUIRY NO:
PROJECT:
DATE: 5/14/2001

Data current as of Feb. 01, 1995

DETAILED TECHNICAL DATA - ENGINEERING DATA

Single CXV-249

Airflow	(CFM)	75960
Water Flow	(USGPM)	715
Total Fan	(Hp)	1- 15.00
Total Pump	(Hp)	1- 5.00
Charge R-717(Ammonia)	(Lbs)	217
Shipping Weight	(Lbs)	11430
Wiest Section	(Lbs)	7620
Operating Weight	(Lbs)	19560

Dimensions

Length	(Ft)	11'-9 3/4" ≈ 3,6m
Width	(Ft)	11'-10 " ≈ 3,6068m
Height	(Ft)	15'-9 1/2" ≈ 4,81m

Connections	(Qty)	Diameter (in)
Coil Inlet	1	4
Coil Outlet	1	4
Make-up	1	1
Drain	1	2
Overflow	1	3

B.A.C. Condenser Selection/Evaluation Program
Release 6.0

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********** Local B.A.C. Representative **********
AME: Baltimore Aircoil Company, Inc.
SS: P.O. Box 7322
Baltimore, MD 21227

ONE: (410) 799-6200
AX: (410) 799-6116

INCA KOLA
INC. ROBERTO REEZ
ING. VICTOR FIGUEROA

INQUIRY NO:
PROJECT:
DATE:

rrent as of Feb. 01, 1995

DETAILED TECHNICAL DATA - WALL LAYOUT DATA

Model: CXV-249 (1-15.00 (Hp)) (Single Unit)

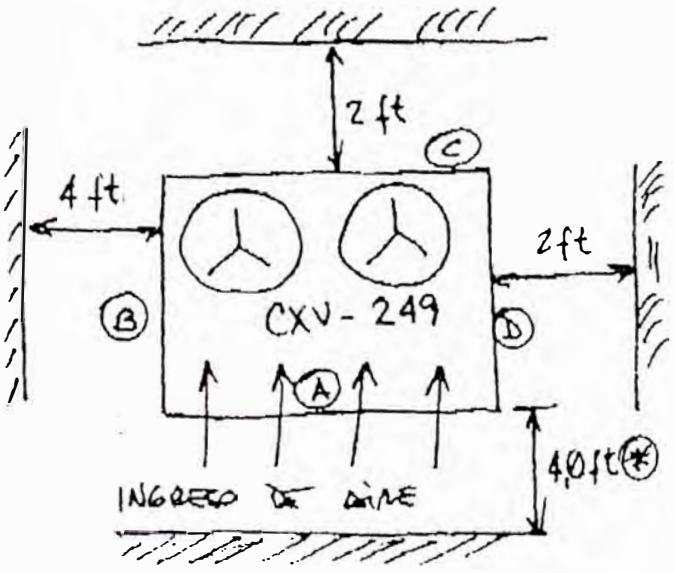
	Min. DISTANCE			
posite Air Inlet	2.00 (Ft)			
posite Connection	2.00 (Ft)			
tion End	4.00 (Ft)			
let	4.50 (Ft)	on Ground		
(*)	4.00 (Ft)	unit elevated	2.00 (Ft)	off grade
	3.50 (Ft)	unit elevated	3.00 (Ft)	off grade
	3.00 (Ft)	unit elevated	4.00 (Ft)	off grade

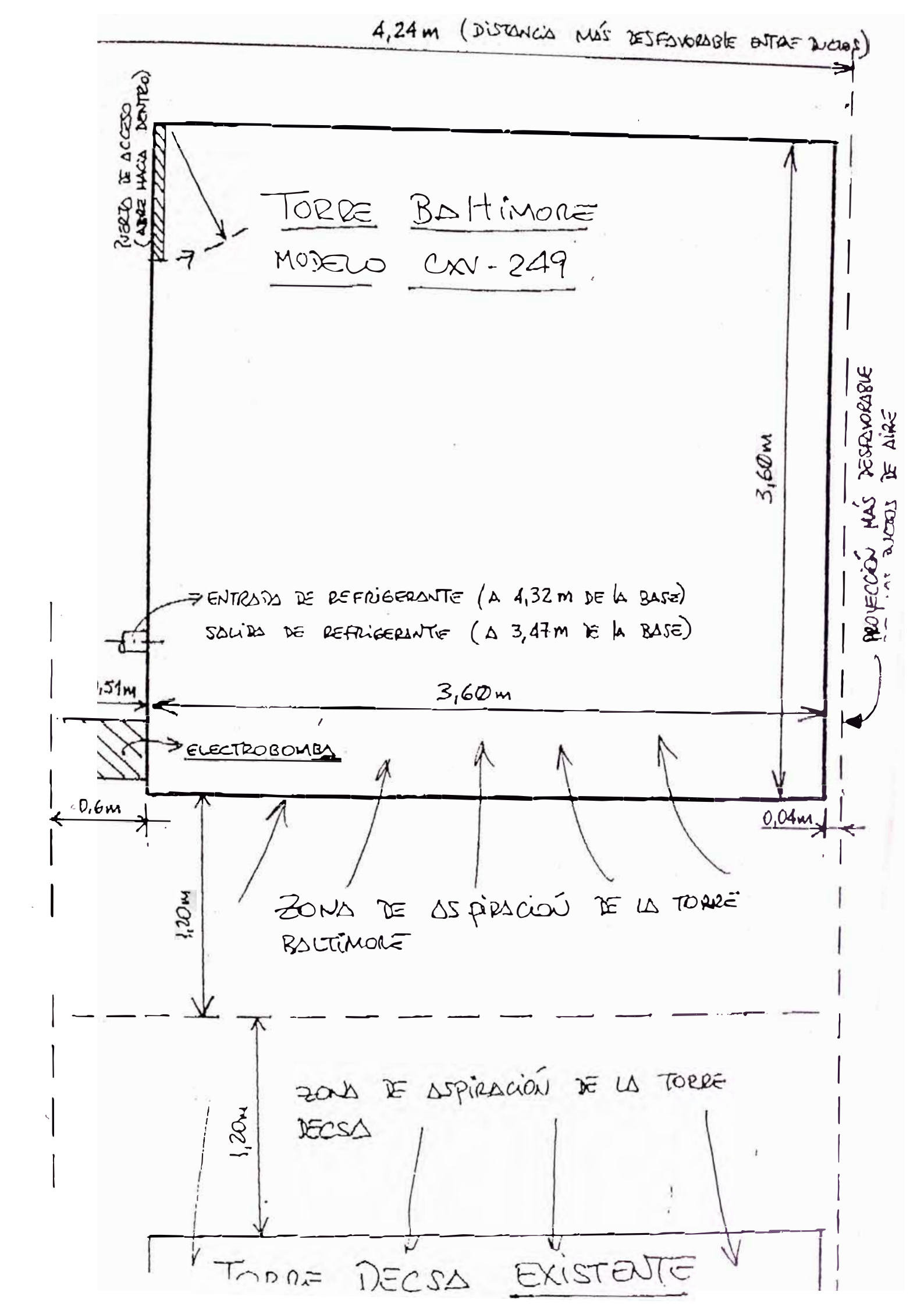
→ 0,60m

ll Height Must Not Exceed the Unit's Height

NOTA:-

* C y D PUEDEN SER MENORES YA QUE NO ES NECESARIO "PASAR" POR ESTAS ZONAS




4,24 m (DISTANCIA MÁS DESFAVORABLE ENTRE DUCTOS)
PUERTA DE ACCESO (ABRE HACIA DENTRO)
TORRE BALTIMORE
MODELO CXV - 249
3,60m
PROYECCIÓN MÁS DESFAVORABLE
ENTRADA DE REFRIGERANTE (A 4,32 m DE LA BASE)
SALIDA DE REFRIGERANTE (A 3,47m DE LA BASE)
1,51m
3,60 m
ELECTROBOMBA
0,6m
0,04m
1,20m
ZONA DE ASPIRACIÓN DE LA TORRE BALTIMORE
1,20m
ZONA DE ASPIRACIÓN DE LA TORRE DECSA
TORRE DECSA EXISTENTE

cpro
ENIEROS

Oferta N° REF 01/109

Lima, 14 de Mayo del 2001

Señores
CORPORACION JOSE R. LINDLEY S.A.
Presente.-

Atn.: **Ing. Roberto Raez**

Ref.: **Condensador evaporativo B.A.C.**

Estimados señores:

Según lo conversado, proponemos a continuación el suministro de un condensador evaporativo de acuerdo a sus necesidades.

1.0 DESCRIPCION DEL SUMINISTRO

Se propone el siguiente condensador evaporativo:

01 Condensador evaporativo Baltimore Air Coil con ventiladores centrifugos, modelo **VXC-S403** fabricado en Bélgica. Todo el acabado exterior del condensador es en plancha de acero galvanizada en zincalum. El serpentín es galvanizado en caliente y los motores de ventilador y bombas son IP-55 con aislamiento clase F.

Capacidad	323 TR
T° condensación	35,0°C
T° bulbo húmedo	26°C
Ventiladores	1 x 30 kW
Bomba de agua	4 kW
Procedencia	Bélgica

2.0 CONDICIONES

Precio

Precio EXW Bélgica	*US$ 19,500*
Flete interno y marítimo estimado	US$ 7 000
Precio C+F Callao estimado	*US$ 26,500*

336-8838 Fax: 336-8996
P.O. Box 170139 - Lima 1

Tiempo de entrega

Es de 5 a 7 semanas Ex Fábrica, después de haber ingresado la orden correctamente.

Forma de pago

Mediante carta de crédito confirmada, irrevocable e intransferible, pagadera contra documentos de embarque, o mediante transferencia bancaria por el total ofertado.

Garantía

Los equipos son suministrados con una garantía contra defectos de fabricación de 12 meses después del arranque o 18 meses después de la entrega en fábrica, lo que suceda primero y de acuerdo a las hojas de "Condiciones de venta y entrega" del fabricante.

3.0 SERVICIOS NO INCLUIDOS

La presente oferta no incluye:

- Embalaje
- Seguro y gastos de desaduanaje
- Válvulas
- Instalación
- Refrigerante
- Tablero eléctrico

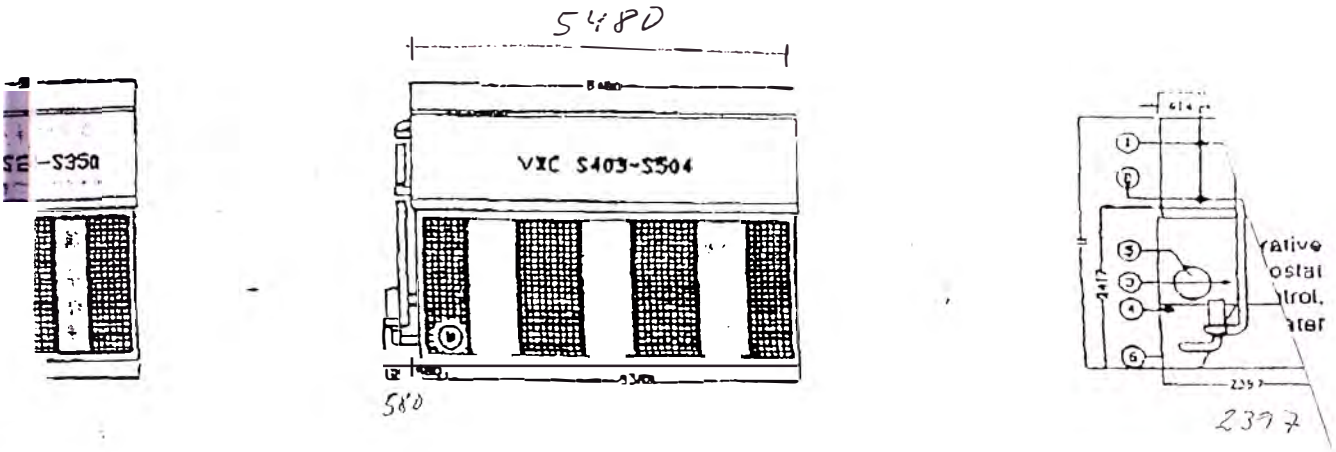
En general, todo aquello que no haya sido explícitamente mencionado en la presente oferta.

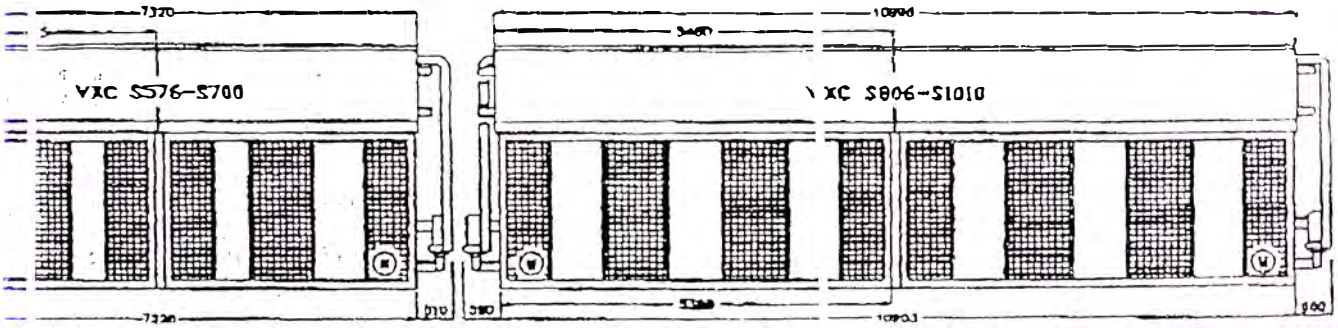
Sin más por el momento, y esperando que nuestra propuesta cuente con su aceptación, quedamos a la espera de sus noticias

Atentamente,

Carlos Rossi
DIVISIÓN REFRIGERACION

VXC ENGINEERING DATA / TECHNISCHE DATEN





location / Anordnung des Ventilatormotors.

onstruction. Refer to factory certified dimensions.
Product improvement, specifications and dimensions are subject to change without notice.

Diese Maßbilder nicht zu Detailzeichnungen, sondern fordern Sie genaue Maßblätter von einer BAC Vertretung
vor, technische Daten und Abmessungen ohne vorherige Ankündigung zu ändern.

/ Kältemittel Ein
/ Kältemittel Aus
/ Netzwasser
/ Ablauf
/ Füllung

AGE EAT ECTION	WEIGHT APPROX. SHIPPING	WEIGHT APPROX. OPERAT.	WEIGHT HEAVIEST SECTION (COIL)	AIR FLOW	FAN MOTOR	WATER FLOW	PUMP MOTOR	R-717 CHARGE	REMOTE SUMPH DRAIN SIZE	REMOTE SUMPH OPERATING WEIGHT	H
ER-SSIGER ENN-STUNG	GEWICHTEN VERSAND GEWICHT	GEWICHTEN BETRIEBS-GEWICHT	Schwerstes Bauteil (Anlaufteil enthalten)	LUFT-DURCH-SATZ	VENTIL. MOTOR	WASSER-DURCH-SATZ	PUMPEN MOTOR	KÄLTE-MITTEL INHALT R-717	GETR. W. BEHÄLTER ABLAUF	GETR. W. BEHÄLTER BETRIEBS-GEWICHT	H
(kW)	(kg)	(kg)	(kg)	(m³/s)	(kW)	(l/s)	(kW)	(kg)	(mm)	(kg)	(mm)
1241	5525	7800	3650	22.9	18.5	24.3	2.2	183	150	6645	4245
1250	5555	7830	3650	24.2	22.0	24.3	2.2	183	150	6675	4245
1413	6530	7705	3650	26.7	30.0	24.3	2.2	183	150	6750	4245
1508	6180	8320	4170	28.2	30.0	24.3	2.2	195	150	7370	4480
1737	7170	10225	4715	38.6	30.0	36.6	2.0	197	200	8750	4010
1649	7230	10285	4715	38.9	37.0	36.6	2.0	197	200	8810	4010
1961	9125	11270	5700	34.9	30.0	36.6	2.0	245	200	9800	4245
2077	8175	11320	5700	37.5	37.0	36.6	2.0	245	200	9850	4245
2172	9250	12500	6690	38.6	37.0	36.6	2.0	293	200	11030	4480
2482	11040	16225	3840	46.8	(2) 18.5	48.8	(2) 2.2	327	250	13325	4245
2585	11140	15325	3840	48.4	(2) 22.0	48.8	(2) 3.2	327	250	13425	4245
2828	11320	16505	3840	53.4	(2) 30.0	48.8	(2) 2.2	327	250	13605	4245
3016	12355	16855	4478	57.4	(2) 30.0	48.8	(2) 2.2	380	250	14750	4480
3473	14415	20655	4810	73.2	(2) 30.0	73.2	(2) 4.0	393	300	17820	4010
3597	14615	20765	4810	77.8	(2) 37.0	73.2	(2) 4.0	395	300	17820	4010
3921	16450	22570	5710	68.8	(2) 30.0	73.2	(2) 4.0	490	300	19815	4245
4153	16620	22770	5710	75.0	(2) 37.0	73.2	(2) 4.0	490	300	20015	4245
4352	16505	25035	6690	73.2	(2) 37.0	73.2	(2) 4.0	588	300	22100	4480

the heaviest section. / Die Wanne ist das schwerste Bauteil.

ER HEATERS & STEEL SUPPORT DATA
HEIZUNGEN & UNTERBAUDATEN

E HEATERS / WANNENHEIZUNGEN

HEATER −18°C	MODELE NO. VXC	HEATER −18°C
HEIZ-LEISTUNG −18°C (kW)	MODELL	HEIZ-LEISTUNG −18°C (kW)
1 x 1	357 - 454	1 x 6
1 x 1.5	562 - 680	2 x 5
1 x 2.5	714 - 908	2 x 6
1 x 3	1124 - 1360	4 x 5
1 x 4	495 - 516	2 x 4
1 x 6	715 - 804	2 x 6
1 x 6	990 - 1032	4 x 4
2 x 4	1430 - 1608	4 x 6
2 x 6		
C 4 x 4		

IMMERSION HEATERS

Electric immersion heaters are factory installed in the evaporative condenser basin. The heaters are controlled by a remote thermostat with the sensing bulb located in the pan. A low water level control, also factory installed, prevents heater operation unless the heater elements are fully submerged.

ELEKTRISCHE HEIZELEMENTE

Die Heizelemente werden werkseitig in der Wanne des Verdunnungsverflüssigers eingebaut. Die Heizstäbe werden über einen Thermostaten (in der Wanne montiert) gesteuert, dessen Fühler in der Wanne eingebaut ist. Ein Niedrigniveauschutzschalter, ebenfalls werkseitig montiert, verhindert das Einschalten der Heizelemente, wenn Sie nicht völlig unter Wasser sind.

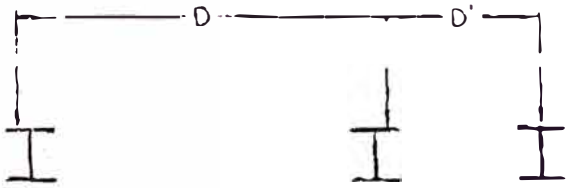
for maintaining pan water at + 4°C at −18°C ambient air temperature. Electric heater package for higher then ambient temperature is available upon request.

wird so gewählt, daß die Wannewassertemperatur bei −18°C Außentemperatur auf + 4°C gehalten wird. turen höher als −18°C können Heizelemente auf Wunsch geliefert werden.

PORT DATA / UNTERBAUDATEN

D	MAX. DEFLEC-TION	MODELE NO. VXC	D	MAX. DEFLEC-TION
D (mm)	MAX. DURCH-BIEGUNG (mm)	MODELL	D (mm)	MAX. DURCH-BIEGUNG (mm)
1153	2.4	357 - 454	2934	10
1153	5	562 - 680	2934	13
1153	8	714 - 908	2934	13
1153	10	1124 - 1360	2934	13
1378	10	495 - 516	3537	13
2327	10	715 - 804	3537	13
2327	10	990 - 1032	3537	13
2327	13	1430 - 1608	3537	13
2327	13			
2327	13			

distance between bolt holes of unit. / Herzdistanz zwischen ohrungen des Gerätes.
a third support beam which is required with the optional nuator package: 905 mm. / Distanz zu einem dritten Träger halldämpfer (Zubehör) : 905 mm.



BEAM SIZE AND LENGTH

Beam size should be calculated in accordance with accepted structural practice. Use 65 % of the operating weight as a uniform load on each beam. The length of the beam must be at least equal to the length of the pan. Maximum permissible beam deflection and center line distances between bolt holes are tabulated at the left.

PROFILGRÖßE UND LÄNGE

Die Träger sind gemäß anerkannten Richtlinien für die Baustatik auszulegen. 65 % des Betriebsgewichts des Gerätes können als gleichmäßige Belastung für jeden Träger angenommen werden. Die Länge der Balken muß mindestens der Länge des Wannenteils entsprechen. Die maximal zulässige Durchbiegung der Balken sowie der erforderliche Abstand zwischen den Balken ist in nebenstehende Tabelle angegeben.

SOLATORS

lators are used, a rail or channel must be provithe unit and the isolators to provide continuous Refer to BAC vibration isolator drawings for the locations.

FEDERISOLATOREN

Bei Verwendung von Federisolatoren muß eine Schiene zwischen den Isolatoren und dem Gerät installiert werden, die für ein gleichmäßige Unterstützung des Gerätes sorgt. Die Lage der Ankerbolzen bei Aufstellung mit oder ohne Federisolatoren ist in den entsprechenden BAC Zeichnungen angegeben.

Baltimore Aircoil

BALTIMORE AIRCOIL INTERNATIONAL N.V., Industriepark, B-2220 Heist-op-den-Berg, Belgium
BALTIMORE AIRCOIL LTD., Princewood Road, Corby, Northants. NN17 2AP, U.K.
BALTIMORE AIRCOIL ITALIA S.R.L., 23030 Chiuro (Sondrio), Italy
ANSTED ITALIA S.R.L., Via nazionale 37, 23030 Chiuro (Sondrio), Italy
BALTIMORE AIRCOIL IBERICA, S.A., C/Costa Rica n° 26 1° C, 28016 Madrid, Spain

INGENIERIA DE SISTEMAS DE FLUIDOS S.A.C.

Callao, 13 de setiembre del 2001 CA-379/01

Señores
CORPORACIÓN JOSÉ R.LINDLEY S.A.
Presente -

Atención: Ing Roberto Ráez

Ref.: CONDENSADOR EVAPORATIVO

Estimados señores:

La fábrica BALTIMORE® ha confirmado la entrega del equipo de la referencia para la siguiente semana.

La Srta. Tami Murakami de su departamento de Logística ya nos ha proporcionado los datos de Bureau Veritas para coordinar la inspección.

Finalmente y de acuerdo con lo informado en su respectiva oportunidad, la fábrica entregará el modelo CXV 253-K en lugar del modelo ofertado CXV 249. El motivo fue que el tiempo de entrega para este último modelo estaba fuera de lo proyectado (abril del 2002). Por ello, la fábrica suministrará un equipo de mayor capacidad (3,907.03 Mbh del CXV253 contra 3,845.5 del CXV249, adjuntamos hojas técnicas) y que cumple con el tiempo de entrega y las condiciones de instalación.

Agradeciendo de antemano la atención brindada a la presente, quedamos de ustedes

Muy atentamente,

Victor Figueroa
Gerente de Ventas

Jr. Supe Nº 470 / 474 - Urb. Santa Marina - Callao - Perú Casilla 01-075
Telfs.: 465-3709 / 453-2797 / 453-2796 / 420-1750 / 465-4091 Fax: 465-9702
E-mail: isfsac@millicom.com.pe

September 5, 2001

Saeg Engineering Group L
8012 NW 68 Street
Miami, FL 33166

Subject: Your P.O. No.: 4-01960
Our B.A.C. No.: U014037301
Model: (1) CXV-253-K Evaporative Condenser
Job: Saeg Peru – "ISF International" – Lima, Peru

Gentlemen:

Enclosed for your records is one (1) copy of the knock down instructions for the above subject equipment.

Your order is currently scheduled for shipment from our factory approximately September 14, 2001. Please be prepared to accept the equipment as scheduled since our facilities cannot accommodate storage of completed units.

Thank you again for your order; and if we can be of further assistance, please contact us.

Very truly yours,

BALTIMORE AIRCOIL COMPANY

Charlene Griffiths
Account Executive

CG/sv
Enclosure: (1) Knock down instruction copy

INGENIERIA DE SISTEMAS DE FLUIDOS S.A.
FAX (511) 465-9702

FROM Victor Figueroa DATE : May 22, 2001

TO: CORP. JOSE R. LINDLEY ATT : ROBERTO RÁEZ

FAX NUMBER : 482-4675 FAX REF: 130/01

No. OF PAGES (Including this) 1 REF CONDENSADOR BALTIMORE®

Estimado Ing. Ráez:

De acuerdo con nuestra conversación telefónica, agradeceríamos tener en cuenta que al momento de realizar la compra, la orden de compra y el pago por el 100% del equipo a los 30 dias de entregado deberán realizarse a nombre de nuestra sucursal en USA, ISF International Inc.

La razón radica en que nuestra sucursal es la que tiene crédito con BALTIMORE mas no INCA KOLA y es quien responderá directamente por el pago ante la fábrica.

Agradecemos de antemano su comprensión y estamos a la espera de cualquier consulta adicional.

Saludos,

Victor Figueroa

IGENIERIA DE SISTEMAS DE FLUIDOS S.A.C.

Authorized VILTER™ Distributor

PR- **487-2001**

allao, 10 de mayo del 2001

eñores:
ORPORACIÓN J.R.LIDLEY S.A.
resente.

t. Ing. Roberto Ráez
ef. Condensador Evaporativo

stimados Señores:

or medio de la presente nos es grato someter a vuestra consideración nuestro resupuesto por el suministro de:

CANTIDAD	**DESCRIPCION**
02	Condensador evaporativo marca **BALTIMORE®** del tipo axial – central, modelo CXV-253 con una capacidad de condensación de 325TR (calor total a retirar de los compresores y motores eléctricos de la etapa de alta) a una temperatura de condensación 95°F y una temperatura de bulbo húmedo de 76°F. Incluye un ventilador de 15HP y una bomba de agua de 5HP (Total = 20HP)

VALOR DE VENTA TOTAL EX-FABRICA, BALTIMORE-MARYLAND **US$ 2 ,990.00**

Tiempo de entrega	**10 @ 12** semanas ex - fábrica
Forma de pago	**30 días**, luego de entregado el equipo en la fábrica
Validez de la oferta :	**30 días**
Garantía	**Cinco años** los ventiladores **Un año** las demás partes

Cualquier consulta al respecto, por favor no dude en contactarnos

Atentamente,
Víctor Figueroa
Gerente de Ventas
División de Refrigeración Industrial

Jr Supe 470 - 474 Urb. Santa Marina Norte, Callao - Perú. Telefs: 453-2796 / 453-2797 / 465-3709 / 420-1750 Fax: 465-9702

TEL: 044-352450-352679

ENIERIA DE SISTEMAS DE FLUIDOS S.A.
: (511) 465-9702

M Victor Figueroa

DATE : May 15, 2001

CORP. JOSE R. LINDLEY

ATT : ROBERTO RÁEZ

NUMBER : 482-4675

FAX REF: 121/01

OF PAGES (Including this) 2

REF : CONDENSADOR BALTIMORE

imado Ing Ráez:

ego de nuestra visita tecnica al lugar donde estará instalado el equipo de la erencia y realizadas las consultas a la fábrica, cumplimos con indicarle lo siguiente:

Baltimore ha realizado una reestructuración de los modelos de su línea CXV, para lo cual el nuevo modelo que corresponde a su proyecto es el CXV-249. Este modelo cumple con la capacidad solicitada (320TR) y es suministrado al mismo valor de venta que el modelo ofertado en nuestra propuesta 487/01. Adjuntamos nuestra nueva propuesta

2. Se adjunta un esquema a mano alzada donde podrán apreciarse todas las medidas involucradas tanto de la torre existente DECSA y de la torre BALTIMORE. Como puede apreciarse, la nueva torre podrá ser instalada sin ningún inconveniente y se podrá tener acceso al interior del equipo también sin problemas.
3. Para verificar lo anterior, se adjunta hoja técnica con las medidas mínimas a considerarse por lado De acuerdo con esto no hay inconveniente en que las distancias C y D sean menores a lo recomendado ya que no es necesario "pasar" por estos lados. El lado de ingreso de aire está retirado de zona de ingreso de aire de la torre DECSA más lo recomendado para el ingreso del aire requerido (véase que la torre BALTIMORE se encuentra unos 0,6m sobre el piso, lo cual ayuda a una mejor aspiración de aire El lado B está separado de los ductos de aire 0.60m. distancia suficiente para llegar a la puerta de acceso (la cual se abre para el interior) y para instalar y hacer mantenimiento a la electrobomba. Por último. las tuberías de ingreso y salida de refrigerante se encuentran lo suficientemente altas para interconectarse sin problemas.

Por anterior. agradeceríamos tenga en cuenta de que la torre a suministrarse "entra" en el espacio que le ha sido asignado.

Saludos,

Víctor Figueroa

Jr. Supe 470 - Urb. Santa Marina - Callao - Peru Casilla 01-075 Telefs. 465-3209 - 453-2790 - Fax 46594702

GENIERIA DE SISTEMAS DE FLUIDOS S.A.
AX: (511) 465-9702

ROM Victor Figueroa DATE : May 15, 2001

): CORP. JOSE R LINDLEY ATT : ROBERTO RÁEZ

AX NUMBER : 482-4675 FAX REF: 115/01

o. OF PAGES (Including this) : 4 REF : CONDENSADOR BALTIMORE

stimado Ing. Ráez

e acuerdo con lo ofrecido, adjunto encontrará copia de la información técnica olicitada

aludos,

Victor Figueroa

B.A.C. Condenser Selection/Evaluation Program
Release 2.03 -

Copyright 1994 Baltimore Aircoil Company, Inc.
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********** Local B.A.C. Representative **********
NAME: Baltimore Aircoil Company, Inc.
)RESS: P.O. Box 7322
Baltimore, MD 21227

PHONE: (410) 799-6200
FAX: (410) 799-6416

INKA KOLA

INQUIRY NO:
PROJECT:
DATE: 5/11/2001

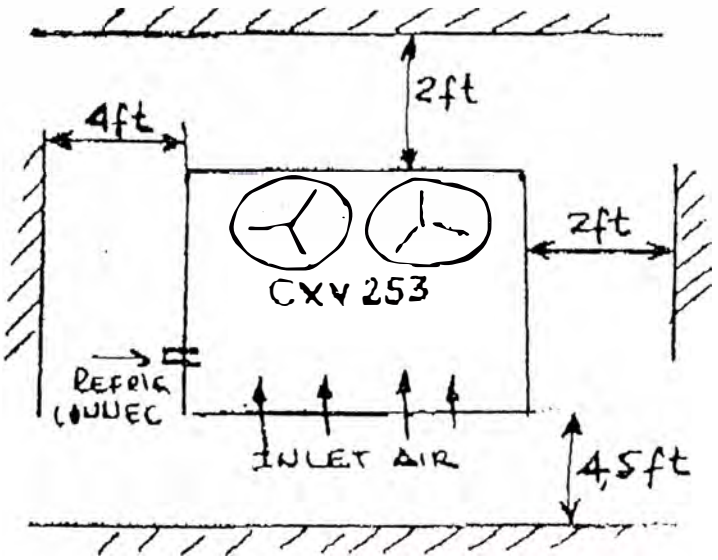
current as of Feb. 01, 1995

DETAILED TECHNICAL DATA - WALL LAYOUT DATA

Model: CXV-253 (1-15.00 (Hp)) (Single Unit)

E	Min. DISTANCE		
Opposite Air Inlet	2.00 (Ft)		
Opposite Connection	2.00 (Ft)		
ection End	4.00 (Ft)		
Inlet	4.50 (Ft)	on Ground	
	4.00 (Ft)	unit elevated 2.00 (Ft)	off grade
	3.50 (Ft)	unit elevated 3.00 (Ft)	off grade
	3.00 (Ft)	unit elevated 4.00 (Ft)	off grade

:
Wall Height Must Not Exceed the Unit's Height



Condenser Selection/Evaluation Program
Release 2.03

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********** Local B.A.C. Representative **********
NAME: Baltimore Aircoil Company, Inc.
RESS: P.O. Box 7322
Baltimore, MD 21227

HONE: (410) 799-6200
FAX: (410) 799-6416
****

INQUIRY NO:
PROJECT:
DATE: 1/18/2001

current as of Feb. 01, 1995

DETAILED TECHNICAL DATA ENGINEERING DATA

Single CXV-253

ow	(CFM)		76800
Flow	(USGPM)		715
Fan	(Hp)	:	1- 15.00
Pump	(Hp)	:	1- 5.00
e R-717 (Ammonia)	(Lbs)		217
ing Weight	(Lbs)		11830
est Section	(Lbs)		7670
ting Weight	(Lbs)		18720
sions			
ngth	(Ft)		12'-1 1/4" 3,69m
dth	(Ft)		11'-10 " 3,60m
ight	(Ft)		15'-10 3/4" 4,84m

ctions	(Qty)	Diameter (in)
il Inlet	1	4
il Outlet	1	4
ce	1	1
ai	1	2
er	1	3

B.A.C. Condenser Selection/Evaluation Program

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********** Local B.A.C. Representative **********
* NAME: Baltimore Aircoil Company, Inc.
* ADDRESS: P.O. Box 7322
* Baltimore, MD 21227
* PHONE: (410) 799-6200
* FAX: (410) 799-6416

TO: INQUIRY NO:
ATTN: PROJECT:
FROM: DATE: 7/16/2001

Data current as of Feb. 01, 1995

BEST SELECTIONS - WET OPERATION - HEAT REJECTION METHOD

Design Conditions
Heat Rejection (Mbh): 3840.00
Condensing Temperature (F): 95.00
Wet Bulb Temperature (F): 76.00
Elevation (Ft): 0.00
Refrigerant : R-717(Ammonia)

Selections Based on : Constant Condensing Temp.
Selections Sorted by: Price

Product Line(s) Considered:
(CXV)

Qty.	Model	Heat Reject. (Mbh)	Cond. Temp. (F)	Unit Fan (Hp)	Unit Pump (Hp)	Energy Eval.	Price Rank
1	CXV-253	3907.3	95.00	1-15.00	1-5.00	0	1.00

All evaporative condenser selections assume an open and unobstructed installation; no external static pressure; and no accessories which may effect airflow through the unit, such as capacity control dampers, solid bottom panels, discharge hoods, and sound attenuation. If one or more of these assumptions do not apply to this project, please contact your local B.A.C. representative for selection and layout assistance.

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********** Local B.A.C. Representative **********
Baltimore Aircoil Company, Inc.
P.O. Box 7322
Baltimore, MD 21227

(410) 799-6200
(410) 799-6416

KA KOLA

INQUIRY NO:
PROJECT:
DATE: 5/14/2001

rrent as of Feb. 01, 1995

EST SELECTIONS - WET OPERATION - HEAT REJECTION METHOD

Conditions

it Rejection	(Mbh)	3840.00
ndensing Temperature	(F)	95.00
t Bulb Temperature	(F)	76.00
evation	(Ft)	0.00
frigerant		R-717(Ammonia)

.ions Based on : Constant Condensing Temp.
:ions Sorted by: Price

ct Line(s) Considered:
(CXV)

Model	Heat Reject. (Mbh)	Cond. Temp. (F)	Unit Fan (Hp)	Unit Pump (Hp)	Energy Eval.	Price Rank
CXV-249	3845.5	95.00	1-15.00	1-5.00	0	1.01

evaporative condenser selections assume an open and unobstructed allation; no external static pressure; and no accessories which effect airflow through the unit, such as capacity control dampers, ld bottom panels, discharge hoods, and sound attenuation. If one more of these assumptions do not apply to this project, please tact your local B.A.C. representative for selection and layout istance.

Release 2.03

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********** Local B.A.C. Representative **********
Baltimore Aircoil Company, Inc.
P.O. Box 7322
Baltimore, MD 21227

ONE: (410) 799-6200
FAX: (410) 799-6416

INKA KOLA

INQUIRY NO:
PROJECT:
DATE: 5/11/2001

current as of Feb. 01, 1995

DETAILED TECHNICAL DATA - SOUND RATING DATA

Model: CXV-253 (1-15.00 (Hp)) (Single Unit)

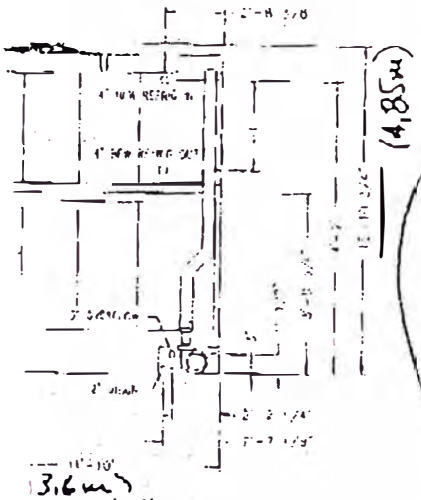
Sound Pressure Levels (SPL)*

Ctr. Frq. (Hz)	Top (Ft) 5	Top (Ft) 50	Side (Ft) 5	Side (Ft) 50	Fan End (Ft) 5	Fan End (Ft) 50	Side (Ft) 5	Side (Ft) 50	Back (Ft) 5	Back (Ft) 50	Sound Power Levels (PWL)
63	92	71	76	68	83	73	76	68	78	71	103
125	87	71	75	62	85	69	75	62	73	66	99
250	89	72	77	68	87	73	77	68	79	73	103
500	89	73	73	66	84	72	73	66	76	68	102
1000	88	75	69	65	81	70	69	65	71	67	102
2000	85	72	57	56	71	61	57	56	60	62	98
4000	72	59	50	48	62	50	50	48	52	55	86
8000	72	61	33	44	58	48	33	44	25	50	87
dBA	92	78	74	68	85	74	74	68	77	71	

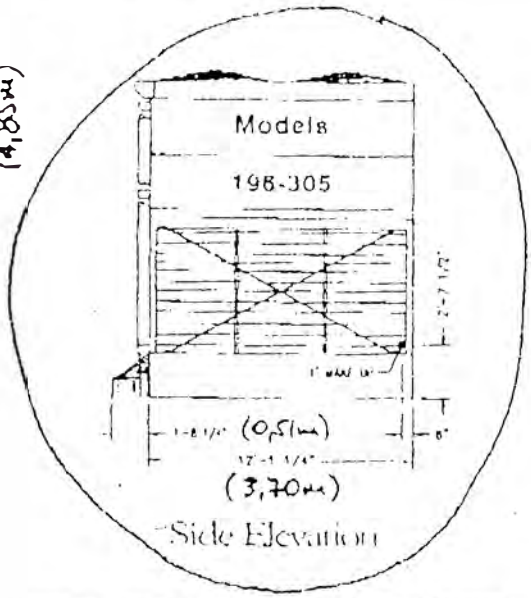
re 0.0002 microbar
re 10E-12 watt

NGINEERING DATA

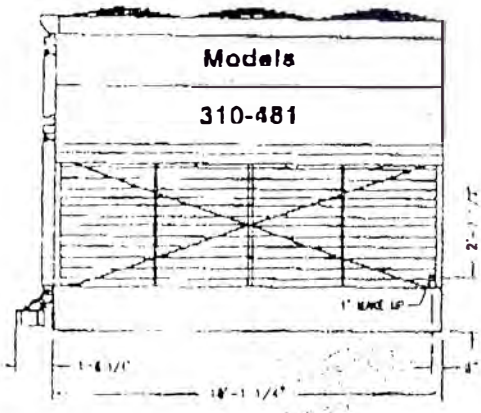
Do not use for construction. Refer to factory-certified dimensions. This brochure includes data current at the time of publication which should be reconfirmed at the time of purchase.



End Elevation



Side Elevation



Side Elevation

del ıber	Approx. Shipping Weight	Approx. Oper. Weight	Hvst. Section Weight	CFM	Motor HP	Pump HP	GPM	R-717 Oper. Charge	Remote Sump Drain Size	Remote Sump Approx. Oper. Weight	Remote Sump GPM	Remote Sump
196	10740	17480	6580	68160	10	5	715	164	10"	16920	600	24"
210	10790	17530	6630	77900	15	5	715	164	10"	16970	600	24"
220	10840	17580	6680	85650	20	5	715	164	10"	17020	600	24"
235	11780	18570	7620	67200	10	5	715	217	10"	18110	600	33-1/4"
253	11830	18720	7670	76800	15	5	715	217	10"	18160	600	33-1/4"
254	12830	19570	8670	64930	10	5	715	270	10"	19310	600	42-1/2"
263	12680	19920	8720	74200	15	5	715	270	10"	19360	600	42-1/2"
300	13920	21110	9760	72700	15	5	715	321	10"	20550	600	51-3/4"
305	13970	21160	9810	79950	20	5	715	321	10"	20600	600	51-3/4"
0	15320	25500	9500	117900	15/7.5	7.5	900	243	10"	24940	750	24"
4	15410	25590	9590	129650	20/10	7.5	900	243	10"	25030	750	24"
7	15510	25690	9690	139550	25/15	7.5	900	243	10"	25130	750	24"
9	16600	27200	11000	101760	10/5	7.5	900	321	10"	26640	750	33-1/4"
3	16890	27290	11070	116300	15/7.5	7.5	900	321	10"	26730	750	33-1/4"
8	18390	29020	12590	98310	10/5	7.5	900	401	10"	28460	750	42-1/2"
9	19990	30830	14180	96290	10/5	7.5	900	475	10"	30270	750	51-3/4"
5	18480	29110	12660	112350	15/7.5	7.5	900	401	10"	28550	750	42-1/2"
7	20070	30910	14250	110050	15/7.5	7.5	900	475	10"	30350	750	51-3/4"
9	20150	30990	14330	121050	20/10	7.5	900	475	10"	30430	750	51-3/4"
	20260	31100	14440	130300	25/15	7.5	900	475	10"	30540	750	51-3/4"
	20280	31120	14460	138350	30/15	7.5	900	475	10"	30560	750	51-3/4"

umber denotes nominal evaporator tons using R-717
F cond. temp., 20 °F suct. temp., and 78 °F wet bulb.
ndard right-hand arrangement as shown has the air
de on the right when facing the connection end.
id arrangement can be furnished by special order.
nd refrigerant connections are located on the same
e unit.
d refrigerant connection sizes are 4-inch BFW inlet
et for all CXV models. Other connections sizes are
by special order.
or sizes shown in the table are for 0 inches water
ternal static pressure (ESP).

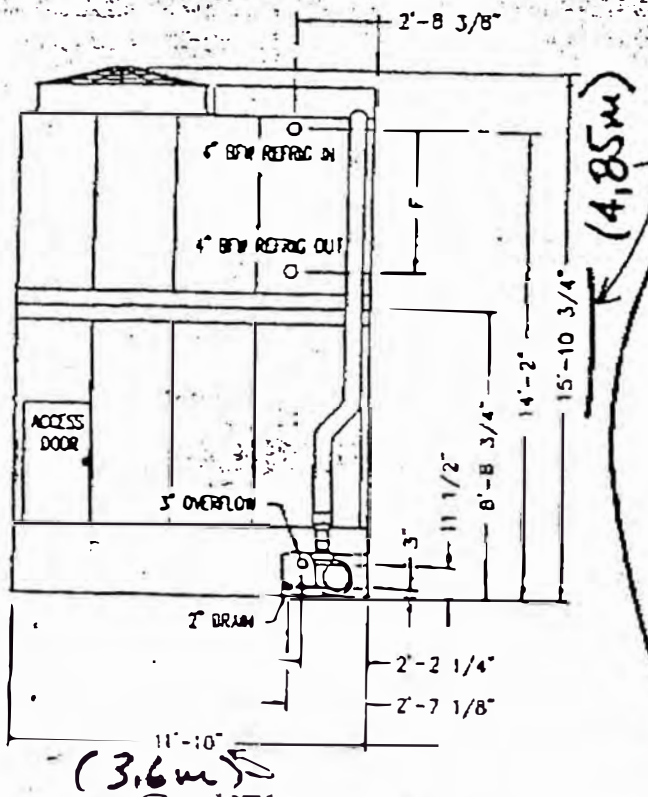
5. All weights are in pounds. The standard operating weight shown in the table is based on total unit weight, weight of refrigerant operating charge, and basin filled to overflow level.
6. Remote sump recirculating water pumps (by others) must be selected for the required flow (GPM) and 2.0 psig at the spray water inlet.
7. Refrigerant charge listed is R-717 operating charge. To determine operating charge for R-22, multiply charge by 1.93.
8. Gallons required is water in suspension in unit plus water in pan at remote sump operating level. Allow for additional water in remote sump to cover pump suction and all related piping.

TEL 044-352450-35267

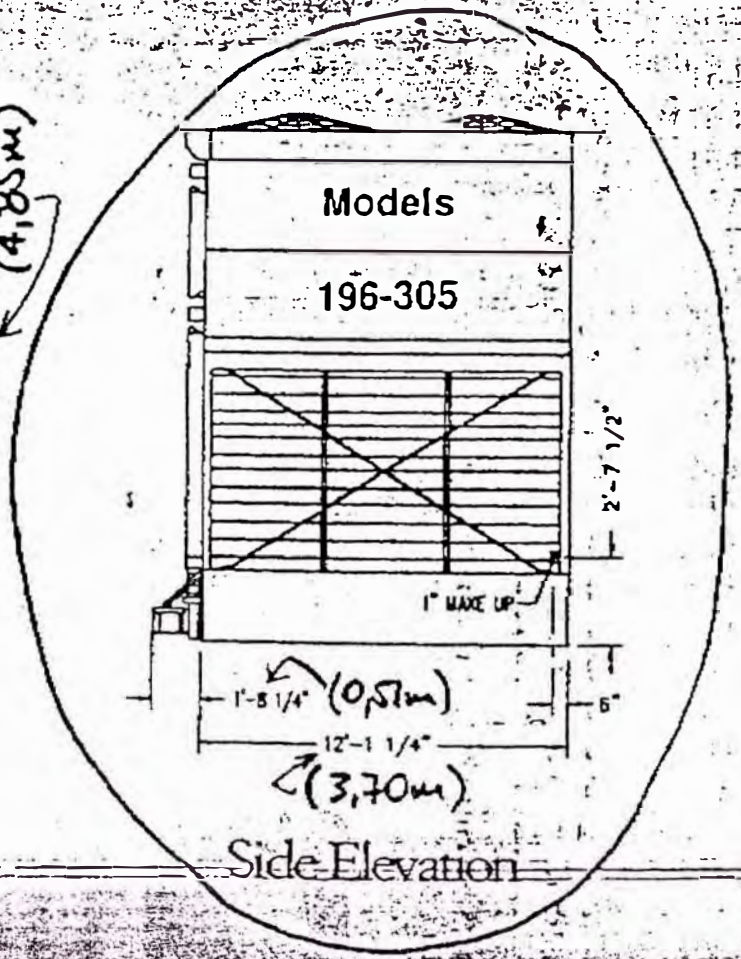
14-MAY-01 15:29 ISF SERVICIOS-S.A

ENGINEERING DATA

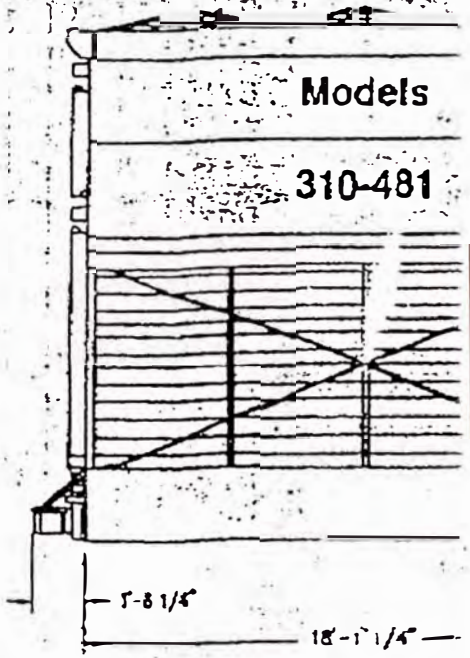
Do not use for construction. Refer to facto
dimensions. This brochure includes data
the time of publication which should be rec
the time of purchase.



End Elevation



Side Elevation



Side Elevatio

Model Number	Approx. Shipping	Approx. Oper.	Hvst. Section	CFM	Motor	Pump BP	GPM	R-717 Qty.	Remote Sump Drain Approx.

ANEXOS 02: PRESUPUESTOS DE INSTALACION

TECPRO

TECPRO INGENIEROS S.A.
Av. Argentina 1760 Lima 1 - Peru
Tel.: 336 8838 / 336 7007 Fax: 336 3996
tecpro@tecpro.com.pe

REFRIGERACION

Oferta N° REF 02/046

Lima, 18 de Febrero del 2002

Señores
CORPOORACION JOSE R. LINDEY S.A.

Atn.: **Ing. Miguel Ortiz**
Sr. Gideon Zea

Ref.: **Instalacion de Condensador**

Estimados Señores:

De acuerdo a su amable solicitud de cotización, le hacemos llegar nuestra mejor oferta por el trabajo de la referencia:

- Armado de condensador (02 partes) en su almacen, de acuerdo a las especificaciones y planos del fabricante Todos los elementos que comprenden el condensador seran suministrados por el cliente.
- Desconexión de las líneas de amoniaco, agua y drenaje del condensador actual.
- Apoyo y supervisión a la maniobra de desmontaje del condensador.
- Habilitación de tuberías de amoniaco, recuperacion de válvulas, y cambio de líneas de agua y drenaje, según la disposición del nuevo condensador.
- Cambio de posición de vigas portantes de 10".
- Apoyo y supervisión del montaje del condensador
- Interconexión de tuberías de amoniaco, agua y drenaje.
- Prueba de presión con nitrógeno.
- Vacío de las líneas de amoniaco.

TECPRO

TECPRO INGENIEROS S.A.
Av. Argentina 1760 Lima 1 - Peru
T.: 336 8638 / 336 7022 Fax: 336 5093
tecpro@tecpro.com.pe

REFRIGERACION

Trabajos no incluidos:

- Evacuación del amoniaco al tanque recibidor.
- Suministro de grúa y transporte del condensador.
- Desconexión e interconexión eléctrica.
- Obras civiles en general.

Nuestra oferta es la siguiente:

Precio	: $ 3,500 + IGV.
Tiempo de entrega	: 09 dias, (incluye 48 horas de parada del sistema.)
Forma de pago	. A convenir
Validez de la oferta	15 dias.

Sin otro particular por el momento, quedamos a la espera de sus gratas noticias.

Atentamente,

Ing. Raúl Ayvar
División de Refrigeración

Ing. Ricardo Flores
División de refrigeración

Mitor Ings. S.A.

REFRIGERACION INDUSTRIAL

PRESUPUESTO N: 048-02 Fecha: 1 de Marzo de 2002

CLIENTE: J. R. Lindley S.A. Att. Ing. Miguel Ortiz

OBRA : Instalación de Condensador Evaporativo "Baltimore" mod. CXV-253-K

PARTIDAS		METRADO		COSTOS	
Nº	DESCRIPCION	CANT.	UNID.	UNITARIO	TOTAL
	DEL SUMINISTRO				En US$
1	Transporte de los componentes del equipo desde el almacén hasta el lugar del ensamble (incluye alquiler de montacargas)	5	hr	15.00	75.00
2	Verificación y recuento de piezas, según Packing-List	2	hr	15.00	30.00
3	Ensamble del equipo, según los planos del fabricante, proporcionados por J. R. Lindley, incluye interconexión de los cuerpos del equipo , megado de los motores eléctricos, etc.	3	dias	250.00	750.00
4	Desconexión del Condensador existente.	6	hr	15.00	90.00
5	Coordinación continua con el personal de la Grua que hara las maniobras de subida y bajada de equipos	8	hr	15	120.00
6	Suministro Tuberías, codos, reducciones de acero SCH40, tuberia galvanizada para ingreso y drenaje de agua	Estimado			270.00
7	Interconexión con las líneas de gas y liquido existentes	3	dias	150	450.00
8	Interconexión con los puntos de ingreso y drenaje de agua	1	dia	120	120.00
	Suministro de Gas Nitrógeno para pruebas de fugas	30	m3	3.5	105.00
10	Detección de fugas y vacio del sistema	1	dia	120	120.00
11	Puesta en marcha	1	dia	120	120.00
12	Gastos de operación	12	dia	25.00	300.00
				US$	**2650.00**

Nota: A estos precios agregar el IGV

CONDICIONES DE VENTA

FORMA DE PAGO : 50 % con la orden, saldo contraentrega
TIEMPO DE EJECUCION : 12 dias (de acuerdo al metrado)
VALIDEZ DE LA OFERTA : 30 dias
GARANTIA : Garantizamos la calidad de la ejecución de nuestros trabajos por 12 meses

Atentamente

Ing. Miguel Torrejón

PROYECTOS - INSTALACION - MANTENIMIENTO

GAMMA Nº 150 - OF. 202
Internacional de Industria y Comercio
O - PERU

e-mail:mitor@wayna.rcp.net.pe
TELEF / FAX: (51-1) 561-3046
CEL.: 991-1870

Mitor Ings. S.A.

REFRIGERACION INDUSTRIAL

Callao, 22 de Febrero del 2.002

PRESUPUESTO Nº 46 -- 02

Señores
CORPORACION J.R. LINDLEY S.A.
RIMAC

Atención Ing. Miguel Ortiz C.
Dpto. de Mantenimiento

Asunto Suministro de Repuestos para torre de enfriamiento DECSA

De nuestra consideración.

Por medio de la presente nos es grato someter a vuestra consideración, nuestro presupuesto por el asunto arriba indicado y que detallamos a continuación

DEL SUMINISTRO:

Los repuestos que estamos ofertando, corresponden a una torre de enfriamiento, marca DECSA, modelo TVA-11-152, Nº serie: 20970043, instalado en su planta.

Nuestra oferta comprende lo siguiente:

- Mantenimiento Correctivo : Un juego de toma de aire (Inlet Grids) antiviento en la aspiración, fabricado en PVC, tipo nido de abeja, de baja pérdida de presión.
- Mantenimiento Preventivo : Un juego de partes de recambio, recomendado por el fabricante para después de dos años de operación, de acuerdo al cuadro adjunto.

PRECIOS DEL SUMINISTRO:

PRECIO DEL ITEM 1 : Un juego de toma de aire US$ 3,380.- más el IGV

PRECIO DEL ITEM 2 : Un juego de partes de recambio US$ 1,535.- más el IGV

CONDICIONES DE VENTA:

- Forma de pago 60 % con la orden, saldo contra entrega.
- Tiempo de entrega De 6 a 8 semanas.

Sin otro particular y a la espera de sus gratas órdenes quedamos de Ud.

Atentamente,

Ing. Henry Torrejón.

PROYECTOS - INSTALACION - MANTENIMIENTO

LE GAMMA Nº 150 - OF. 202
que Internacional de Industria y Comercio
LAO - PERU

e-mail:mitor@wayna.rcp.net.pe
TELEF / FAX: (51-1) 561-3046
CEL.: 991-1870

COTIZACIÓN

INGENIERÍA DE SISTEMAS DE FLUIDOS S.A.

PR-106/02

Callao, 09 de febrero del 2,002

Señores:
CORPORACIÓN JOSÉ R. LINDLEY S.A.
Presente.-

Att. Ing. Roberto Ráez

Estimados Señores:

De acuerdo con su amable solicitud, a continuación detallamos las características y valores de venta nuestra oferta técnico económica por el servicio de:

ENSAMBLE,INTERCONEXIÓN Y PUESTA EN MARCHA DE CONDENSADOR EVAPORATIVO BALTIMORE® MODELO CXV-253-K

DETALLE DEL SERVICIO

1. Transporte de todas las partes del equipo desde el actual almacén hasta el lugar de ensamble
2. Verificación y recuento de las piezas que conforman el equipo
3. Ensamble del equipo según los planos suministrados por el fabricante (dos cuerpos por separado)
4. Desconexión del condensador BALTIMORE® existente y preparación de éste para bajarlo con la grúa
5. Coordinación continua con personal de la grúa que bajará el equipo existente e izará los cuerpos del equipo nuevo
6. Interconexión de los cuerpos del equipo
7. Megado de los motores eléctricos
8. Preparación de tuberías para interconexión incluyendo las válvulas requeridas
9. Interconexión con la línea de gas y líquido existentes
10. Interconexión con los puntos de agua y energía eléctrica suministrados por el cliente
11. Vacío del sistema y pruebas con gas Nitrógeno suministrado por nosotros
12. Pruebas en vacío
13. Regulación con carga y puesta en marcha

VALOR TOTAL DE VENTA SIN INCLUIR I.G.V. **US$ 7,890.00**

Tiempo de entrega	15 días, luego de recibida su O/C
Forma de pago	Factura a 30 días
Validez de la oferta	30 días

5 MINISTROS A CARGO DE ISF SAC

1 Trabajos preliminares de movilización y desmovilización de nuestro personal, equipos y herramientas
Suministro de personal para la dirección, supervisión y ejecución del servicio, dentro del plazo previsto
Suministro de maquinaria, equipos, herramientas y dispositivos de seguridad para nuestro personal
Suministro de materiales permanentes y consumibles requeridos para la ejecución del servicio
Retiro de las tuberías y accesorios que fueran reemplazados
Pago de jornales, beneficios sociales, seguros contra accidentes, transporte, alojamiento y alimentación de nuestro personal en obra

UMINISTROS A CARGO DEL CLIENTE

Coordinación permanente entre nuestro Ingeniero Jefe de obra, en el lugar de las operaciones y el supervisor por parte del cliente

2. Habilitación de un área apropiada para el ensamble del condensador evaporativo
3. Habilitación de un área apropiada para instalar nuestros almacenes, taller y/o oficina provisional
4. Suministro de la grúa y maniobrista necesarios para izar y montar las partes del equipo en la base correspondiente
5. Suministro del punto de energía eléctrica para los ventiladores y la bomba de agua al pie de cada equipo en los voltajes y potencias requeridos
6. Suministro del punto de agua blanda de reposición de acuerdo con las condiciones de caudal y presión exigidos en la entrada correspondiente
7. Suministro de amoníaco

CONSIDERACIONES Y EXCEPCIONES

1. No se considera ninguna Obra Civil
2. No se considera efectuar pruebas radiográficas u otro tipo de ensayo para verificación de la soldadura de las tuberías

Sin otro particular y esperando contar con su aprobación, quedamos de Uds.

Atentamente,

Víctor Figueroa

ANEXOS 03: PRESUPUESTOS DE OBRAS CIVILES

TRANSPORTE DE MAQUINARIAS PESADAS Y MANIOBRAS S.R.L.

Av. 28 de Julio 2379 - D - 3° Piso - La Victoria ☎473-3103 Telefax: 474-6380
Lima - Perú

Lima, 01 de Julio del 2002

Señores
CORPORACION JOSE R. LINDLEY S.A.
JR. CAJAMARCA 371 - RIMAC
LIMA.-

ATT.- ING. MIGUEL ORTIZ

Asunto: Presenta presupuesto por maniobras a Condensador Evaporative

De nuestra consideración:

Tengo a bien dirigirme a Uds. para presentar a su atención nuestro presupuesto para la ejecución del siguiente servicio:

- Por movilizar desde almacén 03, un condensador evaporativo de base 3.60 x 3.70 mts., altura de 4.90 mts. y una p.a. de 06 toneladas, hasta su planta de producción de Jr. Cajamarca, luego izarla a una altura de 12 mts. aproximadamente y ubicarla según sus indicaciones. En su ejecución emplearemos una grúa adecuada y participación de personal con herramientas de maniobras.

  COSTO TOTAL: S/ 7,700.00 más I.G.V.

  FORMA DE PAGO: - Cancelación al término y presentación de nuestra factura.

Sin otro particular, agradecemos su atención al presente y quedamos a disposición de sus gratas ordenes.

Atentamente,

TRANSPORTE DE MAQUINARIAS PESADAS Y MANIOBRAS S.R.L.
SALOMON SULCA POMASONGO
GERENTE

SALA
Y ASOCIADOS
arquitectos s.r.l.

CORPORACION J.R. LINDLEY S.A.
ING. AUGUSTO REY R.
ING. MIGUEL ORTIZ
REUBICACION DE VIGA SOPORTE DE CONDENSADOR
OBRAS CIVILES_ MEJORAMIENTO DE TECHO
22-Jul-2002

olic] nos es grato presentarle nuestra mejor propuesta por lo sgte . :

Descripción	Und	Cant	P.Unit. US $	Parcial US $	Precio Total US $
REUBICACION Y MANTENIMIENTO DE VIGA SOPORTE					
OBRAS DE METALMECANICA					
Reubicacion de estructura soporte					
Corte de estructura	Und	2.00	18.00	36.00	
Medicion y ubicación de viga	glb	1.00	22.00	22.00	
Soldado y limpieza de la zona a reubicar la viga	und	2.00	44.00	88.00	
Suministro e Instalacion de angulo 3"x3"x1/4"para ampliacion de area de soporte de condensador	ml	6.20	26.00	161.20	307.20
OBRAS CIVILES					
OBRAS DE CONCRETO ARMADO					
Recubrimiento de piso con morterto 1:5 con Impermeabilizante	m2	17.00	6.20	105.40	
Acero de refuerzo	kg	40.00	0.58	23.20	
PISOS					
Piso de acabado pulido	m2	17.00	7.50	127.50	
Media caña sanitaria	ml	13.50	2.85	38.48	
Recubrimiento de piso con pintura epoxica	m2	17.00	18.50	314.50	609.08
COSTO DIRECTO				US $	916.28
GASTOS GENERALES + UTILIDAD		13.00%		US $	119.12
TOTAL SIN IGV				US $	1,035.39
TOTAL SOLES SIN I.G.V				S /.	3,592.81

SALA
Y ASOCIADOS
arquitectos s.r.l.

ORPORACION J.R. LINDLEY S.A.
IO G. ROBERTO RAEZ SOTO
G. MIGUEL ORTIZ

ANTENIMIENTO DE VIGA SOPORTE DE TORRE DE ENFRIAMIENTO

: 3-Aug-2002

tra licitud nos es grato presentarle nuestra mejor propuesta por lo sgte .:

Descripción	Und	Cant	P.Unit. US $	Parcial US $	Precio Total US $
BRAS ELECTROMECANICAS					
antenimiento de estructura existente					
uministro y aplicacion de abrasivo para limpieza de estructura	glg	1.00	220.00	220.00	
uministro y aplicacion de pintura (anticorrosivo + 02 manos de esmalte)	glb	1.00	205.00	205.00	
OSTO DIRECTO				US $	425.00
ASTOS GENERALES + UTILIDAD		13.00%		US $	55.25
OTAL SIN IGV				US $	480.25
OTAL SOLES SIN I.G.V				S /.	1,666.47

ANEXOS 04: CATALOGOS

Baltimore Aircoil
Amsted Industries

SUBMITTAL DATA FORM

W CORK & SEAL CO INC
B(5129

T 10RE, MD 21224

DATE 03/02/87
P.O. NO. 17-019872
B.A.C. NO. 87100725
MODEL NO. C1-842-K ←
ZSRATE

LIMA, PERU
CROWN CORK & SEAL CO INC
G F MORIN CO/BALTIMORE LAUREL, MD

EVAPORATIVE CONDENSERS

APACITY: INDOOR
105.00 TONS ,R-717 REFRIGERANT, AT 95.00 F.C.T., 25.00 F.S.T
75.00 F ENTERING WET BULB.

OR3): (1) ~~10~~ 15 HP, 1800 RPM,3 PHASE,60 HERTZ,230/460 SUIT 480 VOLTS,
STANDARD ODP ENCLOSURE. FAN DRIVES BASED ON 0 " ESP

TO(S): (1) M/2 HP, 3450 RPM,3 PHASE,60 HERTZ,230/460 SUIT 480 VOLTS,
ODP ENCLOSURE.

speed fan motors require a starter that incorporates a 15 second time delay when switching from high to low speed.

Data: 6 copies ☐ For Approval ☒ For Record

ITEM	ITEM

FEBRUARY 18, 1987

04/10/87

IA TERMODINAMICA SA

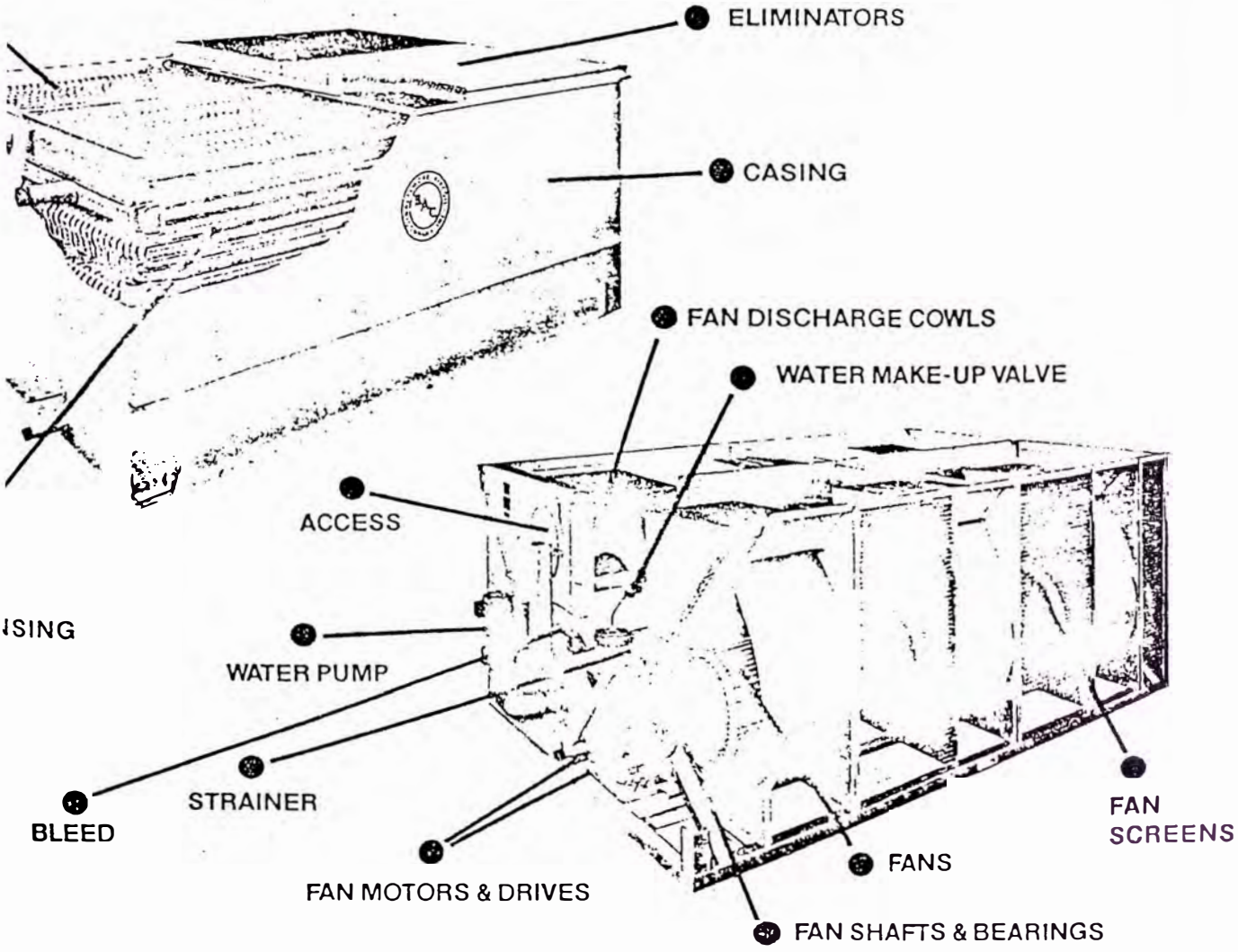
BOX 7322 BALTIMORE, MARYLAND 21227 / TELE: (301) 799-6200 / TELEX: 87821 / FAX. 301-799-6416
BOX 960 MADERA, CALIFORNIA 93639 / TELE: (209) 673-9231 / TELEX: 361756 / FAX: 209-673-5095
EAST DIVISION / ROUTE 2 / BOX 7 PAXTON, ILLINOIS 60957 / TELE: (217) 379-2311 / TELEX: 62796702 / FAX: 217-379-3522
BOX 402 MILFORD, DELAWARE 19963 / TELE: (302) 422-3061 / TELEX: 835399 / FAX: 302-422-9296

ENGINEER COPY

P1

/AP. NDENSER	UNIT SIZE									
:T	VSC 200A—250A		VSC 275A—350A		VSC 400A—500A		VSC 550A—700A		VSC 800A—1000A	
	QUAN	PART NUMBER	QUAN	PART NUMBER	QUAN	PART NUMBER	QUAN	PART NUMBER	QUAN	PART NUMBER
	2	25-100P	3	25-100P	4	25-100P	6	25-100P	8	25-100P
Sha	1	55-2535SB	1	55-2537SB	2	55-2535SB	2	55-2537SB	4	55-2535SB
Sha earings	2	24-79P	2	24-79P	4	24-79P	4	24-79P	8	24-79P
Rin	4	25-108PB	6	25-108PB	8	25-108PB	12	25-108PB	16	25-108PB
Va	1	28-111PB	1	28-87PA	1	28-87PA	1	28-87PA	2	28-87PA
Va Screw	1	21-237P		--------		———		--------		-------
Va Nut	1	21-195P		-------		———		———		———
	1	26-183P	1	26-184P	1	26-184P	1	26-184P	2	26-184P
	4	21-229P	4	21-229P	4	21-229P	4	21-229P	8	21-229P
Ar ssembly	1	55-2791SA	1	55-2793SA	1	55-2793SA	1	55-2793SA	2	55-2793SA
	1	28-46PA	1	28-46PA	1	28-46PA	1	28-46PA	2	28-46PA
Acc Door	2	66-891SB	2	66-891SB	2	66-891SB	2	66-891SB	4	66-891SB
ss r Gasket	2	27-147PA	2	27-147PA	2	27-147PA	2	27-147PA	4	27-147PA
gh	22	60-1046PB	22	60-1047PB	44	65-4244PB	44	60-1047PB	88	65-4244PB
na	4	65-4750SA	4	65-4749SA	8	65-4750SA	8	65-4749SA	16	65-4750SA
na	8	65-4748SA	8	65-4747SA	16	65-4748SA	16	65-4747SA	32	65-4748SA
ne	2	55-2529SB	2	55-2529SB	2	55-2529SB	4	55-2529SB	4	55-2529SB
ts		Note #1		Note #1		Note #1		Note #1		Note #1
p		———		———		———	1	30-166P	1	30-167P
p	1	30-165P	1	30-166P	1	30-167P	1	30-200P	1	30-201P
t	Consult unit nameplate for V-Belt sizes									

/ATER DISTRIBUTION SYSTEM (TROUGHS)



JSING

MECHANICAL SPECIFICATIONS

BALTIMORE AIRCOIL SERIES V EVAPORATIVE CONDENSERS

C1000 CENTRIFUGAL FAN MODELS

P3

G210 Hot-Dip Galvanized Steel Construction

P JECT Lima, Peru

C TOMER Crown Cork & Seal Company, Inc. P.O. 17-019872

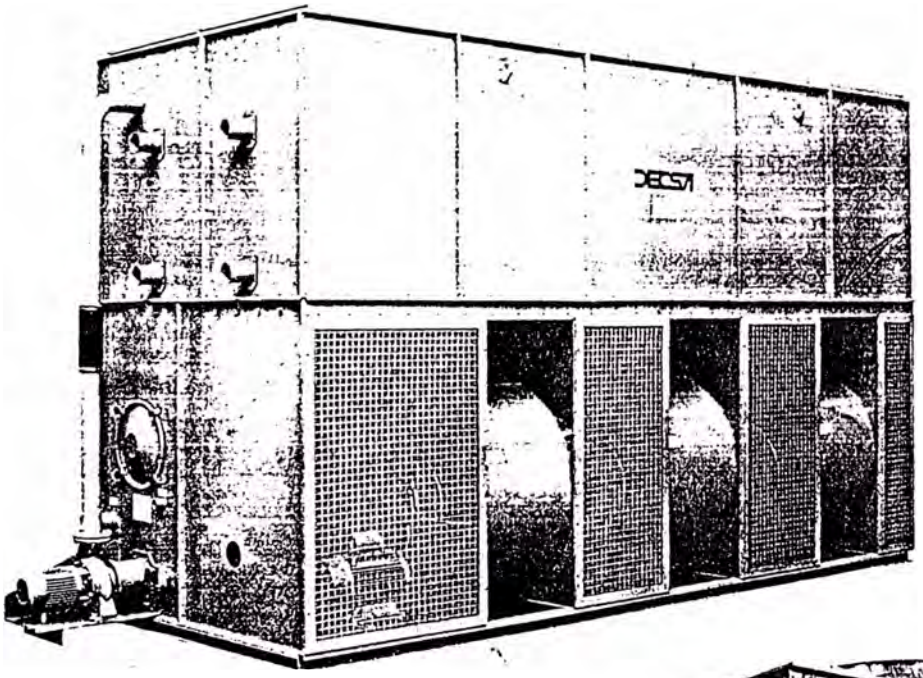
B .C. SERIAL NO. 87100725 ENGINEER Crown Cork & Seal Co., Inc.

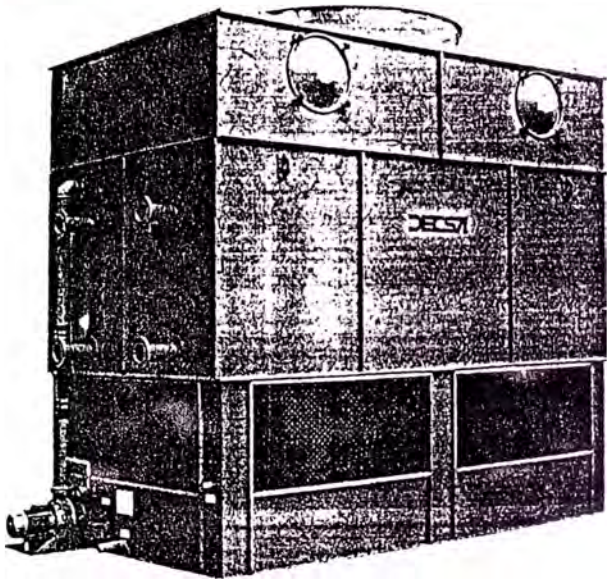
UIT TYPE	Factory-assembled, counterflow, blow-through design evaporative condenser. All steel panels and structural members are constructed from G210 hot-dip galvanized steel. Edges are given a protective coat of zinc-rich compound. A Zinc Chromatized Aluminum finish is applied to the exterior of the unit after assembly.
PA/FAN SECTION CONSTRUCTION	Heavy gauge steel panel construction of G210 hot-dip galvanized steel. The centrifugal fans and motors are located in the dry entering airstream beneath the sloping side of the pan.
MAKE-UP FLOAT ASSEMBLY	Brass make-up valve with unsinkable polystyrene filled plastic float arranged for easy adjustment. The make-up valve is suitable for city water supply pressures between 15 and 50 psig. (Make-up float assembly is not provided on units for remote sump operation.)
STRAINER	Large area, lift-out, hot-dip galvanized steel strainer screens have perforated openings sized smaller than water distribution nozzle orifices. Strainer assembly includes anti-vortexing baffle to prevent air entrainment. (Strainer is not provided on units for remote sump operation.)
FAN DISCHARGE CONES	Fan discharge cowls, constructed of hot-dip galvanized steel, are provided on each fan. They extend within the pan to protect the fans from falling water.
ACCESS	Hot-dip galvanized steel circular access doors are held in place with phenolic knob screws.
BLEED-OFF	Waste water bleed line with adjustable valve provided (except units for remote sump operation).
PUMP	Vertically installed close-coupled centrifugal pump with mechanical seal, installed to drain when pan/fan section is drained. Open drip-proof motor suitable for outdoor operation provided with protective canopy (except units for remote sump operation).
FAN WHEELS	Forwardly curved centrifugal squirrel cage type, protected with the BALTIBOND® Corrosion Protection System. Fan wheels are statically and dynamically balanced. Fan housings have curved inlet rings for efficient air entry.
FAN SHAFT AND BEARINGS	Models C17XX Solid shaft of ground and polished steel with exposed surface coated with a rust preventative. Self-aligning, heavy-duty, grease-lubricated, ball bearings with eccentric locking collars are provided on each end of the fan shaft. Where intermediate bearings are required, self-aligning, oil lubricated, sleeve type bearings with split, cast iron, pillow-block housing are furnished. Models C184X And Larger Hollow steel shaft, protected with two part epoxy, with bearing journals at each end. Solid polished steel journal coated with rust preventative. Self-aligning, heavy-duty, grease-lubricated, ball bearings with eccentric locking collars are furnished at each end of the shaft.

CFR/0900

Condensatori evaporativi serie CFR

Evaporative condensers series CFR





Serie CFR

Di• onibili nei modelli centrifughi ed assiali con identica
e termica, i condensatori CFR utilizzano le batterie full
ce, la cui grande superficie di scambio occupa tutto lo
o disponibile.
delli assiali hanno i ventilatori funzionanti in aspirazione
:o carico verticale che esclude il ricircolo dell'aria umida e
a mazione di ghiaccio sulle pale in inverno.
,e tterie possono essere totalmente o parzialmente alet-
at così da favorire il funzionamento invernale a secco, con
is| mio di energia e nessun pericolo di gelo dell'acqua
ic| olata.

Series CFR

Available both in the centrifugal and axial models with identical heat rejection, the CFR condensers have generously built "full surface" coils, taking up all the available space of the unit.
The axial models have induced type fans that avoid the humid air recirculation, and in winter the risk of ice built up on the impellers.
The coils can be totally or partially finned so as to allow an energy saving dry operation in winter, without any risk of recirculated water iceing.

Dati tecnici

Engineering data

Potenza nominale NH3	Potenza nominale R22	Portata aria	Portata acqua ricircolata	Potenza pompa	CFR-C con ventilatori centrifughi: Potenza motore	Peso a vuoto	Peso in marcia	Peso sez. più pesante	CFR-A con ventilatori assiali: Potenza motore	Peso a vuoto	Peso in marcia	Peso sez. più pesante	Potenza riscaldatore elettrico	Potenza riscaldatore elettrico
kW	kW	m³/s	l/s	kW	kW (1)	kg	kg	kg	kW	kg	kg	kg	kW (2)	kW (3)
Nominal capacity NH3	*Nominal capacity R22*	*Air flow*	*Spray water flow*	*Pump power*	*CFR-C with centrifugal fans: Motor power*	*Net weight*	*Weight in operation*	*Weight heaviest section*	*CFR-A with axial fans: Motor pump*	*Net weight*	*Weight in operation*	*Weight heaviest section*	*Power electric heater*	*Power electric heater*
kW	*kW*	*m³/sec*	*l/s*	*kW*	*kW (1)*	*kg*	*kg*	*kg*	*kW*	*kg*	*kg*	*kg*	*kW (2)*	*kW (3)*
176	148	3,25	3,24	0,37	1,5	590	650	390					1	2
220	185	3,25	3,24	0,37	2	670	740	470					1	2
248	211	3,25	3,24	0,37	2	760	840	570					1	2
382	317	7,11	6,48	0,75	4	1100	1260	770					2	3
447	376	7,11	6,48	0,75	4	1280	1470	930					2	3
503	429	7,11	6,48	0,75	4	1420	1630	1120					2	3
577	479	10,69	9,72	1,1	5,5	1680	2020	1280					3	4
690	578	11,03	9,72	1,1	7,5	1820	2180	1360					3	4
809	691	11,03	9,72	1,1	7,5	2130	2550	1700					3	4
944	789	17,22	15,66	1,5	11	3350	3850	2350	4x2	3030	3500	2350	4	5
1104	935	17,22	15,66	1,5	11	3650	4150	2650	4x2	3400	3900	2650	4	5
1289	1113	17,22	15,66	1,5	11	3740	4300	2950	4x2	3550	4100	2950	4	5
1333	1117	24,17	22,68	2,2	15	4500	5630	3150	11	4050	5050	3150	4	5
1595	1348	25	22,68	2,2	18,5	5100	6350	3700	11	4700	5900	3700	4	5
1864	1606	25	22,68	2,2	18,5	5650	7050	4550	11	5400	6700	4550	4	5
1971	1658	35,14	33,9	3	22	6600	8250	4630	7,5x2	6050	7800	4630	5	6
2463	2071	38,89	33,9	3	30	7500	9350	5400	11x2	6900	9000	5400	5	6
2767	2359	38,89	33,9	3	30	8400	10500	6700	11x2	7900	10150	6700	5	6
2665	2233	48,34	45,3	2,2x2	15x2	10200	12750	3150	11x2	9200	12000	3150	4+4	5+5
3190	2695	50	45,3	2,2x2	18,5x2	10400	13000	3700	11x2	9500	12500	3700	4+4	5+5
3728	3211	50	45,3	2,2x2	18,5x2	11450	14300	4550	11x2	10300	13400	4550	4+4	5+5
3931	3309	70,28	68,1	3x2	22x2	13600	17000	4630	7,5x4	12200	15800	4630	5+5	6+6
4925	4143	77,78	68,1	3x2	30x2	15350	19200	5400	11x4	14200	18500	5400	5+5	6+6
5534	4718	77,78	68,1	3x2	30x2	17000	21050	6700	11x4	16000	22000	6700	5+5	6+6
1805	1522	32,22	31,2	3	22	6500	8130	4550	15	5800	7250	4550	6	7
2208	1870	34,45	31,2	3	30	7500	9370	5450	18,5	6950	8700	5450	6	7
2640	2269	35,56	31,2	3	30	8500	10650	6700	18,5	8050	10500	6700	6	7
2730	2301	48,61	47,1	5,5	18,5x2	10500	13150	7350	11x2	9500	11900	7350	7	8
3246	2763	50	47,1	5,5	22x2	11100	13900	8100	11x2	10200	12800	8100	7	8
3640	3139	50	47,1	5,5	22x2	12500	15600	9900	11x2	11600	14500	9900	7	8
3610	3044	64,45	61,2	2x3	22x2	13300	16600	4550	15x2	12000	14800	4550	6+6	7+7
4416	3739	68,89	61,2	2x3	30x2	15100	18900	5450	18,5x2	14100	17500	5450	6+6	7+7
5280	4538	71,12	61,2	2x3	30x2	16800	21000	6700	18,5x2	15800	19800	6700	6+8	7+7
5459	4602	97,23	93,9	5,5x2	18,5x4	20100	25100	7350	11x4	18100	22500	7350	7+7	8+8
8496	5527	100	93,9	5,5x2	22x4	22700	28400	8100	11x4	21500	26800	8100	7+7	8+8
7281	6279	100	93,9	5,5x2	22x4	25500	31900	9900	11x4	24100	30500	9900	7+7	8+8

MODELLI NON DISPONIBILI

NOT AVAILABLE MODELS

li apparecchi canalizzati o con silenziatori richiedono motori maggiorati.
r temperature minime esterne fino a -10°C.
er temperature minime esterne fino a -20°C.

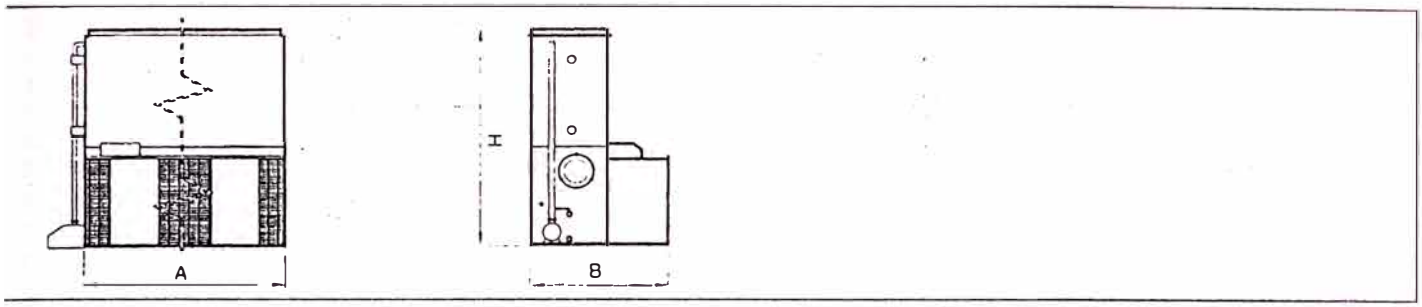
(1) The units with ducts or silencers need increased power.
(2) For minimum ambient temperatures up to -10°C.
(3) For minimum ambient temperatures up to -20°C.

Dimensioni

dimensioni non impegnative in mm

Dimensions

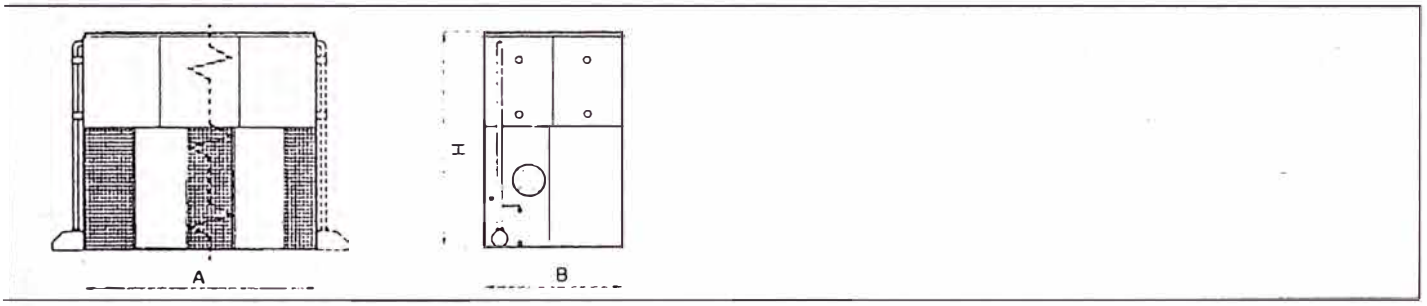
approximative dimensions in mm



Modello	A	B	H
005	1280	1640	2585
007	1280	1640	2815
009	1280	1640	3045
016	2480	1640	2585

Modello	A	B	H
019	2480	1640	2815
022	2480	1640	3045
027	3680	1640	2665
032	3680	1640	2895

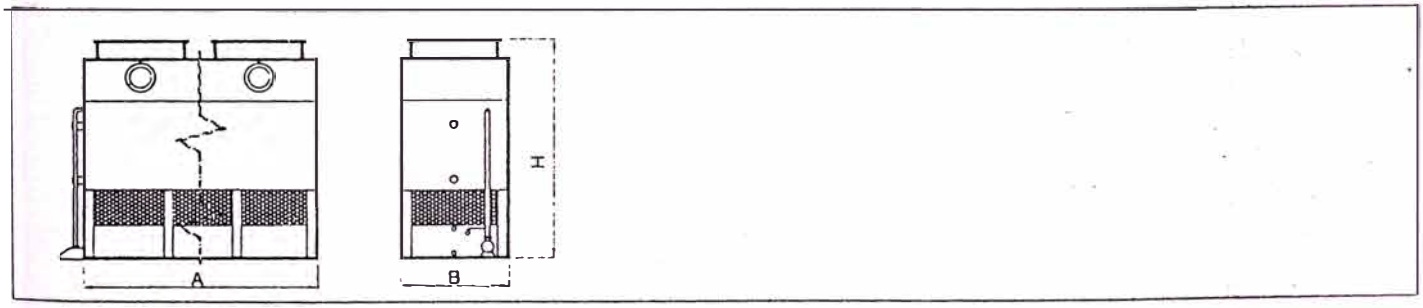
Modello	A	B	H
038	3680	1640	3125
042	3680	2180	3510
051	3680	2180	3740
063	3680	2180	3970



Modello	A	B	H
060	3680	2180	3610
075	3680	2180	3840
090	3680	2180	4070
095	5480	2180	3785
121	5480	2180	3955
140	5480	2180	4125
118	7280	2180	3610
149	7280	2180	3840

Modello	A	B	H
181	7280	2180	4070
189	10880	2180	3785
244	10880	2180	3955
279	10880	2180	4125
080	3680	2980	3610
103	3680	2980	3840
127	3680	2980	4070
131	5480	2980	3785

Modello	A	B	H
159	5480	2980	3955
184	5480	2980	4125
160	7280	2980	3610
205	7280	2980	3840
254	7280	2980	4070
262	10880	2980	3785
319	10880	2980	3955
367	10880	2980	4125



Modello	A	B	H
042	3680	1480	3565
051	3680	1480	3795
063	3680	1480	4025
060	3680	2180	3865
075	3680	2180	4095
090	3680	2180	4325
095	5480	2180	4040
121	5480	2180	4210
140	5480	2180	4380

Modello	A	B	H
118	7280	2180	3865
149	7280	2180	4095
181	7280	2180	4325
189	10880	2180	4040
244	10880	2180	4210
279	10880	2180	4380
080	3680	2980	3865
103	3680	2980	4095
127	3680	2980	4325

Modello	A	B	H
131	5480	2980	4040
159	5480	2980	4210
184	5480	2980	4380
160	7280	2980	3865
205	7280	2980	4095
254	7280	2980	4325
262	10880	2980	4040
319	10880	2980	4210
367	10880	2980	4380

La specifica tecnica e dati più dettagliati sono contenuti nella documentazione dei Raffreddatori Evaporativi Serie REF.

Dati e caratteristiche non impegnativi.

The Technical Specification and more detailed information are available in the literature of the Series REF Evaporative Coolers.

Data and specifications are not binding.

Selezione

elle abella Dati Tecnici è indicata la potenzialità nominale
k di ciascun modello con due diversi fluidi frigorigeni.
e ite il diagramma sotto riportato, è possibile ricavare il
ente di correzione K, sulla base delle effettive condi-
i funzionamento. Moltiplicando il coefficiente K per i
ettivi da sottrarre al fluido frigorigeno, si ottengono i
retti. Il diagramma va utilizzato solamente per funzio-
to con batteria spruzzata; per funzionamento a secco
tare il nostro Ufficio Tecnico.

g cato dei simboli usati:
Calore da sottrarre al fluido frigorigeno (in kW)
u. Temperatura dell'aria esterna al bulbo umido (in °C)
Temperatura di condensazione (in °C)

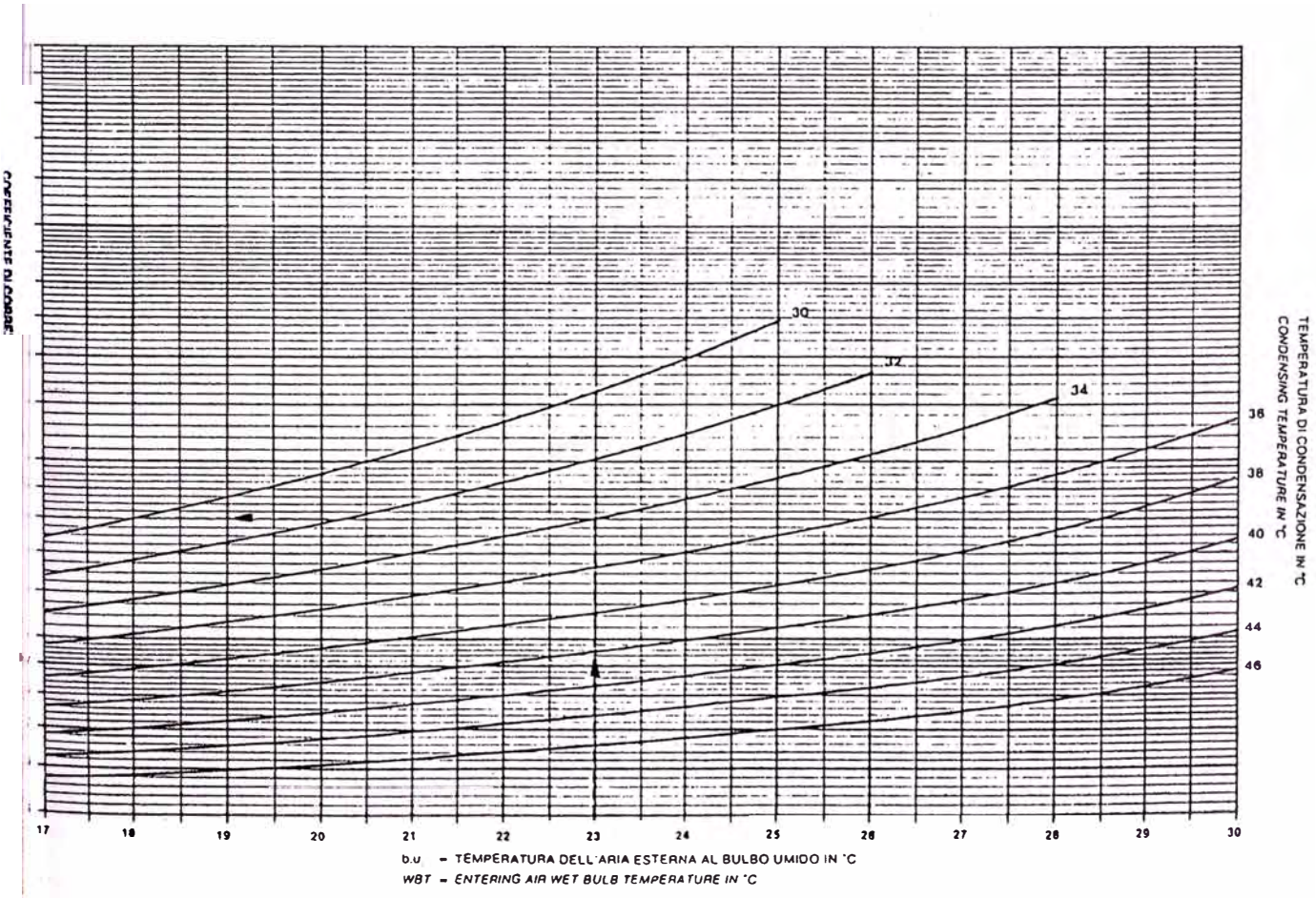
ei pio: siano da sottrarre Q=350 kW, fluido NH3, tempe-
tu dell'aria esterna al bulbo umido 23°C, temperatura di
nsazione 34°C.
l agramma si ricava K=1,6x350=560 corretti. Dalla ta-
lle Dati Tecnici si seleziona il modello CFR 027 (centrifugo
as ale) con 577 kW.

Selection

The Engineering Data table indicates the nominal capacity in kW of each model with two different refrigerant fluids. With the below chart it is possible to obtain the K correction factor, based on the actual operating conditions. Multiplying the K factor for the actual heat load to be rejected in kW, we obtain the corrected kW. The chart must be used only for sprayed coil operation; for dry operation, please contact our Technical Office.

Meaning of the symbols:
THR *= Heat to be rejected from the refrigerant fluid (kW)*
WBT *= Wet bulb ambient temperature (°C)*
CT *= Condensing temperature (°C)*

Example: *heat to be rejected = 350 kW, refrigerant fluid NH3 ammonia, wet bulb temperature = 23 °C, condensing temperature = 34 °C.*
From the chart we obtain K = 1,6 x 350 = 560 kW corrected. From the Engineering Data table we select the mod. CFR 027 (centrifugal or axial) with 577 kW.



Decsa srl
I-27058 Voghera - Italy / Via Cappelletta, 1
Tel. ++39 0383 6941.1 / Fax 62244
www.decsa.it / e-mail: info@decsa.it

ICK REFERENCE

intenance eck List

B.A.C.

COOLING TOWERS
EVAPORATIVE CONDENSERS
INDUSTRIAL FLUID COOLERS

Every Month:	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEPT.	OCT.	NOV.	DEC.
C ck fan and motor bearings and lubricate, if cessary.												
C ck tightness and adjustment of thrust ars on sleeve bearing units and locking ars on ball bearing units.												
ck belt tension and adjust if necessary.												
n strainer (if atmosphere is extremely , it may be necessary to clean strainer kly).												
n and flush sump.												
all B.A.C. cooling towers, check hot water ribution system and clean, if necessary.												
ck operating water level in the pan and st float valve, if required.												
evaporative condensers and industrial fluid lers, check water distribution. Adjust and h out troughs, if necessary.												
ck bleed-off rate and adjust if necessary.												
ck fans and air inlet screens and remove dirt or debris.												

a Year: Inspect and clean protective finish inside and out. Look particularly for any signs of spot lean and refinish any damaged protective coating.

uthorized B.A.C. parts, contact:

Representing:

B.A.C.

Baltimore Aircoil

BALTIMORE AIRCOIL COMPANY

C. Maintenance Manual for detailed maintenance procedure.

Cooling System SPRING Start-Up Procedures

A. Inspection of the Unit:

Check eliminators for proper position.

Check position of strainer screens and air inlet screens to be sure screens have not shifted during shut-down.

Check fan wheels, bearings, fan motors, and pumps (if applicable) for lubrication. (See Item E) Rotate all fan shafts by hand to make sure they turn freely.

Check fan motors for proper rotation. Directional arrows on fan housing sides indicate correct rotation.

Clear fans of any trash or debris that may have accumulated during shut-down.

Check make-up valve for leakage and to insure float arm moves freely.

B. Clean and Flush Sump of the Unit:

This is accomplished by removing the flush connection and flushing the debris down the drain.

C. Fill Pan with Water and Check Float Valve Level.

After the unit has been in operation under load for several days, operating water level should be checked. The operating water level should be approximately five (5) inches below the center line of the overflow connection.

D. Adjust Belt Tension of Fan Motors.

Proper belt tension is determined by pressing against a single belt midway between sheaves with one finger, which will deflect the belt ½" with moderate pressure. To adjust the belts, loosen the locknut on the inside of the frame angle and rotate the exterior nut as necessary. Re-tighten the locknut and recheck the tension.

E. Lubricate Bearings:

Sleeve Bearings: Use the B.A.C. oil that was shipped with the unit. During the first week of operation, refill each bearing cup several times to saturate the felt wick in the bearing cartridge. DO NOT USE OILS CONTAINING DETERGENTS FOR LUBRICATION.

Ball Bearings: After prolonged shut-downs, it is recommended that these bearings be purged.

Fan Motors, Pumps (if applicable): Lubrication should be in accordance with the motor manufacturer's recommendations.

Check and Adjust Accessories:

1. *Capacity Control Dampers:* Using the crank arm, rotate the damper shaft through the full range (open to closed positions) to make sure there is no binding.
2. *Electric Damper Controls:* Verify wiring is correct and end switch setting is correct. Refer to suggested wiring diagrams supplied with the submittal data.

PROPER MAINTENANCE

Proper start-up procedures and scheduled periodic maintenance will prolong the life of the equipment, and insure the trouble-free performance for which the unit was designed. Instructions for maintenance are given in the B.A.C. Maintenance Manual, which is included with every unit shipped. This manual should be read and kept in a safe place. Additional copies are available from your local B.A.C. Representative.

WINTERIZING Your Cooling System

Baltimore Aircoil has several maintenance tips for winterizing your water cooling system that could prevent system freeze-up and the resultant damage to equipment.

A. For All Cooling Towers, Industrial Fluid Coolers and Evaporative Condensers:

1. Provision must be made to protect the water in the basin from freezing when the unit is idle. This can be accomplished by using a remote sump installed in a heated space or installing steam/hot water coils or electric immersion heaters in the tower basin.
2. All outdoor water lines, including the make-up water line to the unit and drain lines from the unit should be traced with heater cable, and insulated.
3. During operation, frequent visual inspections of the unit must be performed regularly to:
   a. Insure all operating controls are properly set and functioning normally.
   b. Insure the method of freeze prevention is effective.
   c. Discover any icing conditions before they develop to the point where the unit is damaged or system performance is impaired.
4. A regular preventive maintenance program must be established and carried out despite adverse weather conditions. Items covered should include:
   a. Regular lubrication of moving parts.
   b. Regular checking of make-up valve and cleaning of strainers to prevent high water levels in basin.
   c. Regular checking and cleaning of hot water distribution system to assure uniform flow over unit.
5. All outdoor water lines should be insulated and traced with heating cable.

B. Coil Protection for Industrial Fluid Coolers:

1. Charge the coil with ethylene glycol to prevent the system fluid from freezing.
2. If no ethylene glycol is used, full flow through the coil must be maintained with the temperature of the circulating fluid never less than 50°F.
3. During light load periods, auxiliary heat should be applied directly to the circulating fluid.
4. A vacuum breaker or air vent should be installed at the high point of the system and an adequately sized drain should be installed at the low point to permit emergency drainage of the coil.
5. All outdoor lines and spray pump should be insulated and traced with heating cable.

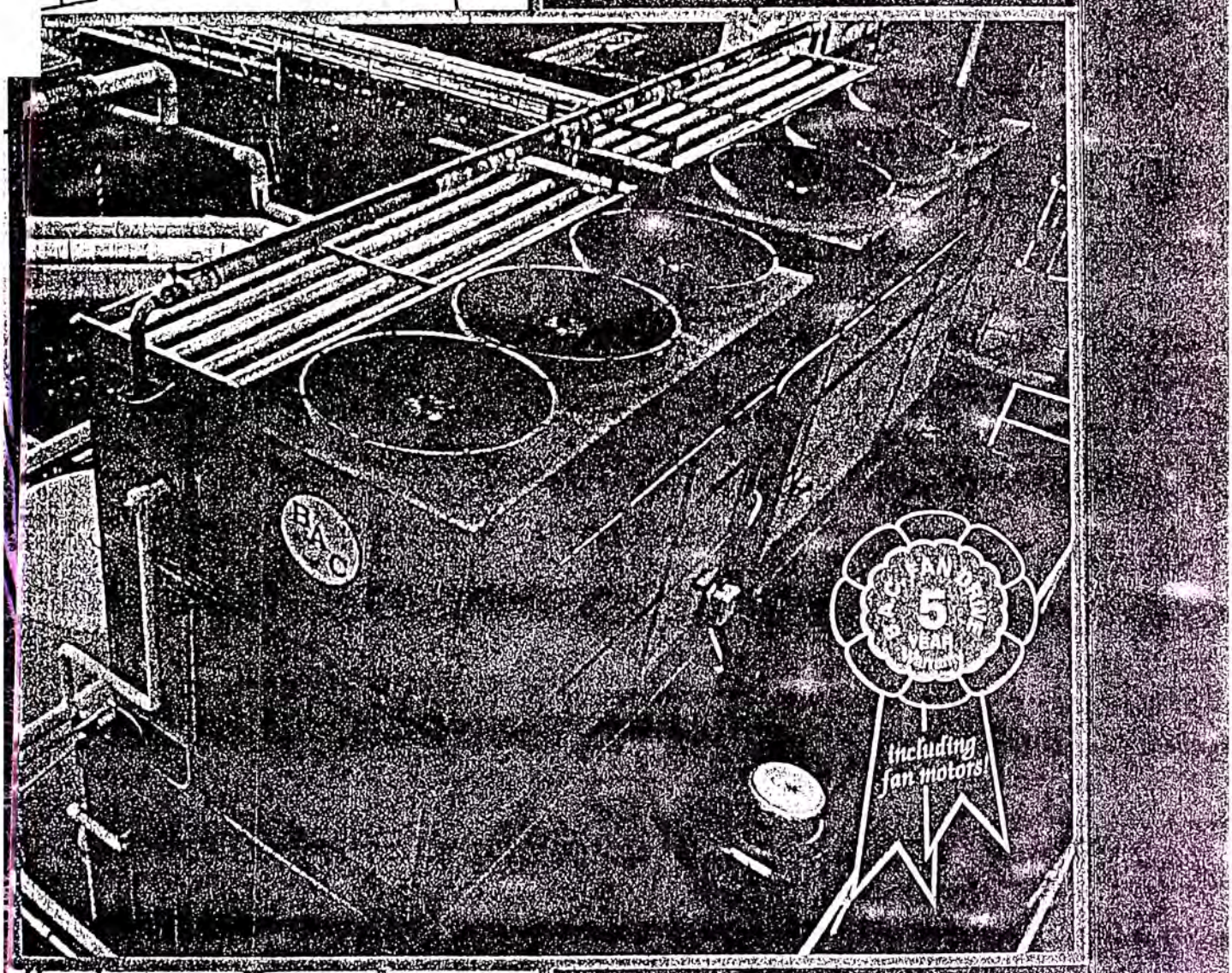
B.A.C. Baltimore Aircoil®
BALTIMORE AIRCOIL COMPANY
P.O. Box 7322, Baltimore, Maryland 21227

IVE	V-belt type with taper-lock sheaves. Selected for 150% motor nameplate horsepower. Mounted and aligned at the factory.
TOR	Drip-proof ball bearing type with 1.15 service factor, suitable for outdoor service and mounted on an adjustable motor base. Motor is located in weather protected position under the sloping pan side.
N GUARD SCREENS	Hot-dip galvanized steel screens.
T TRANSFER TION STRUCTION	Heavy gauge panel construction of G210 hot-dip galvanized steel. Heat transfer section is separable from pan/fan section.
DENSING COIL	Continuous 1.05" O.D. all prime surface steel encased in steel framework with entire assembly hot-dip galvanized after fabrication. Tubes sloped for liquid drainage. Tested to 350 psig air under water.
ER DISTRIBUTION TEM	Schedule 40 PVC spray header and branches. Removable branches and large orifice, plastic spray nozzles are held in place with snap-in rubber grommets.
MINATORS	Eliminators are constructed of hot-dip galvanized steel and are removable in easily handled sections. They impart three distinct changes in air direction to effectively strip entrained moisture from the leaving airstream with minimum air resistance, and to direct discharge air away from fans.

SERIES 1500

CXV EVAPORATIVE CONDENSERS

Engineering Bulletin



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RAISING THE STANDARD IN

B.A.C.®

Baltimore Aircoil

BULLETIN

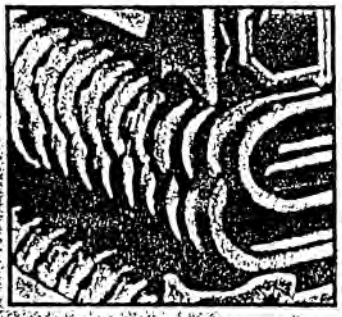
NSTRUCTION DETAILS

Heavy Duty Construction

ie 1500 Evaporative Condenser (CXV) is factory-
le from standardized parts manufactured under
cc trolled conditions to ensure each unit is built
y t the same high-quality construction standards.
te panels and structural elements of the CXV are
at e G-235 (Z700 metric) hot-dip galvanized steel.
; tl heaviest galvanizing commonly available in the
a l is the accepted standard for normal evapora-
de sing applications. All cut edges have a zinc-rich
ap ied before assembly. This standard corrosion
or system will provide reliable protection and long
ıc applications.

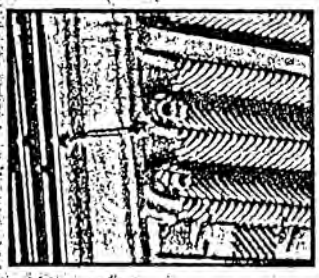
Condensing Coil

d ısing coil is all prime
ntinuous serpentine
b g and has a design
280 psig. It is tested by
c g eddy current system
350 psig air pressure
a r. The coil is designed
i tubes for free drainage
o ensed liquid. The coil
s in a steel framework
e ire assembly is hot-dip
z after fabrication.



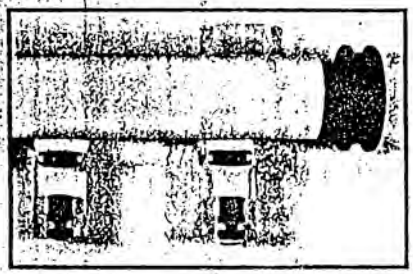
ross® Wet Deck Surface (patented)

e polyvinyl chloride (PVC)
k urface designed, manu-
d nd tested by BAC is an
mponent of the Series
porative Condenser's
heat transfer system.
ck surface is impervious
ay, biological attack and
e spread rating of 5 per
ndard E84-77a.



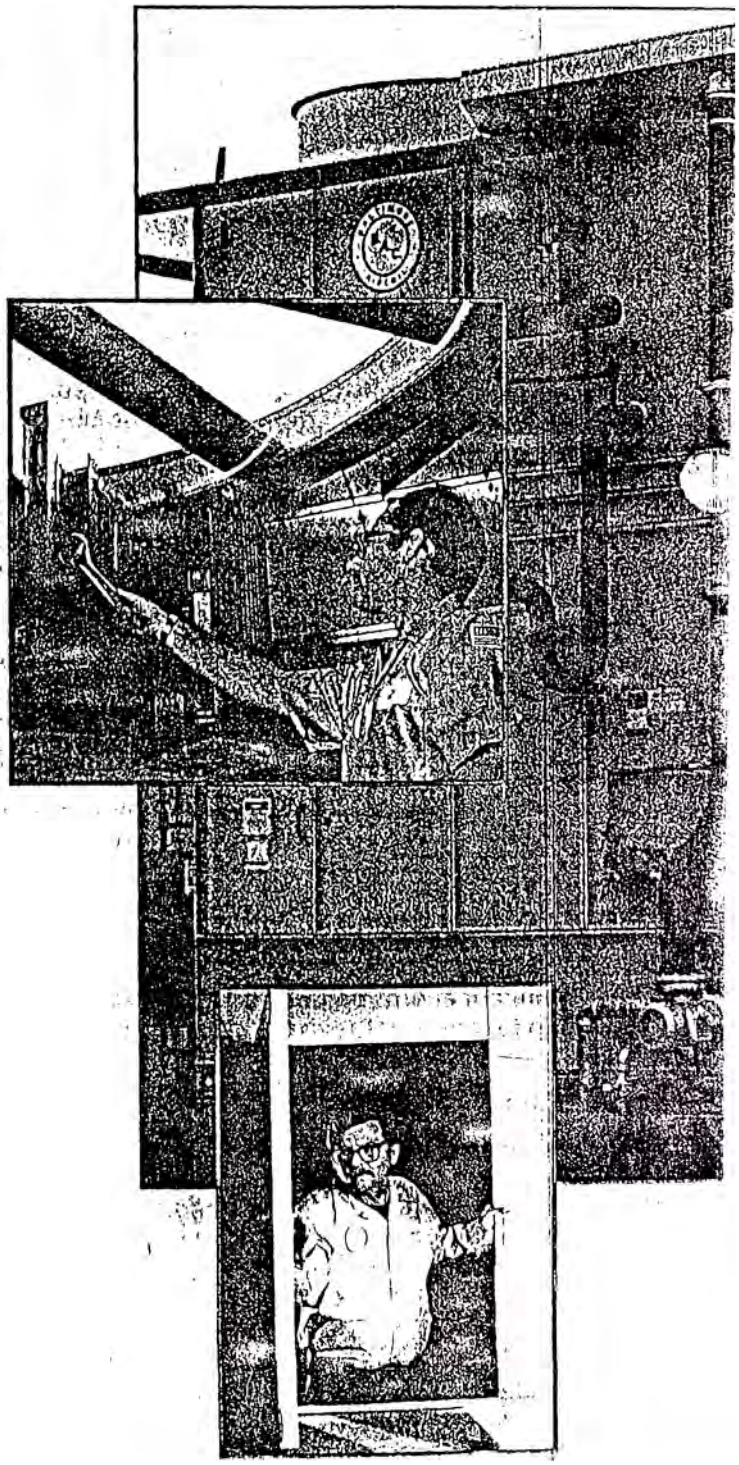
Water Distribution System

a zed header and
40 PVC spray
vith large diameter,
360° plastic spray
re designed for
vetting of the coil
operating condi-
e nozzles, spray
and headers are
d by rubber grom-
h permit easy removal for cleaning.



Fan Motors

The totally enclosed, air-over (TEAO) motors are designed specifically for evaporative cooling service. The motors are furnished with double-sealed, permanently-lubricated bearings and extra protection from moisture on the windings. Fan motors are warranted against defects in materials and workmanship for a period of five (5) years from the date of shipment.



Eliminators

ucted of PVC and furnished in easily able sections for quick access to the coil ct n, the eliminators impart three distinct ia es in air direction to effectively strip ois re from the airstream leaving the coil with inir um air resistance.

Access Door & Internal Walkway

A oversized (27" x 43") access door provides e / access to a permanent internal walkway which is positioned above the basin water level. A spacious P ium area allows simple routine maintenance of th fan drive system.

BALTIDRIVE® PowerTrain (patented)

The exclusive BALTIDRIVE® PowerTrain, now with over a decade of proven performance, is designed to provide long life with minimum maintenance. The solid-backed, multigroove, neoprene/polyester belt is manufactured to stringent B.A.C. specifications, and the driver and driven fan sheaves are corrosion-resistant, extending belt life significantly. Belt tension is easily adjusted by means of a simple, threaded bolt-and-nut arrangement on the motor base support assembly. Together, these components provide a highly-reliable system with low maintenance requirements. **The mechanical equipment components (fans, fan shafts, bearings, sheaves, mechanical equipment supports and fan motors only) are warranted against defects in materials and workmanship for a period of five (5) years from the date of shipment.**

Fans & Fan Cylinders

Heavy duty, aluminum axial-flow fans have been selected to achieve very low fan motor horsepower. The air is discharged through fan cylinders designed for stream-lined air entry and minimum tip clearances for maximum fan efficiencies. Heavy gauge, hot-dip galvanized fan guards are mounted on top of the fan cylinders.

Fan Shaft Bearings

Fans and shafts are supported by heavy duty, self-aligning, grease lubricated ball bearings with moisture proof seals and integral slinger rings. Bearings are selected for a minimum L10 life of 40,000 hours. Extended lubrication lines can be provided to permit lubrication of the drive bearings from the base of the unit.

Water Pump

A close-coupled, bronze-fitted, centrifugal pump with mechanical seal and TEFC motor is mounted and piped from the suction strainer to the water distribution system.

Water Bleed Line

A metering valve to control bleed rate is installed between the pump discharge and the overflow connection.

Water Make-up Valve Assembly

A solid brass valve is actuated by a large diameter, polystyrene-filled, plastic float which is adjustable by means of wingnuts on the float rod. The entire assembly is factory installed and can be adjusted from the exterior base of the unit.

Strainer

Accessible from outside of the unit to allow for easy inspection and cleaning, the suction strainer has an anti vortexing hood specifically designed to prevent air entrainment.

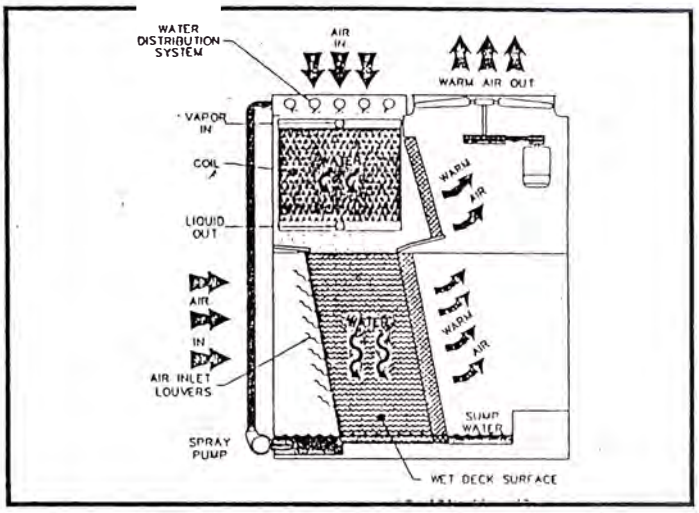
ONE OF THE Amsted INDUSTRIES

P.O. Box 7322, Baltimore, Maryland 21227 • (410) 799-6200 • Fax (410) 799-6416

TECHNOLOGICAL LEADERSHIP

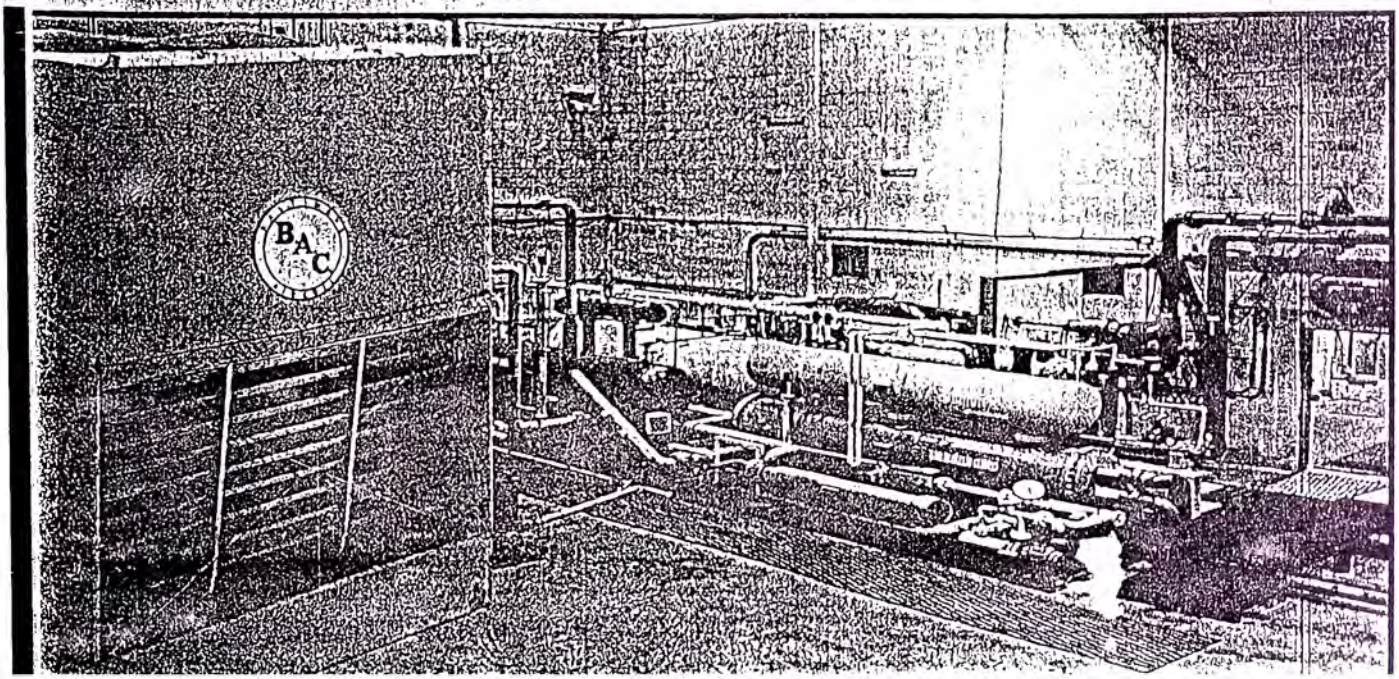
it: ounding in 1938, Baltimore Aircoil Company pe ialized in the design and manufacture of ra e condensing equipment and has become a ic leader in this field. B.A.C.'s continuing program ir ering research has resulted in many design ti s, including the V-Line in 1968, the VX-Line in th HIGH -K® Shell and tube Heat Exchanger in th Low Profile Series V-Line in 1988, and the ® l cteria, Slime and Algae Control in 1993. Once I A.C. raises the standard in heat transfer lc / with the Series 1500 Evaporative Condenser, u which combines counterflow and crossflow t ver and evaporative condenser technology for e evaporative condenser performance.

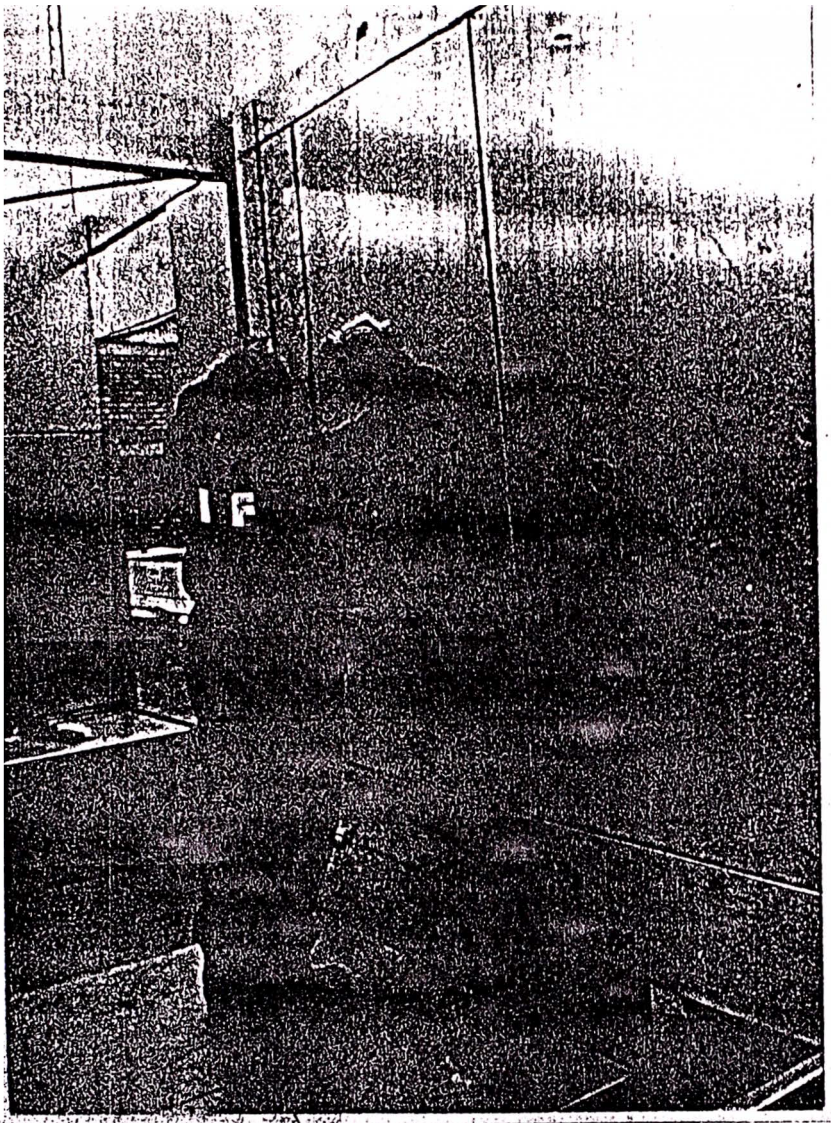
a e condenser research and product development n are conducted at the world's largest Evaporative n Test Facility located at the Corporate Research v opment Laboratory. Here, B.A.C. engineers t cians can simulate the broad range of environ- l nd system operating conditions that are t ed by units in actual use. Tests are conducted i nent ranging in size from small prototype s sed in conceptual development up through l eld-erected units.



PRINCIPLE OF OPERATION

The vapor to be condensed is circulated inside the tubes of the condensing coil which is continually wetted on the outside by a recirculating water system. Air is simultaneously drawn downward over the coil, causing a small portion of the recirculated water to evaporate. This evaporation rejects the heat from the coil, condensing the vapor into liquid. The water is then distributed over a wet deck surface where it is cooled by air being drawn across it, before being recirculated over the condensing coil by the condenser water pump.

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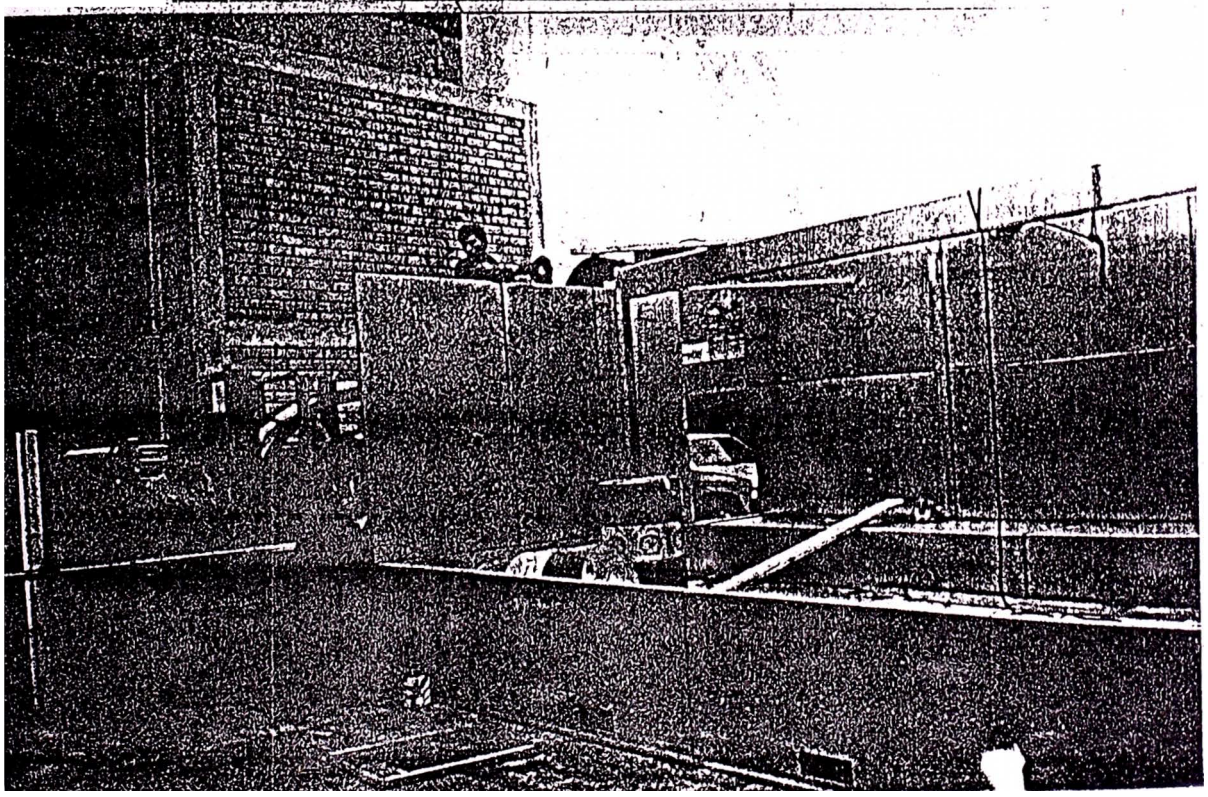

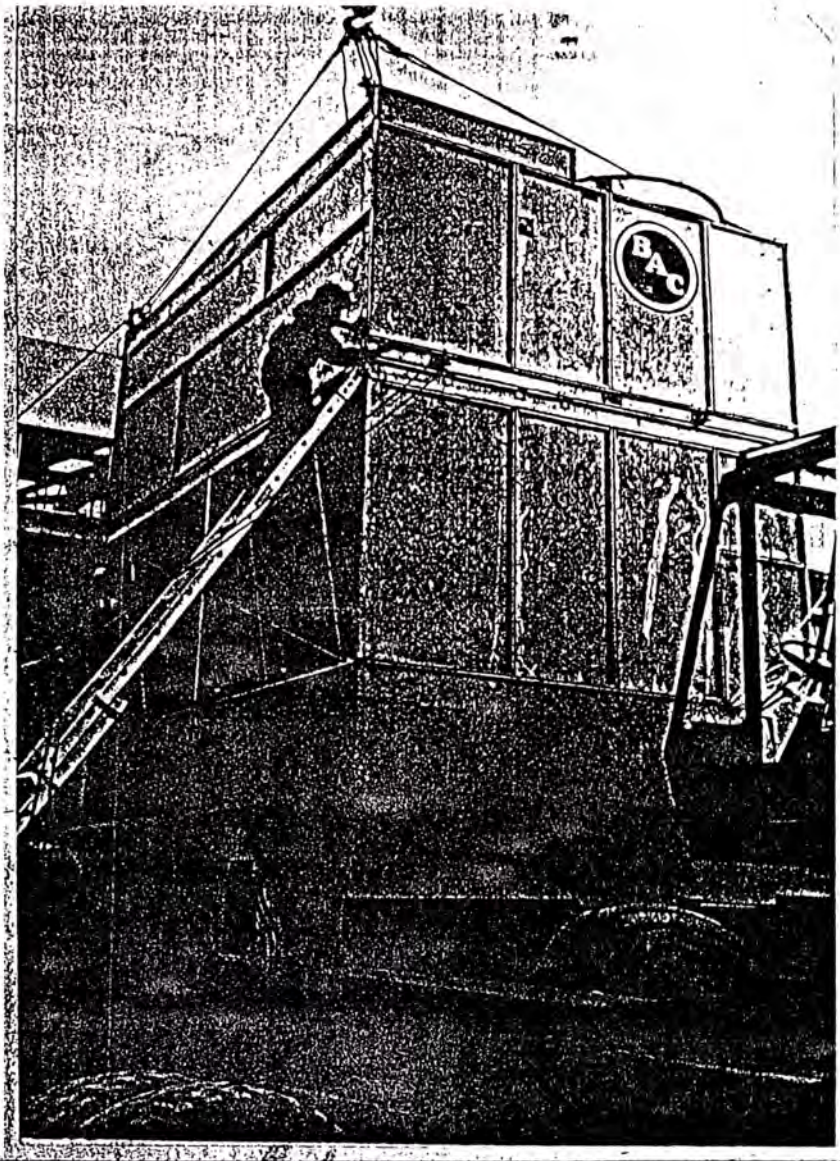
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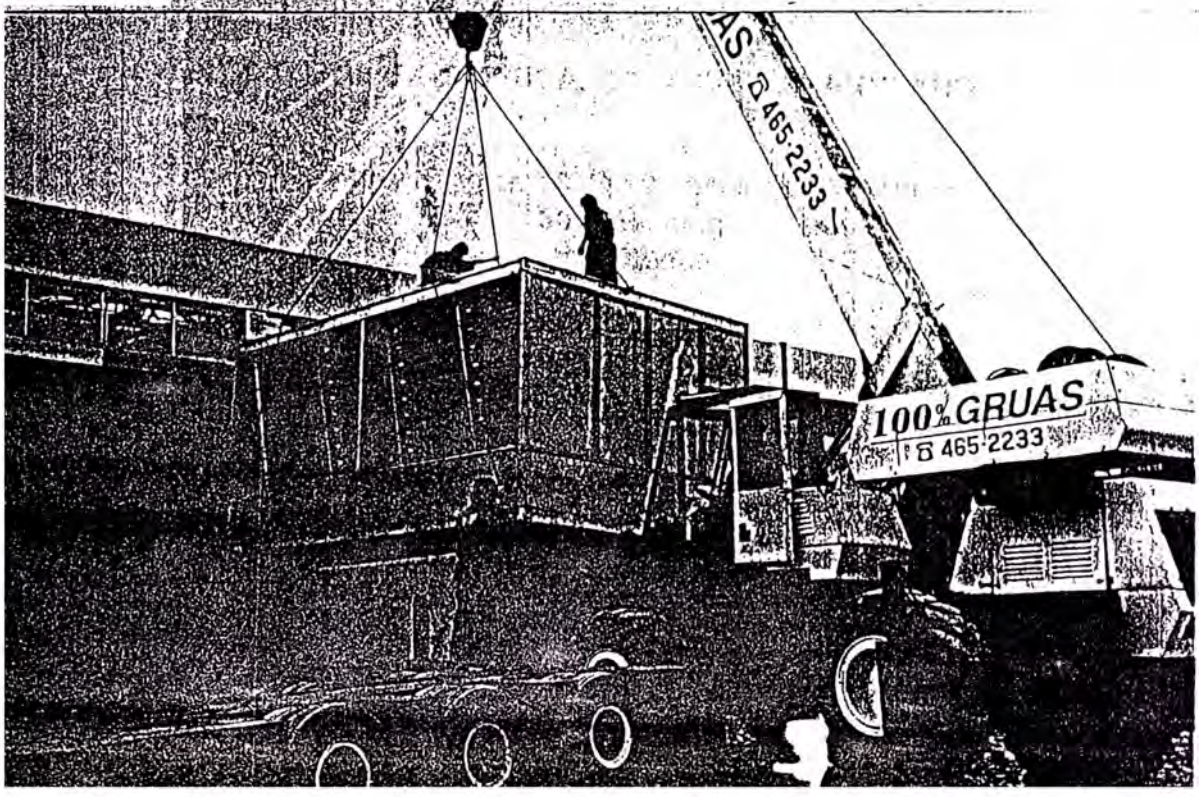
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Baltimore Aircoil

Series 1500 Cooling Towers Evaporative Condensers and Industrial Fluid Coolers

Rigging and Assembly Instructions

his illetin outlines proper rigging and assembly procedures for Series 1500 cooling towers, evaporative condensers, and industrial uid oolers. Thoroughly review the instructions in this bulletin with all personnel prior to an actual Series 1500 rigging operation. fak ure all necessary equipment is available before starting.

e s : to have a copy of the certified drawing available for reference. If you do not have a copy of this drawing or if you need ldi inal information about this unit, contact the B.A.C. Representative whose name and phone number are on a label attached to le u t adjacent to the access door. The model number and serial number of the unit are also located in this area.

hi ping

erie 1500 units are factory-assembled to ensure uniform ual and minimize field assembly. Series 1500 cooling w nodels 15146 to 15177, 15201, and 15219 ship in one ecti per cell. All other Series 1500 models ship in two ecti s per cell (upper and lower) due to shipping height stri ons. For the dimensions and weights of a specific cell ve ion, refer to the certified drawings.

Ch k Unit Before Rigging

he unit is delivered to the jobsite, check it thoroughly re all required items have been received and are free of pping damage before signing the bill of lading. Inspect e owing parts:

- eaves and Belts
- earings
- earing Supports
- n Motor(s)
- n(s) and Fan Shaft(s)
- et Deck Surface
- ooling or Condensing Coil(s)*
- emovable Drift Eliminators*
- terior/Exterior Surfaces
- ouvers
- oat Valve Assembly(s)
- rainer(s)
- pray Water Pump*
- ater Distribution System
- lake Hood Assembly (if applicable)*
- liscellaneous Items:
  - All bolts, nuts, washers, and sealer tape required to assemble sections or component parts are furnished by B.A.C. and are shipped with the unit. A check list inside the envelope attached to the side of the unit marked "For Rigger" indicates what miscellaneous parts are included with the shipment and where they are packaged.

* XV and FXV units only

RNING Before an actual lift is undertaken, ensure no water, ice, or debris has collected in the sump or elsewhere in the Such accumulations will add substantially to the equipment's weight.

RNING For extended lifts or where hazards exist, use lifting s with safety slings placed under the unit.

Unit Weights

Before rigging any Series 1500 unit, verify the weight of each section from the certified drawings.

Anchoring

Three-quarter (¾) inch diameter holes are provided in the bottom flange of the pan section for bolting the unit to the support beams. Refer to the suggested support location drawing included in the submittal for location of the mounting holes. The unit must be level for proper operation. Anchor bolts must be provided by others.

SAFETY Adequate precautions, appropriate for the installation and location of these products, should be taken to safeguard the public from possible injury and protect the equipment and premises from damage.

WARNING Operation, maintenance, and repair of this equipment must be undertaken only by qualified personnel. Proper care, procedures, and tools must be used in handling, lifting, installing, operating, maintaining, and repairing this equipment to prevent personal injury and/or property damage.

DANGER When the fan speed of a Series 1500 unit is to be changed from the factory set speed, including the use of a variable fan speed control device, steps must be taken to avoid operating at or near any natural frequency which may result in fan failure and possible injury or damage. Consult your B.A.C. Representative on any such applications.

WARRANTIES Please refer to the Limitation of Warranties applicable to and in effect at the time of the sale/purchase of these products.

FREEZE PROTECTION These products must be protected by mechanical and operational methods against damage and/or reduced effectiveness due to possible freeze-up. Please contact your B.A.C. Representative for recommended protection alternatives.

LOCATION Series 1500 units must be located to ensure an adequate supply of fresh air to the fans. When units are located adjacent to walls or in enclosures, care must be taken to ensure the warm, saturated, discharge air is not deflected and short-circuited back to the air intakes.

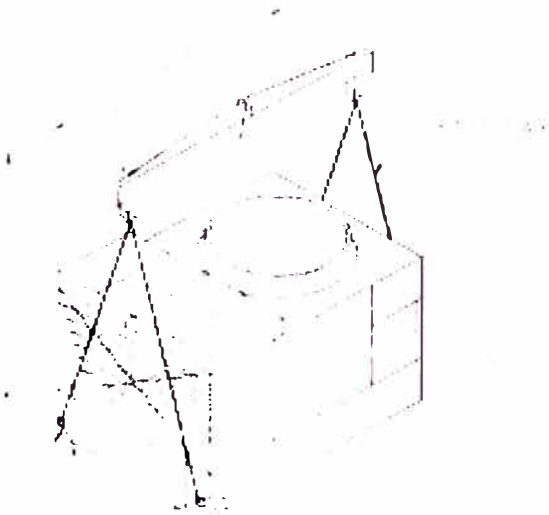
Also, each unit should be located and positioned to prevent the introduction of discharge air into the ventilation systems of the building where the unit is located or of adjacent buildings.

For detailed recommendations on Series 1500 layout, please consult your Baltimore Aircoil Representative.

g

Table 1 and **Figures 1** and **2** for each section's required im 1 spreader bar length and recommended rigging dimen-s. o assemble sections and join multiple cells, refer to the op ite section below.

e: All single-cell and multi-cell units must be rigged one on a time. Cooling tower models 15146 to 15177, 15201, 15219 ship in one section per cell. All other models ship in se ons per cell.

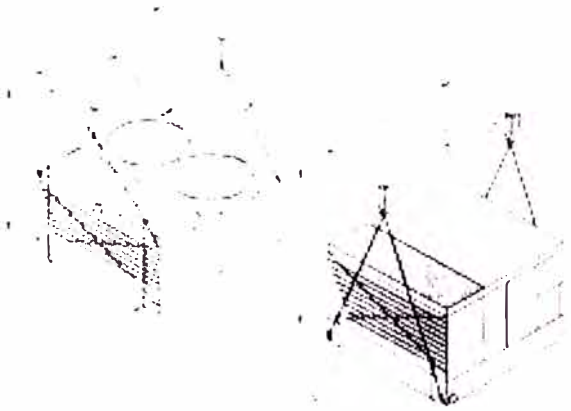


One-Piece Cells

Figure 1
Models 15146 to 15177, 15201, & 16219

el Number of ell's unit)	Dimensions (for each cell)				
	Section	H	W1	W2	W3
15146 to 15177 15201 15219	1-Piece	12'-0"			
15200 15227 to 15282	Upper	15'-0"		6"	12"
	Lower	8'-0"	12"		
15296 to 15425	Upper	17'-0"		6"	12
	Lower	11'-0"	12"		
CXV-64 to CXV-95 FXV-42x	Upper	14'-0"		3'-6"	8'-6"
	Lower	7'-0"	8'-6"		
CXV-103 to CXV-163 FXV-43x	Upper	16'-0"		3'-6"	8'-6"
	Lower	9'-0"	8'-6"		
CXV-160 to CXV-192 CXV-206 FXV-44x	Upper	18'-0"		3'-6"	8'-6"
	Lower	11'-0"	8'-6"		
CXV-196 CXV-210 to CXV-305 FXV-64x	Upper	18'-0"		4'-6"	11'-10"
	Lower	11'-0"	11'-10"		
CXV-310 to CXV-481 FXV-66x	Upper	25'-0"		4'-6"	11'-10"
	Lower	18'-0"	11'-10"		

Table 1



Two-Piece Cells

Figure 2
Models 15200, 15227 to 15425,
All CXV and FXV Models

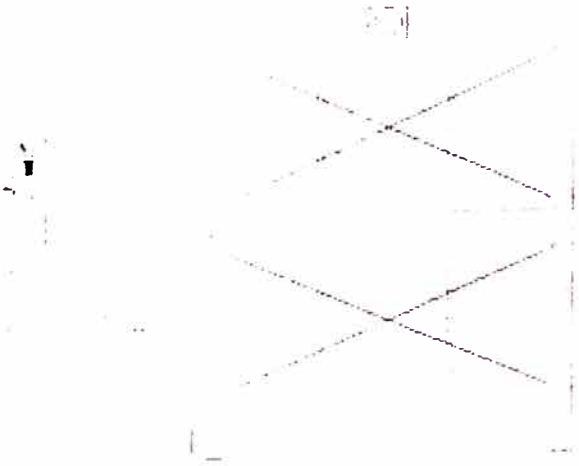


Figure 3

ec on Assembly

fur l models other than cooling tower models
51 to 15177, 15201, and 15219)

n a mble a two-piece cell, position the bottom section on the unit
ppo and bolt in place. Instal flat tape sealer supplied with the unit,
ide e down as illustrated in **Figure 3**, on the mating flange of the
wer ection in a continuous line.

sm drift pins in the bolt holes provided (**Figure 4**), guide the top
unto the bottom section. Screw in place using self-tapping
rew or bolts supplied with the unit, to prevent water leakage.

ote On multi-cell installations, BAC suggests that the top and
ptto sections of cells subsequent to the first be assembled on the
p. foundation adjacent to the final mounting locations. This will
low pace for securing the top and bottom sections of each cell.
lov he subsequent cell(s) to their final position using the lifting
at the base of the cell(s). Refer to the section "Assembly of
ulti -Cell Units" below for details. All multi-cell units have the cell
mb on each section and match marks to show how to mate the
ells.

Figure 4

s nbly of Multiple-Cell Units

ulti -cell installations may employ sump connectors to equalize the
ater evel in the sump of each cell (**Figure 5**). When used, sump
nne ors must be assembled as the cells are being positioned on the
it pports. See below for details on their installation. For two-
ctn cells, first attach the first cell's bottom section to the foundation
d n fasten the first cell's top section to the first cell's secured
ott section. Assemble each subsequent cell just next to its final
oun ng location and then position next to the previous cell. Use the
fting evices at the base of each subsequent cell to slide cells together.

se t sump connector assembly procedure outlined below to join the
m onnection for multi-cell units. The procedure is the same for all
odc

sition cell #1 on the unit support and bolt into place.

pe down the surface by the opening to remove any dirt or
ois e that may have accumulated during shipment.

pe down the flanges on both ends of the sump connector. On
nc , apply a layer of 1/8" x 1" butyl sealer tape around the face of
ic f ge over the centerline of the holes. Do not overlap or stretch
lo tly at the corners. When it is necessary to splice the sealer, be
ire press the two ends together to form a smooth, continuous strip.
pp a second layer of sealer tape over the first layer following the
tm rocedure. Refer to Figure 5.

ing drift pins to align the bolt holes, place the sump connector
ver opening in the sump of cell #1 and fasten into place. Insert the
/8" f-tapping screws or bolts from the sump connector into the sump
all illustrated in **Figure 6**.

ply sealer to the other end of the sump connector as described
a all **three**.

sition cell #2 on the unit supports. Wipe down the surface by
he ening to remove any dirt or moisture.

ing drift pins to assure alignment, draw cell #2 tight against the
n connector.

Not For units equipped with the positive closure plate option, skip
lepo and go to steps 8b and 8c under positive closure plate option
ha, illustrated in **Figure 6**, insert 3/8" self tapping screws in each
ole am the sump connector into the sump wall and tighten.

Figure 5

SECTION THRU A - A

Figure 6

ss nbly of Multiple-Cell Units (continued)

sit' Closure Plate Option

e onal positive closure plate and gasket can be furnished to enable liv' al cells to be isolated for cleaning and routine maintenance on ılti cell units. The plate ships loose inside the sump

i l the positive closure plate and gasket follow steps one through ten m the instructions above. Complete the installation with steps a dc below.

ead 3/8" self-tapping screws from the sump connector into the np all with the positive closure plate as shown in **Figure 7**.

ition the neoprene gasket and positive closure plate over the d fasten in place with 3/8" wing nuts and flat washers.

llation of the Optional Outlet Depressed Sump Box 1500 cooling towers only)

ional side outlet depressed sump box option allows a Series oling tower water outlet connection to be piped from underneath in four possible directions, 90° apart. The connection is a bolt fit a 150-pound ASA flat-faced flange with a full-face gasket.

ll the side outlet depressed sump box, follow steps one through low.

pe the edges around the opening in the cold water basin to any dirt or moisture that may have accumulated during nt. Apply a layer of 1/8" x 1" butyl sealer tape around the m the basin over the centerline of the holes. Do not stretch the oo thinly or overlap at the corners. When it is necessary to he sealer, be sure to press the two ends together to form a ous strip. Apply a second layer of sealer tape over the first layer ng the same procedure. Refer to **Figure 8**.

ert the sump box assembly into the opening in the cold water nd attach it to the basin with 3/8" x 1" bolt and nuts, flat , and lock washers as shown in **Figure 8**.

ce the sump strainer over the opening.

Figure 7

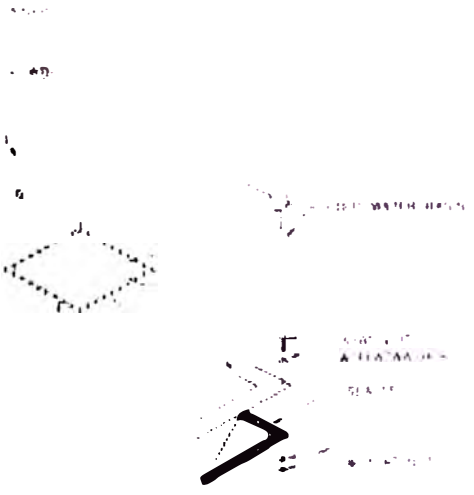


Figure 8

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P.O. Box 7322, Baltimore, MD 21227

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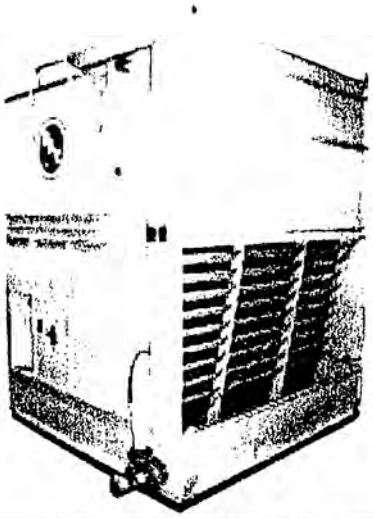
PP-10M 7/99

Series 1500 Closed Circuit Cooling Towers (FXV) and Evaporative Condensers (CXV)



Operating and Maintenance Instructions

Baltimore Aircoil Company Series 1500 Closed Circuit Cooling Towers and Evaporative Condensers have been designed to give long, trouble-free service when properly installed, operated and maintained. To obtain optimum performance and maximum service life, it is important that a program of regular inspection and maintenance be developed and carried out. This bulletin is published as a guide to establishing such a program.

Included in the bulletin are the recommended services for start-up, operation and shutdown and the approximate frequency for each. Note that the recommendations on frequency of service are minimums and where operating conditions are severe, the services should be performed more often. For each required service, follow the procedures outlined under the "Maintenance Procedures" section of this bulletin. The units are illustrated on page 2 with the major points of inspection and service identified. A copy of the unit certified drawing should also be available for reference. If you need additional information about operation or maintenance not covered in this bulletin, contact your B.A.C. Representative. The name and phone number of your B.A.C. Representative can be found on a label located on the connection end of the unit, by calling 1-(800) 896-8497, or by visiting our web site at www.BaltimoreAircoil.com.

Model Number: _____

Serial Number: _____

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Baltimore Aircoil

BULLETIN M24811-OCA

General Maintenance Information

The scope and frequency of the services required to maintain a Series 1500 Closed Circuit Cooling Tower or Evaporative Condenser are primarily a function of the air and water quality at the site.

AIR

The most harmful atmospheric conditions are those with industrial quantities of industrial smoke, chemical fumes, salt or heavy dust. Such airborne impurities are carried into the unit and absorbed by the recirculating water to form a corrosive solution.

WATER

The most harmful conditions develop as water evaporates from the unit, leaving behind the dissolved solids originally contained in the make-up water. These dissolved solids may be either alkaline or acidic and, as they are concentrated in the recirculating water, can produce scaling or accelerated corrosion.

The extent of impurities in the air and water determines the frequency of most maintenance services and also governs the extent of water treatment, which can vary from a simple continuous bleed and biological control to a sophisticated treatment system (see "Water Treatment" section, page 10).

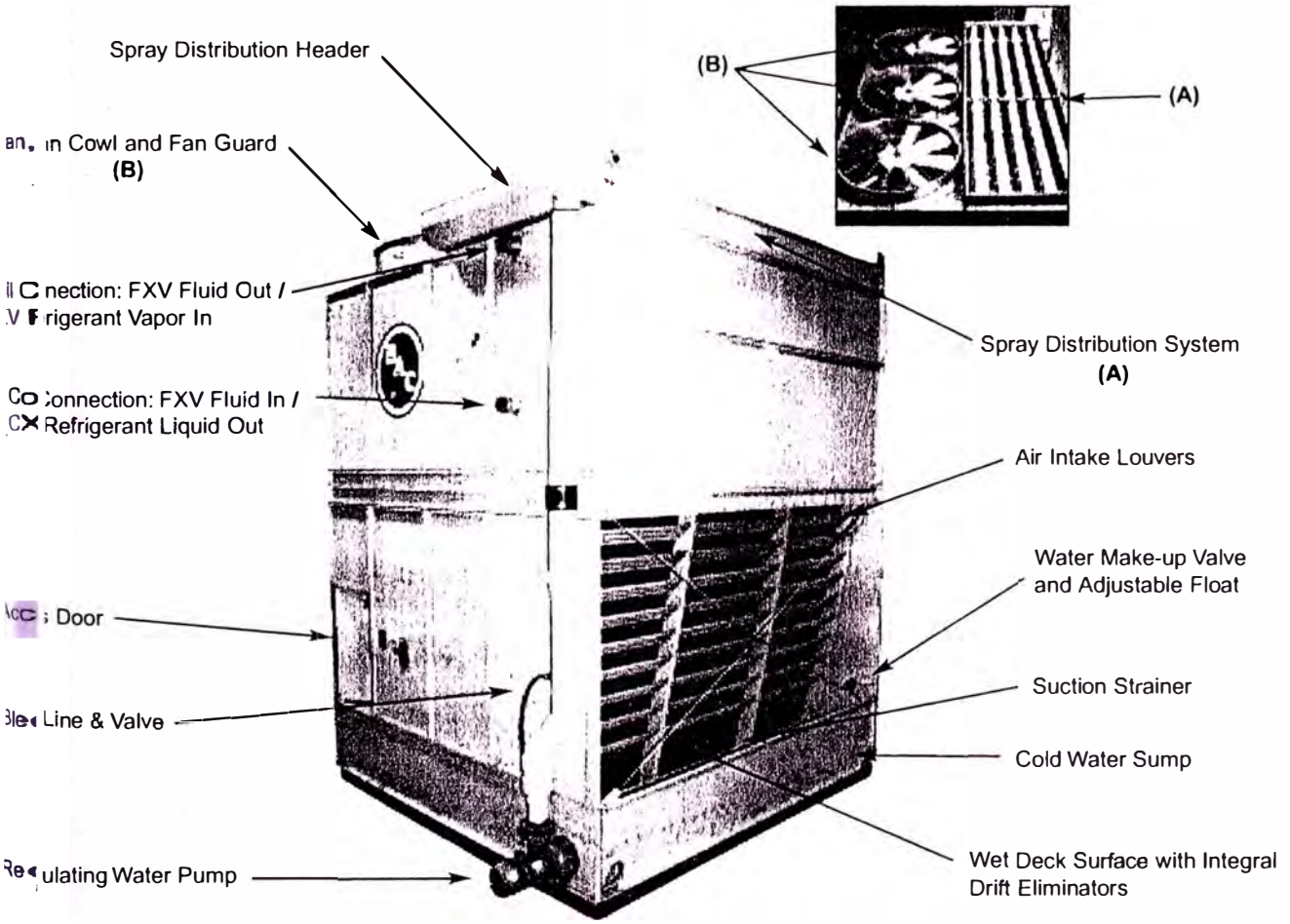


Figure 1 — Series 1500 FXV/CXV

Operation and Maintenance

Described below are the recommended services for start-up, operation, and shutdown as well as the approximate frequency for each. For each service, follow the procedures outlined under the "Maintenance Procedures" section of this bulletin.

TABLE 1: Recommended Maintenance Services[1] for series 1500 Closed Circuit Cooling Towers and Evaporative Condensers

Type of Service [2]	Monthly	Quarterly	Start-Up	Shutdown	Annually	Ref. Page
Inspect general condition of unit	X		X	X		
Inspect and clean/replace as necessary:						
a) suction strainer	X		X	X		5
b) cold water sump	X		X	X		5
c) air-inlet louvers	X		X	X		5
Check and adjust water level in cold water sump	X		X			5-6
Check operation of make-up valve	X		X			5-6
Check bleed rate and adjust	X		X			10
Check belt condition on BALTIDRIVE PowerTrain and tension as required [3]	X		X			7
Lubricate fan shaft bearings		X	X	X		6
Lubricate motor-base-adjusting screw		X	X	X		6
Clean outside of fan motor		X	X	X		6
Clean debris from unit	X		X	X		4
Inspect heat transfer section	X		X			8
Inspect spray nozzles	X		X			8
Drain sump and piping				X		4, 9
Inspect protective finish					X	8

Notes:

1. Recommended service intervals are for typical installations. Severe environmental conditions may dictate more frequent servicing.
2. When operating in ambient temperatures below freezing, the Series 1500 Closed Circuit Cooling Tower/Evaporative Condenser should be inspected more frequently (see "Winter Operation" section, pages 8-9).
3. Tension on new belts must be readjusted after the first 24 hours of operation and quarterly thereafter.

WARNING: Before performing any maintenance or inspection, make certain all electric power has been disconnected and locked in the off position.

CAUTION: STORAGE

If the unit is to be stored for a period of time prior to installation, it is not recommended that any cover be placed over the unit. This can trap heat inside of the unit and cause damage to the fill section and other PVC components.

SAFETY PRECAUTIONS

The operation, maintenance and repair of this equipment must be undertaken only by qualified personnel. All such personnel must be thoroughly familiar with the equipment, the associated systems and controls, and the procedures in this manual. **Proper care, procedures, and tools must be used in handling, lifting, installing, operating, maintaining and repairing this equipment to prevent personal injury and/or property damage.**

CAUTION: All electrical, mechanical, and rotating machinery constitute a potential hazard, particularly for those not familiar with its design, construction, and operation. Accordingly, **adequate safeguards** (including the use of protective enclosures where necessary) **should be taken with this equipment both to safeguard the public** (including minors) **from injury and to prevent damage to the equipment,** its associated system, and the premises.

The Series 1500 has been designed so all routine maintenance can be performed from the interior of the unit or at the base of the unit's exterior. This eliminates the need for access to the top of the unit to perform routine maintenance. **WARNING:** The top horizontal surface of the unit is not intended for use as a walking surface or working platform. **If access to the top of the unit is desired, the purchaser/end-user is cautioned to appropriate means complying with applicable safety standards of governmental authorities.**

CAUTION: At no time should this equipment be operated without all fan screens, access panels, and access doors in place

WARNING: When the fan speed of a Series 1500 Closed Circuit Cooling Tower / Evaporative Condenser is to be changed from the factory-set speed, including changes achieved by the use of a variable-speed control device, **steps must be taken to avoid operating at or near the fan's "critical speed" which could result in fan failure and possible injury or damage.** Consult with your local B. A. C. Representative on any such applications.

For the protection of authorized service and maintenance personnel, each fan and pump motor associated with this equipment should be installed with a local-disconnect switch located within sight of the unit.

WARNING: No service work should be performed on or near the fans, motors, and drives or inside the unit without first ensuring the fan and pump motors have been disconnected and locked out.

WARNING: The recirculating water system may contain chemicals or biological contaminants, including Legionella, which could be harmful if inhaled or ingested. Personnel exposed directly to the discharge airstream and associated drift, mists generated during operation of the water distribution systems and/or fans, or mists produced by high pressure water jets or compressed air (should these be used to clean portions or components of the recirculating water system) should wear respiratory protection equipment approved for such use by OSHA and/or local occupational safety and health authorities.

WARNING: Please refer to the Limitation of Warranties applicable to and in effect at the time of the sale/purchase of these products.

Freeze Protection: Mechanical and operational methods must be employed to protect these products against damages and/or reduced effectiveness due to possible freeze-up (see "Winter Operation" section, pages 8-9).

Operation and Maintenance
(continued)

NITI . AND SEASONAL START-UP

'rior initial start-up or after a shutdown period, the ierie 1500 Closed Circuit Cooling Tower/Evaporative :on ıser should be thoroughly inspected and cleaned:

. If ı t sits on vibration isolators or isolation rails, refer to ıe ın ıufacturer's guidelines before unloading weight om e unit.

. Cle n all debris, such as leaves and dirt, from the sid bf the unit and the air-inlet louvers.

. Dr ı the cold water sump (with suction strainer in ace and flush to remove accumulated dirt.

. Re ove the suction strainer, clean, and reinstall.

. Ins ect spray nozzles and heat transfer section.

. Tu ı the fan by hand to ensure rotation without obstruc- ɔn.

St ı the fan motor and check for proper fan rotation.

At easonal start-ups, adjust the belt tension on the ALTADRIVE® PowerTrain fan-drive system. Note, do not djus he tension at initial start-up since the drive has ɜen -operly tensloned at the factory prior to shipment.

Ch k float-operated, make-up valve to ensure the ılve operating freely.

). F or to seasonal start-up, lubricate the fan shaft bear- gs. fote this is not required at initial start-up since the n b rings have been lubricated at the factory prior to ılp nt.

. At itial start-up, or before start-up when the sump is ɔmp tely drained, fill the sump with fresh water to the /erf v level. For new installations, initiate the biocide ate eatment program at this time (see "Water eat ent" section, pages 10). At seasonal start-up and llov g a shut-down period of more than 3 days, resume ıe b ide treatment program or administer a shock treat- ıen f appropriate biocides prior to operating the unit ns elimlnate accumulated biological contaminants ee iological Control" section, page 11).

1. S the float on the make-up valve to shut-off the valve her ne float is approximately 1/2" below the overflow vel

2. S rt the spray water pump and check for proper rota- ɔn Indicated by the arrow on the pump cover.

ote On remote sump applications, adjust system flow ıte design. The supply valve to the spray header ho be opened slowly until the design pressure (1.0 psi t s y header connection) and spray water flow are ɜac d. Pressure greater than 10.0 psi may cause dam- ge the distribution system.

3. C en the valve in the unit bleed line and adjust bleed) th ecommended rate (see "Water Treatment" sectlon, ag 0).

14. Check the voltage and current of all three legs of the fan and pump motor wiring. The current must not exceed the nameplate rating. After prolonged shutdowns, the motor insulation should be checked with a "megger" insulation tester prlor to restartlng the motors.

CAUTION: Rapld on-off cyclIng can cause the fan motor to overheat. Controls should be set to allow a maximum of slx on-off cycles per hour. If this unit is to be controlled with a variable frequency drive (VFD), refer to the "Variable Frequency Drives" section on page 6.

AFTER 24 HOURS

After twenty-four hours of operating under load, the following services should be performed:

1. Check the unit for any unusual noise or vibration.
2. Check the operating water level in the cold water sump. Adjust make-up float valve if necessary.
3. Readjust the belt tension.
4. Clean suction strainer.
5. Inspect spray nozzles and heat transfer section.

OPERATION

During operation, the unit should be inspected, cleaned, and lubricated on a regular basis. The required services and recommended frequency for each are summarlzed in Table 1 on page 3 of this bulletin.

SEASONAL SHUTDOWN

WARNING: Before performing any maintenance or inspection, make certain all electric power has been disconnected and locked in the off position.

The following services should be performed whenever the Series 1500 Closed Circuit Cooling Tower/Evaporative Condenser is shutdown for a prolonged period:

1. If unit sits on vibration isolators or isolation rails, refer to the manufacturer's guidelines before unloading welght from the unit.
2. Clean all debris, such as leaves and dirt, from the Inside of the unit and the air-inlet louvers.
3. Drain the cold water sump (wlth suction strainer in place) and flush to remove accumulated dirt.
4. Remove the suction stralner, clean, and relnstall.
5. Cover the fan-dlscharge opening to keep out dirt and debris.
6. Lubricate the fan shaft bearings and motor-base-adjusting screw.
7. Close the shutoff valve in the make-up water line and draln all exposed make-up water piping.
8. Inspect the integrity of the corrosion protection system.
9. Inspect the integrity of the anti-skid tape on the internal walkway.

Maintenance Procedures

COLD WATER SUMP AND SUCTION STRAINERS

The cold water sump should be inspected regularly. Any trash or debris accumulating in the sump or on the strainer should be removed and, if necessary, the float adjusted to maintain the design operating level. Quarterly, or more often if necessary, the entire cold water sump should be drained, cleaned, and flushed with fresh water to remove the silt and sediment normally collected in the sump. If not removed periodically, this sediment can become corrosive and cause deterioration of the protective finish. After the sump has been flushed, the strainer should be removed, cleaned, and replaced before refilling the sump with fresh water.

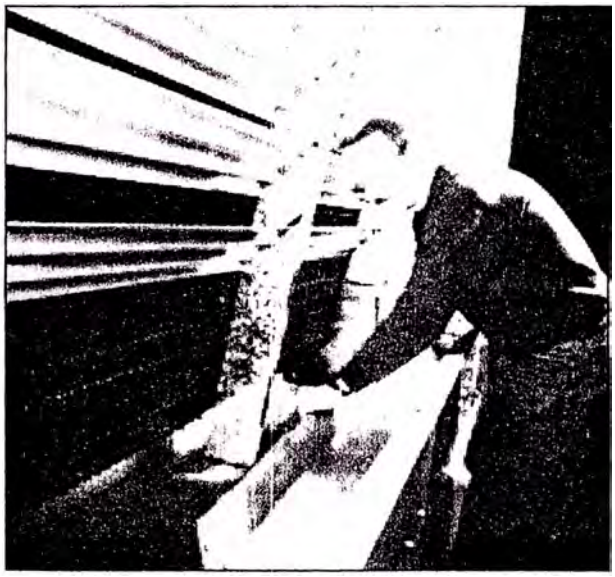


FIGURE 2 — Suction Strainer

MAKE-UP VALVE

A float operated mechanical water make-up assembly is furnished as standard equipment on the unit (unless the unit has been ordered with the optional electric water level control package or for remote basin application). It is located inside the unit cold water sump within easy reach from the outside of the unit on the air inlet face.

The standard make-up assembly consists of a bronze make-up valve connected to a float arm assembly and actuated by a large diameter polystyrene filled plastic float. The float is mounted on an all-thread rod, which is held in place by wing nuts. The operating water level in the cold water sump can be adjusted by repositioning the float and all-thread rod using the wing nuts provided.

The make-up assembly should be inspected monthly and adjusted as necessary. The valve itself should be inspected annually for leakage and the valve seat replaced if necessary. **The make-up water supply pressure must be maintained between 15 and 50 psig for proper operation.**

FIGURE 3 — Mechanical Make-Up Valve

To make the initial sump water level setting, adjust the wing nuts so the make-up valve is completely closed when the water level in the cold water sump is 1/2" below the overflow connection. Under design thermal load and with average city water pressure (15 to 50 psig) at the valve, this setting should produce an operating water level of 7" (from the pan bottom.) This level is the same for all Serles 1500 Closed Circuit Cooling Towers/Evaporative Condensers. Note: If the thermal load is less than the design load at the time of unit start-up, this procedure may produce operating levels greater than the recommended 7". The make-up float valve may have to be adjusted to attain the recommended operating level. The unlt sump should be closely monitored and water level adjusted as necessary during the first twenty-four hours of operation.

As an option, an electric water level control package is available in lieu of the mechanical make-up assembly described above. The package consists of a probe-type liquid level control assembly and a slow closing solenoid valve. Stainless steel electrodes, factory set at predetermined lengths, extend from an electrode holder into the cold water basin. These electrodes should be periodically cleaned to prevent accumulations of scale, corrosion, sludge or biological growth from interfering with the electrical circuit. With the electric water level control package, the water level is maintained at the recommended operating level regardless of the system thermal load. Therefore, it is not necessary, nor is it recommended, that the operating level be adjusted.

Maintenance Procedures
(continued)

urin ne start-up of units equipped with the electric water vel control package, the control unit should be bypassed ord to fill the unit to 1/2" below the overflow connection.

perat on at the recommended water level will ensure that e u sump contains sufficient water volume to prevent r en inment in the circulating pump during system art-t and to provide sufficient excess sump capacity to cep he total system pull-down volume.

ull-d wn volume is defined as that quantity of water isp ed in the unit during pump operation plus that nta ed in the water distribution system, external piping, d a heat exchangers which could drain to the unit mp hen the circulating pump is shut down.)

AN OTOR

e s ndard fan motor used on Series 1500 Closed rcu Cooling Towers/Evaporative Condensers is a E.A (Totally-Enclosed, Air-Over) motor with permanently ric ed ball bearings and special moisture protection on e rings, shaft, and windings. During operation, the tsi surface of the motor should be cleaned at least art y to ensure proper motor cooling. Condensation aln enings, located at the lowest point of the housing, ou oe open and free of any debris (check after pro- ge shutdowns). Also, **the motor insulation should cked with a "megger" insulation tester prior to sta ng the motor.**

AR BLE FREQUENCY DRIVES

ote : Applications employing variable frequency drives F for fan motor control must use inverter duty elec- C ors built in compliance with NEMA Standard MG.1, art . **The standard fan motors normally furnished lth A.C. products are not intended for this duty d I not be warranted if so applied.**

A NG: When the fan speed of the unit is changed om e factory set speed, including changes achieved by e u of a variable fan speed control device, steps must e ta n to avoid operating at or near the fan's "critical ee which could result in fan failure and possible injury da age. Consult with your local B.A.C. Representative a such applications.

ec mended Operating Speeds: For optimum system i ance and equipment longevity, fan motors should ot l operated below 25% of full speed, nor within 10% f a unit resonant frequencies. Contact your B.A.C. p entative for this information. **WARNING: Before erf ming any maintenance or inspection, make erg all electric power has been disconnected and cb in the off position.**

la um Allowable Wire Runs: The VFD should be ce as closely as possible to the inverter duty motor. ep ding on the style, operating voltage and switching 6C ncy, the maximum recommended length of wire can an rom 20 to 200 feet. Consult the inverter manufac- ne determine the maximum allowable wire lengths for ou plication.

FAN SHAFT BEARINGS

The fan shaft is supported by two pillow-block ball bearings, each equipped with a lubrication fitting and a slinger/locking collar to keep out moisture. The fan shaft bearing should be lubricated only with a hand grease gun. **Do not use high-pressure grease guns since they may rupture the bearing seals.** The bearings should be lubricated as follows:

Initial Start-Up: Lubrication is normally not required since the bearings have been lubricated at the factory. If, however, the unit has been stored at the jobsite for more than one year, bearings should be purged with new grease before initial operation.

Seasonal Start-Up: Purge both bearings with new grease prior to start-up.

Operation: Lubricate bearings after every 2,000 hours of operation or once every three months, whichever comes first.

Seasonal Shutdown: Purge bearings with new grease prior to any prolonged storage or downtime.

Lubricate the bearings only with one of the following water-resistant greases for ambient temperatures ranging from -65°F to +250°F.

Mobil — Mobil #28	American — Rycon #3
Shell — Alvania #3	Chevron — SRI

ADJUSTABLE MOTOR BASE

The motor base adjusting screw should be coated twice a year with a good quality, corrosion inhibiting grease, such as one of those recommended for lubricating the fan shaft bearings.

BALTIDRIVE® Power Train

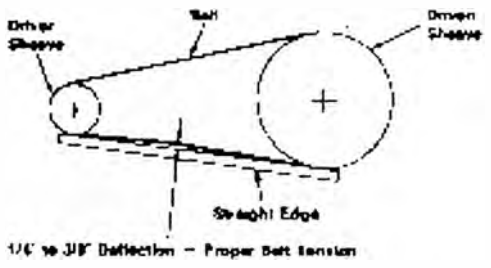
The BALTIDRIVE® Power Train consists of a specially designed belt, with corrosion resistant, aluminum fan and motor sheaves. The solid-backed, multi-groove, neoprene/polyester belt provides the premium quality necessary for evaporative cooling service. The aluminum sheaves extend the life of the belt by minimizing any possibility of rust or corrosion. These components provide a highly reliable system with low maintenance requirements. The only servicing required on the BALTIDRIVE® Power Train is to periodically check the condition of the belt and, when necessary, adjust the tension. The recommended service intervals are specified below.

Initial Start-Up: No servicing is required prior to initial unit start-up since the drive has been tensioned and aligned at the factory.

Operation: *After initial unit start-up or the installation of a new belt, the tension must be readjusted after the first twenty-four hours of operation.* Thereafter, the condition of the belt should be checked monthly and the tension adjusted as necessary, but at least once every three months.

Maintenance Procedures
(continued)

Seasonal Start-Up: Readjust the tension on the belt. **WARNING: Before performing any maintenance or inspection, make certain all electric power has been disconnected and locked in the off position.** To check the belt tension, place a straightedge along the belt from sheave to sheave (as shown in Figure 4) or use a tape measure (as shown in Figure 4) to measure belt deflection. Apply a moderate force by hand (approximately 40 lbs) evenly across the width of the belt in the center of the



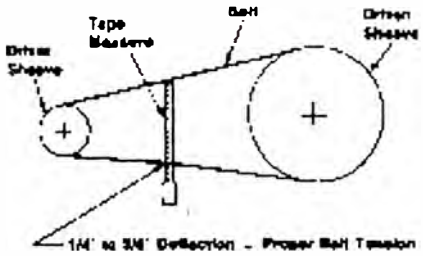


FIGURE 4 — Belt Tension Check

span between the sheaves. If the belt deflects between ¼" and ⅜" (as shown in Figure 4), the belt is adequately tensioned.

If belt tensioning is required, proceed as follows:

1. Loosen the lock nut on the Motor Base Adjusting Screw (see figure 6)
2. Turn the Motor Base Adjusting Screw clockwise to tension the belt, or counterclockwise to relieve belt tension. During adjustment of belt tension, the drives should be rotated several times by hand to evenly distribute the tension throughout the belt.
3. When the belt is properly tensioned, retighten the locking nut on the Motor Base Adjusting Screw.

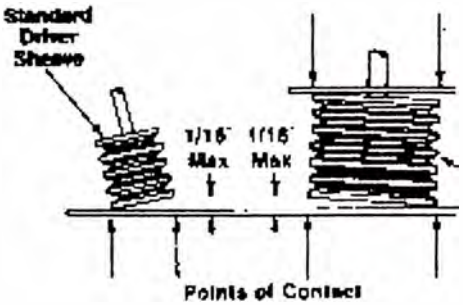


FIGURE 5 — Standard Drives

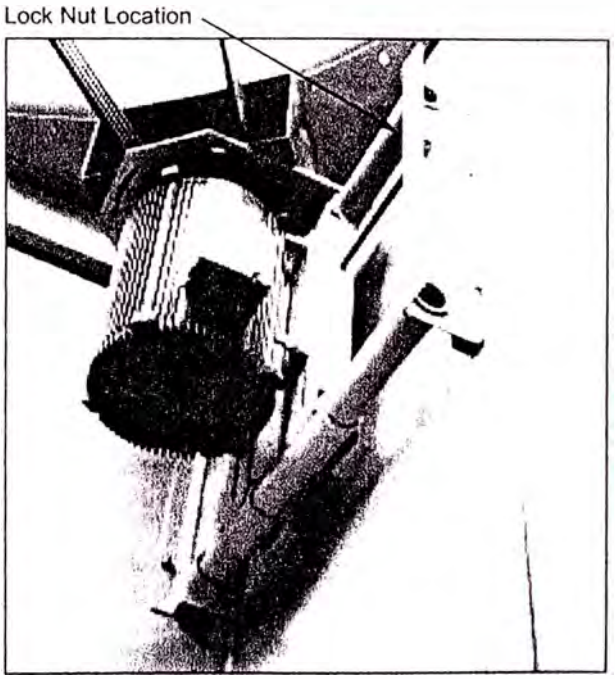


FIGURE 6 — Adjustable Motor Base

Note: There should be no "chirp" or "squeal" when the fan motor is started.

The drive alignment should be checked annually to ensure maximum belt life. This can be done by placing a straightedge across the driver and driven sheaves for standard drives (as shown in Figure 5) and the optional ENERGY MISER® Fan System drives (as shown in Figure 7). When the drive is properly aligned, the straightedge will contact all four points as indicated. No more than 1/16" deviation from four point contact is recommended. If realignment is necessary, loosen the motor sheave and align it with the fan sheave. Allow approximately 1/4" for draw-up as the bushing screw is retightened.

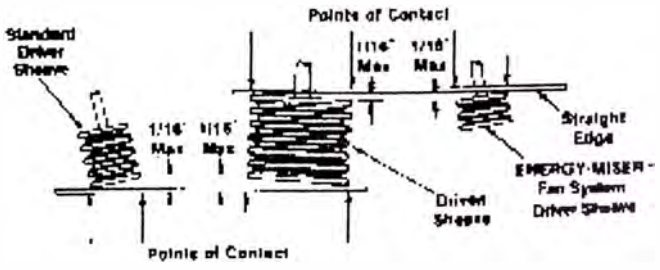


FIGURE 7 — ENERGY MISER® Fan System Drives

Maintenance Procedures

(continued)

SPRAY NOZZLES AND HEAT TRANSFER SECTION

The spray nozzles and heat transfer section should be inspected and cleaned each month. The inspection procedure is as follows:

1. Check to see if the nozzles are producing the spray pattern shown in Figure 8.
2. Clean any nozzles that are clogged. If necessary, the nozzle and rubber grommet may be removed for cleaning. To remove, grasp the nozzle at the base (closest to the rubber grommet) and pull while twisting.
3. Inspect the coil and wet deck surface. Any corrosion, damage, or obstructions must be corrected.
4. During periods of low ambient temperature (well below design), these units may be able to run at reduced fan speeds. The fans should be cycled down until they are completely off, with the spray pump running continuously. The coil may be used for seasonal dry operation, followed by seasonal wet operation, but NOT for frequent cycling of the spray pump. **Frequent spray pump cycling may lead to excessive scale build-up and reduced wet and dry performance.**

The coil is designed for seasonal dry operation, followed by seasonal wet operation and NOT for frequent cycling of the spray pump. **Frequent spray pump cycling may lead to excessive scale build-up.**

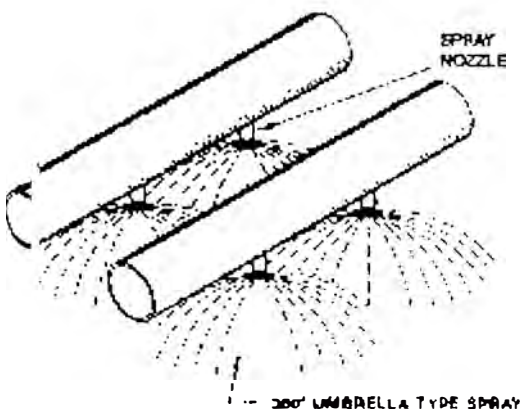


FIGURE 8 — 360° Nozzle Spray Distribution

CAUTION: Do not use steam or high pressure water to clean the wet deck surface under the coil section.

CORROSION PROTECTION

Series 1500 Closed Circuit Cooling Towers and Evaporative Condensers are constructed of corrosion resistant materials. The wet deck surface is made of an inert synthetic material, which requires no protection against rot, decay, rust or biological attack. Other materials used in construction of the equipment, which are listed below should be inspected regularly.

GALVANIZED STEEL COMPONENTS

Galvanized steel components should be inspected for blemishes or corrosion. Affected areas should be wire brushed and recoated with a cold galvanizing compound such as ZRC.

BALTIBOND® CORROSION PROTECTION SYSTEM COMPONENTS

Galvanized steel components protected with the BALTIBOND® Corrosion Protection System may develop scratches, scrapes or blemishes. These may be touched up with a repair kit (B.A.C. Part No. 16-133P). In the unlikely event that the damage is more extensive than simple scratches or minor blemishes, contact your local B.A.C. representative.

STAINLESS STEEL COMPONENTS

Stainless steel components should be inspected for signs of blemishes or corrosion and cleaned with stainless steel wool as necessary. If more extensive corrosion is prevalent, contact your local B.A.C. representative.

Winter Operation

PROTECTION AGAINST PAN WATER FREEZING

Freeze protection of the water is required in the cold water sump when the unit is idle. This can be accomplished with electric immersion heaters, steam coils, or steam injectors. A remote sump may be used, eliminating the need for freeze protection in the unit. When a remote sump is not used, all exposed make-up lines and water piping that are not drained at shutdown should be traced with electric heat tape and insulated.

LEAVING FLUID TEMPERATURE

When operating at ambient temperatures below freezing, the unit will normally produce leaving spray water and/or leaving water temperatures below design. **Low leaving water temperatures tend to promote ice formation.** When operating at below freezing ambient temperatures, the leaving fluid temperature of Series 1500 Closed Circuit Cooling Towers and Evaporative Condensers with liquid cooling circuits should be maintained at 50°F (45°F for an antifreeze solution). The unit should be inspected frequently to detect any potential icing problems.

CAPACITY CONTROL

The first step in maintaining a sufficiently high leaving fluid temperature is to ensure that the unit operates with the maximum possible heat load. Secondly, reduce the unit capacity (for example by cycling fans - **CAUTION: Rapid on-off cycling can cause the fan motor to overheat. Controls should allow a maximum of six on-off cycles per hour.** If the unit is equipped with two-speed motors, operation at low speed may be sufficient to prevent icing.

Winter Operation
(continued)

(Note: When two-speed motors are used, the motor starter should include a fifteen second time delay when switching from high to low speed.) Cycling the fans off periodically to prevent ice formation and/or to melt ice accumulating on the intake louvers may be necessary. Another acceptable form of capacity control is the use of variable frequency drives (VFDs). **WARNING: When the fan speed of a Series 1500 Closed Circuit Cooling Tower/Evaporative Condenser is to be changed from the factory speed, including the use of a VFD device, steps must be taken to avoid operating at or near "critical speeds". Consult with your B.A.C. Representative on any application utilizing variable speed control to determine whether any critical speeds may be encountered and if any modifications may be required. Additionally, inverter duty motors are required on installations that are to be controlled by VFDs (see "Variable Frequency Drives" section, page 6).**

Under severe conditions, when fan cycling is insufficient to prevent icing, it may be necessary to operate the fan(s) in reverse to remove any ice accumulation by forcing warm air out the intake louvers. **CAUTION: DO NOT operate the fans in reverse any longer than is necessary since extended reverse operation may cause the ice to form on the fan blades, fan stack, or eliminators and damage the unit.** Because of this possibility, units using reverse fan operation for ice removal should be equipped with a vibration-cut-out switch. The duration of reverse operation must be limited to a maximum of thirty minutes. A time delay of approximately forty seconds between forward and reverse direction should be incorporated into the motor controls.

PROTECTION AGAINST COIL FREEZING

This section applies to Series 1500 Closed Circuit Cooling Towers and Evaporative Condensers with liquid cooling circuits. **To best protect the Series 1500 coil against freeze-up, use an industrial grade antifreeze solution inside the coil.** For most installations, an inhibited ethylene or propylene glycol solution is recommended. Table 2 provides the coil volume for each FXV model (the coil volume for CXV condenser models using liquid cooling circuits is job specific).

When an industrial grade antifreeze solution is not possible, the operating system must meet both of the following conditions.

Model No.	Coil Volume (Gal)	Model No.	Coil Volume (Gal)
FXV-421	52	FXV-Q441	205
FXV-422	69	FXV-641	167
FXV-423	86	FXV-642	221
FXV-424	103	FXV-643	275
FXV-431	78	FXV-644	328
FXV-432	103	FXV-Q640	221
FXV-433	129	FXV-Q641	328
FXV-434	154	FXV-661	248
FXV-441	104	FXV-662	328
FXV-442	138	FXV-663	409
FXV-443	172	FXV-664	485
FXV-444	205	FXV-Q660	328
FXV-Q440	138	FXV-Q661	485

Table 2: Coil Volume

1. Maintain full flow through the coil. If this is not possible, keep flow above the recommended minimum coil flow stated in Table 3 (the minimum coil flow for CXV condenser models using liquid cooling circuits is job specific).
2. Maintain a heat load on the circulating fluid so that the fluid leaving the coil will not fall below 50°F (45°F for an antifreeze solution).

Model No.	Min. Flow (GPM)
FXV 42X, 43X, 44X	75
FXV Q44X	150
FXV 64X, 66X	110
FXV Q64X, Q66X	220

Table 3: Minimum Coil Flow

If the process load is extremely light during shut-off, it may be necessary to apply an auxiliary heat load to the circulating fluid to maintain the fluid above 50°F (45°F for an antifreeze solution) when freezing conditions exist.

Do not drain the coil as a normal method of freeze protection. Frequent draining promotes corrosion inside the coil tubes. However, draining is acceptable as an emergency method of freeze protection if the coil is not protected by an industrial grade antifreeze solution. Consult your local B.A.C. Representative for guidelines on the installation of an emergency coil drain system.

Further protection against coil freeze-up is possible with the installation of an alarm to alert personnel when the temperature of the fluid leaving the coil falls below 50°F (or below 45°F for an antifreeze solution).

For more detailed information on winter operation and for recommended operating procedures on specific installations, contact your local B.A.C. Representative.

Water Treatment

ORR SION AND SCALE CONTROL

clos circuit cooling towers and evaporative con-
ense cooling is accomplished by evaporation of a por-
on of e recirculating spray water as it flows through the
lt. A this water evaporates, the impurities originally
ese emain in the recirculating water. The concentra-
on o e dissolved solids increases rapidly and can
ach acceptable levels. In addition, airborne impurities
e oft introduced into the recirculating water, intensify-
g the roblem. If these impurities and contaminates are
t eff tively controlled, they can cause scaling, corro-
on, a l sludge accumulations, which reduce heat trans-
effi ncy and increase system operating costs.
e d ee to which dissolved solids and other impurities
ild i in the recirculating water may be defined as the
cles concentration. Specifically, cycles of concentra-
on is e ratio of dissolved solids (for example: Chlorides,
lfate etc.) in the recirculating water to dissolved solids
the ake-up water. **For optimal heat transfer effi-
enc nd maximum equipment life, the cycles of
nce ration should be controlled such that the
circ atlng water is maintained within the guidelines
ted Table 4 below.**

eria	BALTIBOND® Corrosion Protection System	Galvanized Steel
H	6.5 to 9.0	7.0 to 9.0
ardn as $CaCO_3$	30 to 500 ppm	30 to 500 ppm
kalir as $CaCO_3$	500 ppm max.	500 ppm max.
otal D olved Solid	1200 ppm max.	1000 ppm max.
hlori	250 ppm max.	125 ppm max.
ulfat	250 ppm max.	125 ppm max.

ble 4: Recirculated Water Quality Guidelines

Units aving galvanized steel construction and a circulat-
g wa r pH of 8.3 or higher will require periodic passiva-
on O ne galvanized steel to prevent "white rust," the
ccu ation of white, waxy, non-protective zinc corrosion
odu s on galvanized steel surfaces.

he c es of concentration are controlled by "bleeding" or
low down" a small amount of recirculating water from
e sy em. The "bleed" water is replenished with fresh
ake water, thereby limiting the build-up of impurities.
ypic , the bleed is accomplished automatically through
sol id valve controlled by a conductivity meter. The
ondu ivity meter set point is the water conductivity at
he d red cycles of concentration and should be deter-
line y a competent water treatment expert. (Note: The
ble l valve and conductivity meter must be supplied by
ther Alternatively, a bleed line with a valve can be
sed continuously bleed from the system. (Note: This
leed ne and valve is provided on the standard, self-con
tained recirculation system. This bleed line and valve is not provided on remote sump configured units.) In this arrangement, the rate of bleed can be adjusted using the valve in the bleed line and measured by filling a container of known volume while noting the time period. The bleed rate and water quality should be periodically checked to ensure that adequate control of the water quality is being maintained. The required continuous bleed rate may be calculated by the formula,

$$\textit{Bleed Rate} = \frac{\textit{Evaporation Rate}}{\textit{Cycles of Concentration-1}}$$

The evaporation rate can be determined by one of the following:

1. The evaporation rate is approximately 2 USGPM per one million BTU/HR of heat rejection.
2. The evaporation rate is approximately 3 USGPM per 100 tons of refrigeration.
3. Evaporation Rate = Water Flow Rate (USGPM) x Range (°F) x 0.001.

Example: At a water flow rate of 900 GPM in the coil and a cooling range of 10°F, the evaporation rate is 9 GPM (900 GPM x 10°F x 0.001 = 9 GPM)

In addition to chemical treatment for biological control, chemical treatment may be necessary to control scale or corrosion and maintain the water quality within the recommended guidelines. Chemical water treatment programs must meet the following requirements:

1. The chemicals must be compatible with galvanized steel as well as all other materials used in the system (pipe, heat exchanger, etc.).
2. **Chemicals to inhibit scale and corrosion must be added to the recirculation water by an automatic feed system on a continuously metered basis.** This will prevent localized, high concentrations of chemicals that can cause corrosion. The chemicals should be fed into the system at the discharge of the recirculating pump. **They should not be batch fed directly into the cold water sump.**
3. **Acid water treatment** is not recommended unless the unit has been furnished with stainless steel coils and constructed with either the BALTIBOND®Corrosion Protection System or stainless steel. Acid treatment can be used when the requirements of sections 1 and 2 are maintained.

Biological Control

Bleed-off with or without chemical treatment for scale and corrosion control is not adequate for control of biological contamination. The growth of algae, slimes and other microorganisms, if unchecked, will reduce system efficiency and may contribute to the growth of potentially harmful microorganisms, including Legionella, in the recirculating water system.

Accordingly, **a biocide treatment program specifically designed to address biological control should be initiated when the system is first filled with water and administered on a regular basis thereafter in accordance with the supplier's instructions.** Liquid biocides may be added to the sump of the unit in dilute form. If a solid form of biocide is used, it should be added to the system via a pot feeder. If ozone water treatment is used, ozone concentrations should not exceed 3-4 ppm in order to ensure maximum equipment life.

B.A.C. offers a simple, easily applied, low maintenance form of biological control, the IOBIO® Bacteria, Slime and Algae Control. The control is easy to use and requires little maintenance. By delivering low concentrations of iodine through the make-up water line, the IOBIO® Control automatically controls unwanted microbiological contaminants in the recirculated water system. Contact your local B.A.C. Representative for more information.

START-UP FOLLOWING A SHUT-DOWN PERIOD

To minimize the risk from biological contamination following a shutdown period, it is recommended that the sump be drained when the system is to be shut down for more than 3 days. To resume operation of a drained system, clean all debris, such as leaves and dirt from the unit and refill the sump with fresh water. While operating the circulating pump(s) and prior to operating the unit fans, execute one of the following two alternative biocidal treatment programs:

1.Resume treatment with the biocide that had been used prior to shutdown. Maintain the maximum recommended biocide residual (for the specific biocide) for a sufficient period of time (residual and time will vary with the biocide) as recommended by the water treatment supplier to bring the spray water under good biological control.

2.Check the pH of the recirculating water and, if necessary, adjust it to 7.0 to 7.6. Then treat the sump water with sodium hypochlorite to maintain the level of 4 to 5 mg/l (ppm) FREE chlorine over a six (6) hour period. Test kits that can be used to measure the free residual of chlorine are commercially available.

For specific recommendations on treatment for scale, corrosion, or biological control, consult a qualified water treatment consultant.

COIL CLEANING

Both the inside and outside of the heat exchange coil may require occasional cleaning. The chemicals used must be compatible with the materials being treated (Standard coil for example: Outside of coil is galvanized steel; inside of coil is black carbon steel). **For specific recommendations on coil cleaning, consult a qualified consultant.**

SERIES 1500 EVAPORATIVE CONDENSERS

The installation and manufacturing processes commonly used for field assembly of steel-piped refrigeration systems leave weld byproducts inside coils and connecting piping. It is common practice to install filters and/or strainers that remove contaminants during initial system operation. Shortly after system startup, the filters and/or strainers should be cleaned or replaced.

Factory Authorized Parts

Baltimore Aircoil Company maintains a stock of replacement parts at each of its several manufacturing facilities. These parts are designed and built specifically for B.A.C. products, and assure B.A.C. customers of:

- Guaranteed performance
- Immediate availability
- Original equipment quality
- Local assistance with service problems

All factory authorized parts are guaranteed for one full year, and their use will ensure continued maximum performance from your B.A.C. equipment. Shipment of parts is normally made within three (3) days after receipt of an order. In emergency situations, shipment can usually be made within 24 hours. To order factory authorized parts, contact your B.A.C. Representative. You can determine your B.A.C. Representative by the label next to the unit nameplate, by calling 1-(800) 896-8497, or via the internet at www.BaltimoreAircoil.com.

Be sure to include the serial number when ordering any parts.

To facilitate servicing the Series 1500 Closed Circuit Cooling Tower/Evaporative Condenser, it is suggested that one each of the following spare parts be carried on hand:

Make-Up Float Ball — Large diameter, foam filled plastic float for make-up valve.
Valve Seat for Make-Up Valve — Elastomer seat for positive shut off.
Fan Shaft Bearing — Grease lubricated ball bearings with special moisture proof seals and integral slinger rings designed specifically for evaporative cooler applications.
Fan Belt — Solid backed, multi-groove, specially compounded, neoprene polyester drive band.
Spray Nozzles and Grommets Kit — 360°, large diameter plastic metering orifices, engineered to give optimum water distribution.

In addition, your B.A.C. Representative usually stocks common wear items for immediate delivery, and is available to inspect your unit to ensure it is in proper operating condition.

Please record your unit's model number and serial number (as they appear on the unit nameplate) on the front and back cover. This will help ensure the quickest, most accurate response.

Model Number: _____

Serial Number: _____

Baltimore Aircoil

Worldwide manufacturing and sales facilities in:

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BALTIMORE AIRCOIL COMPANY, P.O. Box 960, Madera, California 93639
BALTIMORE AIRCOIL COMPANY, Midwest Division, P.O. Box 317, Paxton, Illinois 60957
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BALTIMORE AIRCOIL OF CANADA, 35 Sinclair Avenue, Georgetown, Ontario, Canada L7G1J3
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BALTIMORE AIRCOIL ITALIA S.R.L., 23030 Chiuro (Sondrio), Italy
BAC IBERICA, S.A., C/Costa Rica, No. 26, 1°, Madrid-28016, Spain
BAC JAPAN CO., LTD., 2-27-4 Shin-Machi, Setagaya-Ku, Tokyo 154, Japan
BAC TECHNIC COOLING TOWER, CO., 1100 Northway Drive, Fort Worth, Texas 76131

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BAC COOLING TOWERS SDN BHD, Plot 20-A, Jalan Perusahaan, Kawasan Perindustrian Prai 4, 13600 Prai, Malaysia

A Unit of the Amsted Industries

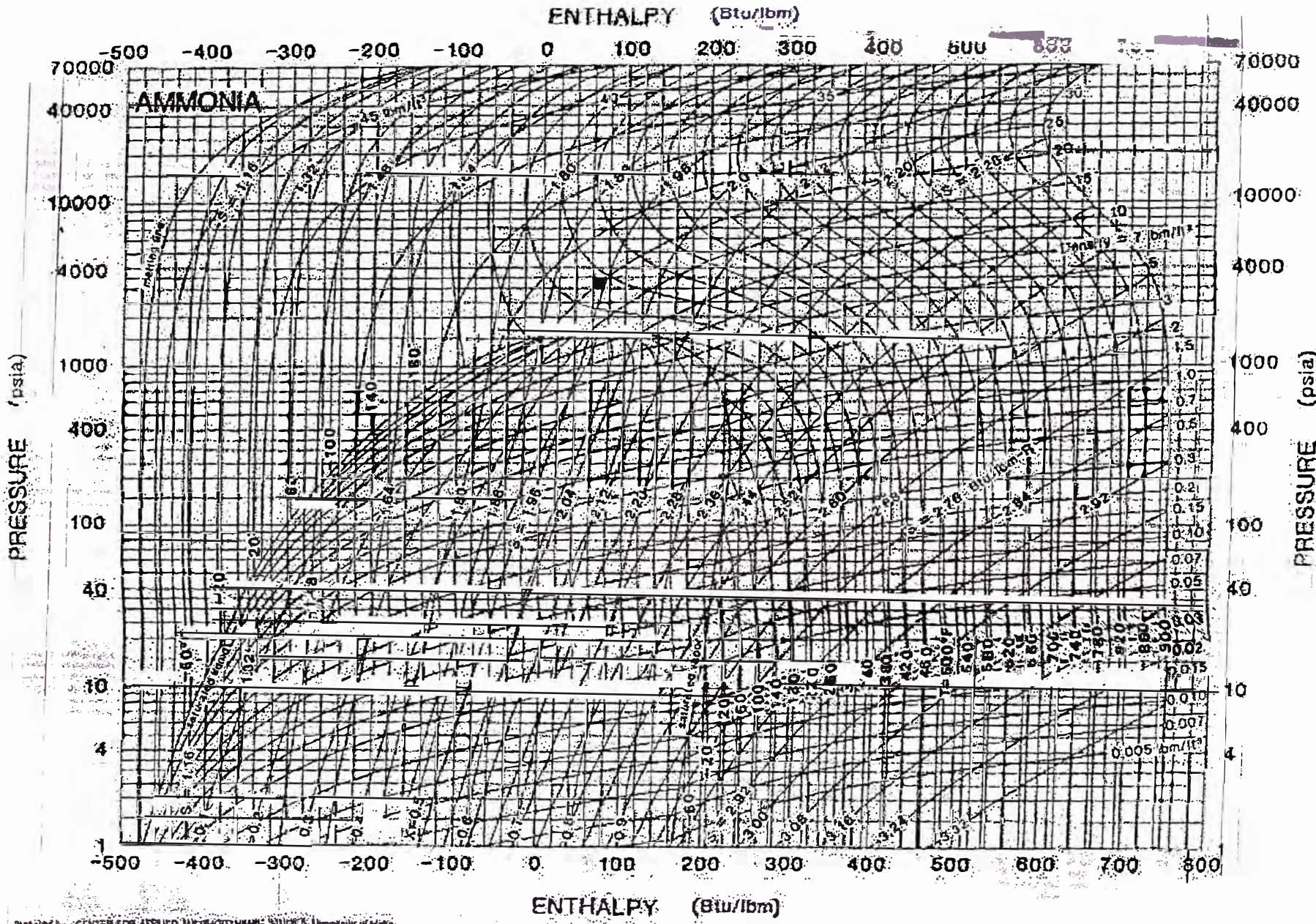

Fig. 21 Pressure-Enthalpy Diagram for Refrigerant 717 (Ammonia)

Note: The reference states for enthalpy and entropy differ from those in the table.

ANEXOS 05: PLANOS

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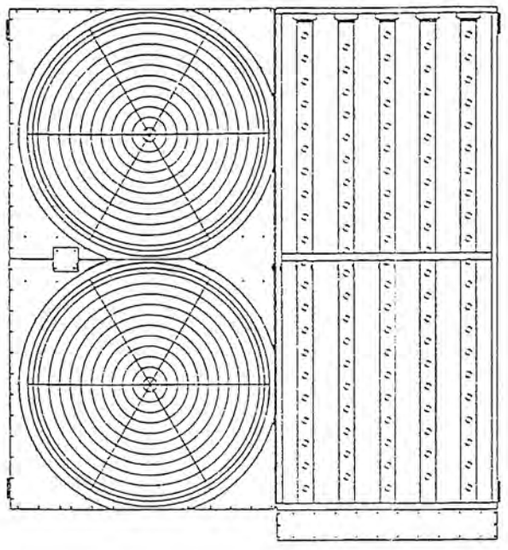
MODELO: CXV 253-K
SERIE: U0140373-01
BELT: 2R-B115



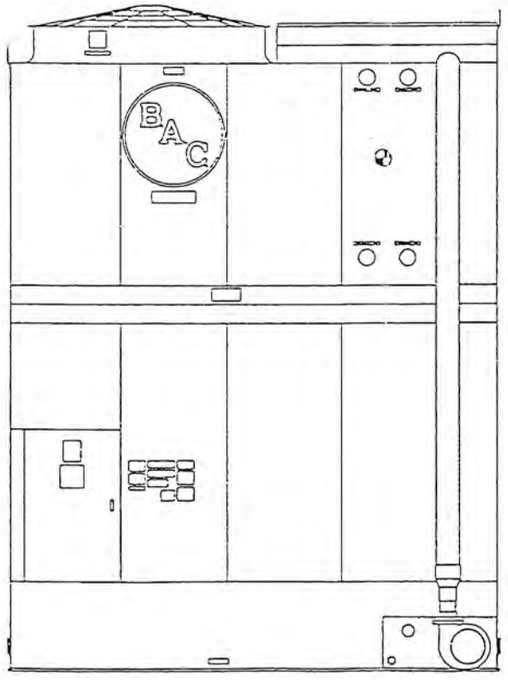
FIELD ASSEMBLY INSTRUCTIONS

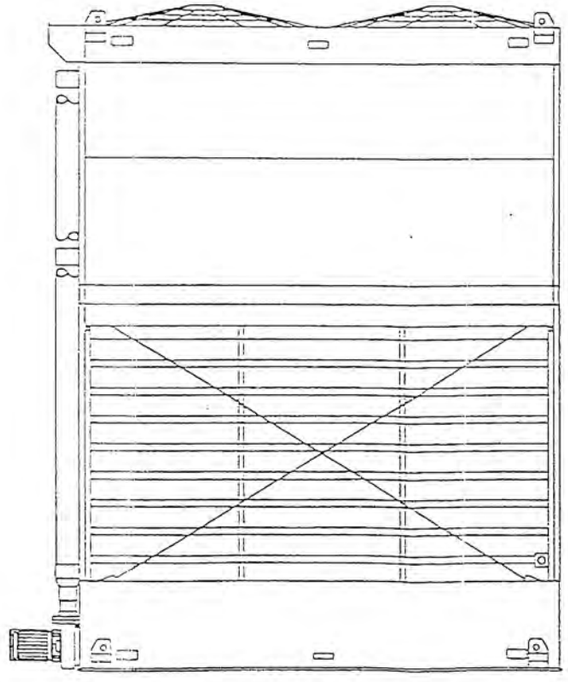
SERIES 1500 FLUID COOLER

MODELS : FXV-64X

SERIES 1500 EVAP. CONDENSER

MODELS : CXV-196 & 210 THRU 305





Rev. A Date 07/15/98 REVISION	BALTIMORE AIRCOIL COMPANY	
	KD : FXV/CXV 12 x 12	DWG NO: 9C4201
	DWG BY: JSK CHK BY: WHS DATE: 10/11/96	PAGE NO: 1

Sales Order: 4037301 Cell: 1 OF 1
Model: CXV-253 Box Size: 12X12X08
Job: SAEG PERU ISF INTERNATIONAL Cust: SAEG ENGINEERING GROUP
Configured by: NSTRACKE SO Due Date: 09/11/01

** Work Ord: 4037301F01 FINAL Temp B/M: 4037301F01

WO Due Date: 09/07/01 BBD Sq Ft: .000

Part Number	Qty	Description	Alt	Face	Stk	Assy Hrs	Act. Hrs
271423P2	1	PLS LBL ISO 9001 COMPANY	PA				
4C3147M5	1	GLV FINAL 12X12	F-				

** Work Ord: 4037301N01 LABELS Temp B/M: 4037301N01

WO Due Date: 09/07/01 BBD Sq Ft: .000

Part Number	Qty	Description	Alt	Face	Stk	Assy Hrs	Act. Hrs
271234P2	1	NEW MULTI COLOR REP LABEL					
277299	1	PLS REP LABEL OTHER	P-				
4C3161M5	1	GLV LABEL 12X12 COND 1-C	F-				

Sales Order: 4037301 Cell: ALL CELLS
Model: CXV-253 Box Size: 12X12X08
Job: SAEG PERU ISF INTERNATIONAL Cust: SAEG ENGINEERING GROUP
Configured by: NSTRACKE SO Due Date: 09/11/01

Assy Hours Summary by Department

Dept.	Assy Hrs.
42AFF1	7.100
42AFF2	14.780
44CU1	1.060
50SHU1	.660
Total	23.600

BALTIMORE AIRCOIL
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Industries

SUBMITTAL DATA FORM

CUSTOMER	SAEG ENGINEERING GROUP L 8012 NW 68 ST MIAMI, FL 33166	DATE P.O. NO. B.A.C. NO. MODEL NO. SHIP DATE NO. OF COPIES	7/25/01 4-01960 U014037301 CXV-253-K 9/14/01 3

PROJECT: ENGINEER: B.A.C. REP:	SAEG PERU – "ISF INTERNATIONAL" – LIMA, PERU SAEG ENGINEERING GROUP – MIAMI, FL

EVAPORATIVE CONDENSER

ALL INFORMATION IS PER UNIT

CERTIFIED CAPACITY: 3840 MBH, R-717 REFRIGERANT, AT 95°F CONDENSING TEMPERATURE AND 76°F ENTERING WET BULB

FAN MOTOR(S): (1) 15 HP, 1800 RPM, 3 PHASE, 60 HERTZ, SUITABLE 460 VOLTS, STANDARD EFFICIENT, TEAO ENCLOSURE. FAN DRIVES BASED ON 0" ESP

NOTE:

- **Two speed fan motors and/or Energy Miser Fan Systems require a starter that incorporates a 15 second time delay when switching from high to low speed.**

DRAWINGS	FEATURES
UNIT PRINT (BAC-17004A) STEEL SUPPORT (BAC-17064A) CONDUIT (BAC-16526A)	UNIT WILL SHIP COMPLETELY UNASSEMBLED FOR FIELD ASSEMBLY BY OTHERS BAC IS NOT RESPONSIBLE FOR LEAKS

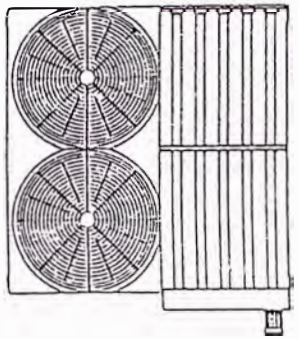
THANK YOU FOR YOUR ORDER ACCEPTED AT THE B.A.C. BALTIMORE, MD PLANT ON: JUNE 19, 2001

AN APPROVED SUBMITTAL IS NOT REQUIRED. YOUR ORDER HAS BEEN SCHEDULED FOR SHIPMENT FROM OUR FACTORY APPROXIMATELY 09/14/01. PLEASE BE PREPARED TO ACCEPT THE EQUIPMENT AS SCHEDULED SINCE OUR FACILITIES CANNOT ACCOMMODATE STORAGE OF COMPLETED UNITS.

BALTIMORE AIRCOIL COMPANY TERMS & CONDITIONS OF SALE ATTACHED.

KNOCK DOWN INSTRUCTIONS TO FOLLOW UNDER SEPARATE COVER

P.O. BOX 7322, BALTIMORE, MARYLAND 21227 / TELE: (410) 799-6200 / FAX: (410) 799-6416
P.O. BOX 960, MADERA, CALIFORNIA 93639 / TELE: (209) 673-9231 / FAX: (209) 673-5095
P.O. BOX 317, PAXTON, ILLINOIS 60957 / TELE: (217) 379-2311 / FAX: (217) 379-3522
P.O. BOX 402, MILFORD, DELAWARE 19963 / TELE: (302) 422-3061 / FAX: (302) 422-9259
35 SINCLAIR AVENUE, GEORGETOWN, ONTARIO L7G 1J3 / TELE: (905) 877-5272 / FAX: (905) 877-9400

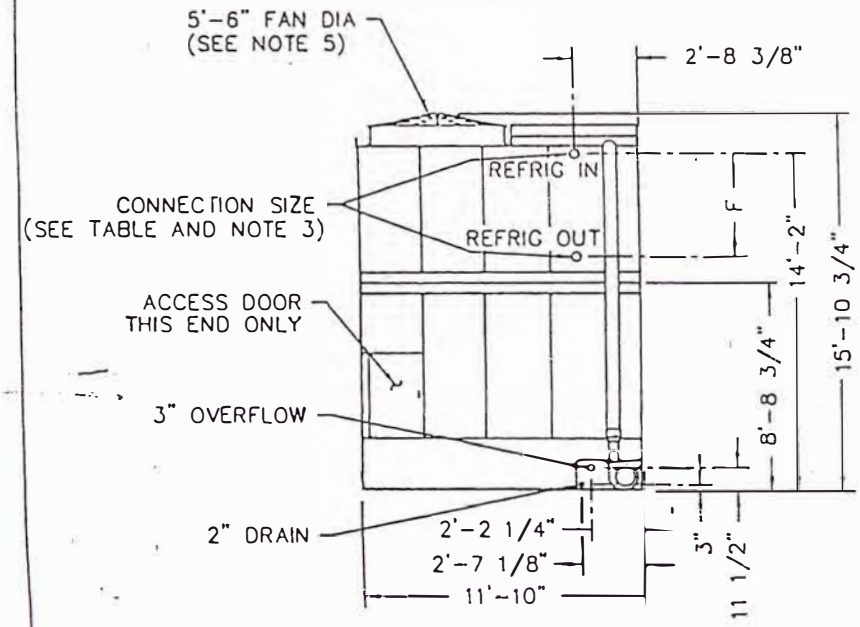


PLAN VIEW

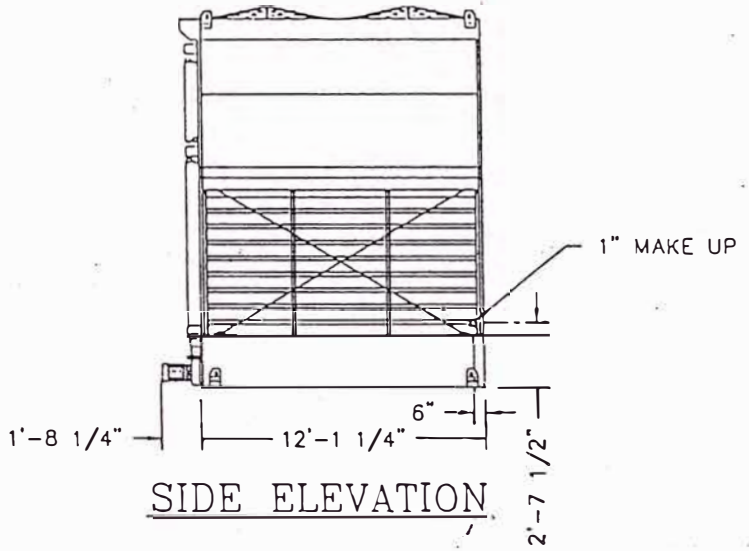
MODEL NUMBER	SHIPPING WEIGHT	OPERATING WEIGHT	HEAVIEST SECTION (UPPER)	CONNECTION SIZE	F
CXV-196	10,740	17,480	6580	4"	24"
CXV-210	10,790	17,530	6630	4"	24"
CXV-220	10,840	17,580	6680	4"	24"
~~CXV-235~~	~~11,780~~	~~18,670~~	~~7020~~	~~4"~~	~~33 1/4"~~
CXV-253K	11,830	18,720	7670	4"	33 1/4"
~~CXV-264~~	~~12,830~~	~~19,870~~	~~8670~~	~~4"~~	~~42 1/2"~~
CXV-283	12,880	19,920	8720	4"	42 1/2"
CXV-290	13,920	21,110	9760	4"	51 3/4"
CXV-305	13,970	21,160	9810	4"	51 3/4"

NOTES:

1. ALL DIMENSIONS ARE IN FEET AND INCHES. WEIGHTS ARE IN POUNDS.
2. DIMENSIONS SHOWING LOCATION OF COIL CONNECTIONS ARE APPROXIMATE AND SHOULD NOT BE USED FOR PREFABRICATION OF CONNECTING PIPING.
3. COIL CONNECTIONS ARE IPS BEVELLED FOR WELDING.
4. CONNECTIONS 3" & SMALLER ARE MPT.
5. THE AREA ABOVE THE DISCHARGE OF THE FAN MUST BE UNOBSTRUCTED.
6. FOR WEIGHT LOADING AND SUPPORT REQUIREMENTS REFER TO THE SUGGESTED STEEL SUPPORT DRAWING.



END ELEVATION



SIDE ELEVATION

(RH UNIT)

B.A.C. ORDER NO: U014037301	BALTIMORE AIRCOIL COMPANY	SERIES 1500 EVAPORATIVE CONDENSER
DATE: 7/25/01		DRAWING NUMBER: BAC-17004A A

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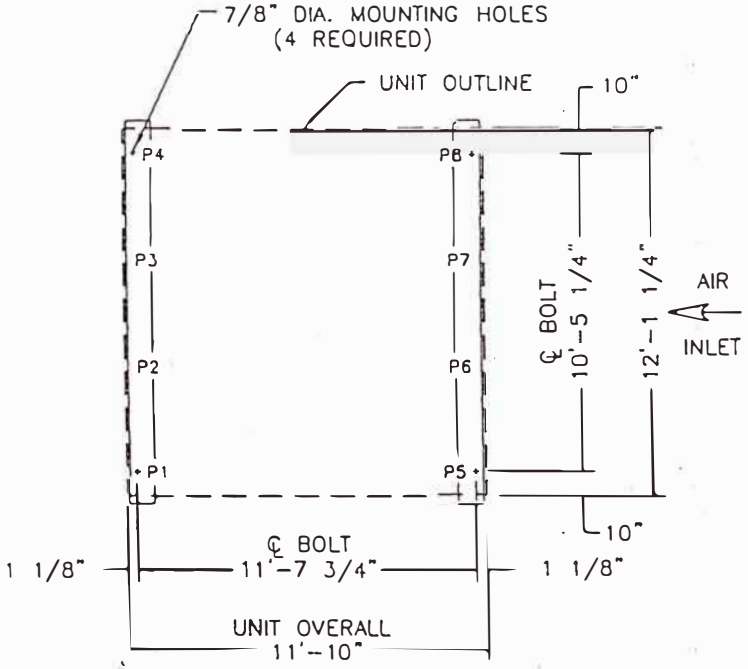
MODEL NUMBER	SHIPPING WEIGHT	WEIGHT LOADING (LBS.)								
		OPER. WEIGHT	P1	P2	P3	P4	P5	P6	P7	P8
CXV-196	10,740	17,480	2006	1220	1220	2006	4913	601	601	4913
CXV-210	10,790	17,530	2012	1226	1226	2012	4926	601	601	4926
CXV-220	10,840	17,580	2018	1233	1233	2018	4938	601	601	4938
~~CXV-235~~	~~11,780~~	~~18,670~~	~~2176~~	~~1222~~	~~1222~~	~~2176~~	~~5336~~	~~601~~	~~601~~	~~5336~~
CXV-253	11,830	18,720	2182	1228	1228	2182	5349	601	601	5349
~~CXV-264~~	~~12,830~~	~~19,870~~	~~2347~~	~~1225~~	~~1225~~	~~2347~~	~~5762~~	~~601~~	~~601~~	~~5762~~
CXV-283	12,880	19,920	2353	1231	1231	2353	5775	601	601	5775
CXV-290	13,920	21,110	2523	1233	1233	2523	6198	601	601	6198
CXV-305	13,970	21,160	2529	1240	1240	2529	6210	601	601	6210

NOTES:
1. SUPPORTING STEELWORK AND ANCHOR BOLTS TO BE DESIGNED AND FURNISHED BY OTHERS.
2. ALL SUPPORTING STEEL MUST BE LEVEL AT TOP.
3. BEAMS SHOULD BE SELECTED IN ACCORDANCE WITH ACCEPTED STRUCTURAL PRACTICE, MAXIMUM DEFLECTION OF BEAM UNDER UNIT TO BE 1/360 OF SPAN, NOT TO EXCEED 1/2 INCH.
4. ALTERNATELY THE UNIT MAY BE SUPPORTED ON COLUMNS AT THE FOUR CORNERS OF THE UNIT. CONSULT YOUR BAC REPRESENTATIVE FOR DETAILS.
5. IF VIBRATION ISOLATION RAILS ARE USED BETWEEN UNIT AND SUPPORTING STEEL, BE CERTAIN TO ALLOW FOR THE LENGTH OF THE VIBRATION RAILS WHEN DETERMINING LENGTH OF SUPPORTING STEEL. VIBRATION RAIL LENGTH AND MOUNTING HOLE LOCATIONS MAY DIFFER FROM THOSE OF THE UNIT. REFER TO VIBRATION ISOLATOR DRAWINGS FOR THIS DATA.
6. DO NOT USE THIS DRAWING TO SIZE POINT VIBRATION ISOLATORS. SEE YOUR BAC REPRESENTATIVE FOR DETAILS.



PLAN VIEW

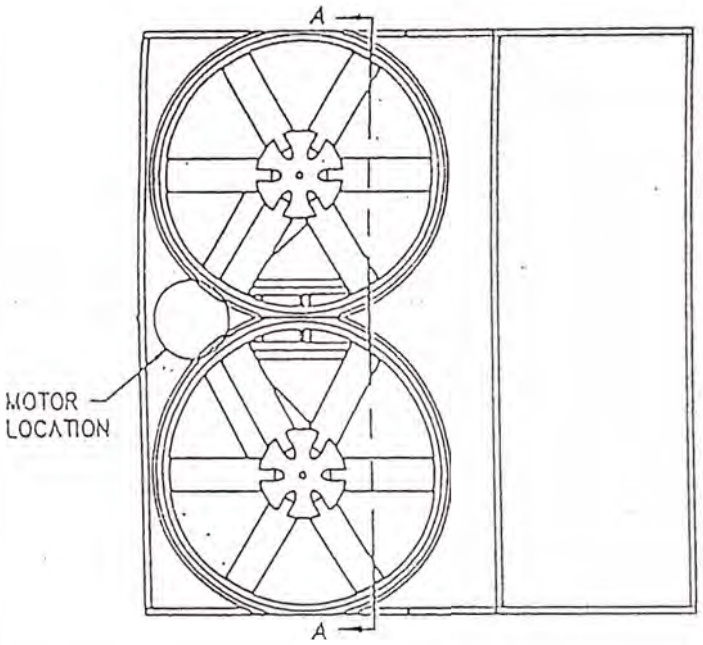
END ELEVATION

B.A.C.
ORDER NO: U014037301

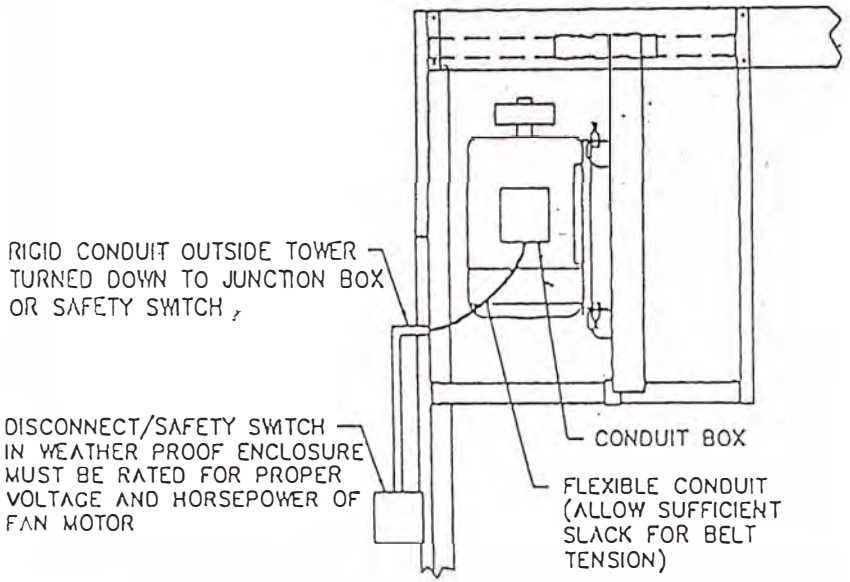
BALTIMORE AIRCOIL COMPANY

SERIES 1500, EVAPORATIVE CONDENSER
STANDARD STEEL SUPPORT

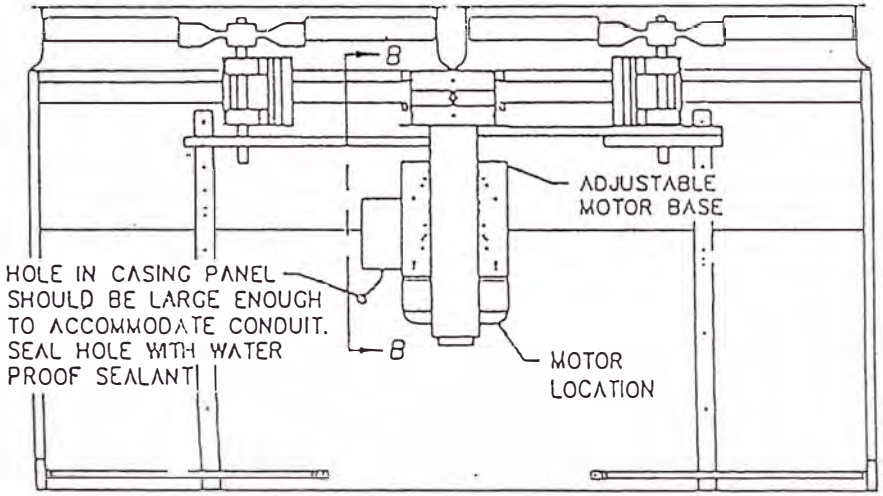
DRAWING NUMBER:



PLAN VIEW



SECTION B–B



SECTION A–A

NOTES:
1. ALL CONDUIT MUST BE WATER TIGHT AND PITCHED DOWNWARD TO ALLOW CONDENSATION TO DRAIN AWAY FROM MOTOR CONDUIT BOX. THEREFORE, DO NOT RUN THE CONDUIT THROUGH THE FAN DECK.
2. ALL WIRING MUST CONFORM TO LOCAL AND NATIONAL ELECTRICAL CODES.
3. RIGID CONDUIT OUTSIDE CASING PANEL MUST TURN DOWN TO JUNCTION BOX.

B.A.C. ORDER NO: U014037301	BALTIMORE AIRCOIL COMPANY	SERIES 1500 RECOMMENDED CONDUIT INSTALLATION
DATE: 7/25/01		DRAWING NUMBER: BAC–16526A A

GHT 1996, BALTIMORE AIRCOIL COMPANY

MODELS : FXV-64X
MODELS : CXV-196 AND 210 THRU 305

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GENERAL INSTRUCTION	5	9C4171 R8	–
GENERAL INSTRUCTION	6	9C4172 R8	–
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STANDARD PAN	7A	9C4205 R8	A
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OPTIONAL FILL AND SPRT'S WITH W.T. SST PAN	11B		
LOUVERS AND SUPPORTS	12A	9C4209 R8	A
OPTIONAL LOUVERS & SPRT'S W/ W.T. SST PAN	12B		
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CASING SIDE PANELS	13	9C4210 R8	B
OPTIONAL PARTITION WITH DUAL MOTOR	14	9C4211 R8	–
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MOTOR AND MOTOR SHEAVE	21	9C4217 R8	B
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STL SPRAY SYSTEM	24B		

ASSEMBLY SEQUENCE	PAGE	DRAWING NO.	REV
FINAL ASSEMBLY ITEMS			
FAN GUARD	25	9C4190 R8	–
ACCESS DOOR	26	9C4191 R8	A
PUMP PIPING BY BAC :			
– PVC PUMP PIPING RH UNIT	27A	9C4192 R8	A
– PVC PUMP PIPING LH UNIT	27B	9C4193 R8	A
– STL PUMP PIPING RH UNIT	27C		
– STL PUMP PIPING LH UNIT	27D		
PUMP PIPING BY OTHERS :			
– END OUTLET	27E		
– BTM OUTLET : PUMP SUCTION OR GRAVITY FLOW	27F		
REAR CLOSURE PLATE OR FLUME FOR 2 CELL	28	9C4194 R8	–
MAKE UP ASSEMBLY	29	9C4195 R8	A
COIL VENT PLUG : FOR FXV (FLUID COOLERS) ONLY	30	9C4196 R8	–
LABELS : FLUID COOLER – 1 CELL	31A	9C4197 R8	B
LABELS : FLUID COOLER – 2 CELL	31B	9C4231 R8	–
LABELS : EVAP. CONDENSER – 1 CELL	31C	9C4220 R8	A
LABELS : EVAP. CONDENSER – 2 CELL	31D	9C4221 R8	A

REV 0 DATE: 08/30/01 REVISION	BALTIMORE AIRCOIL COMPANY	
	TABLE OF CONTENT	DWG NO: 9C4202 R8
	DWG BY: JSK CHK BY: WHS DATE: 10/08/96	PAGE NO: 2

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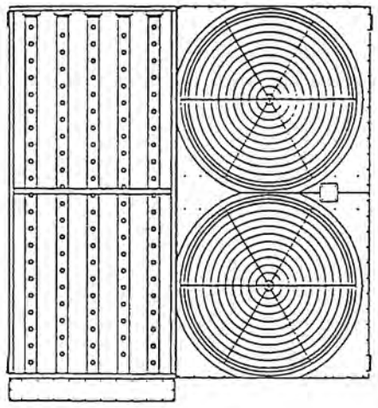
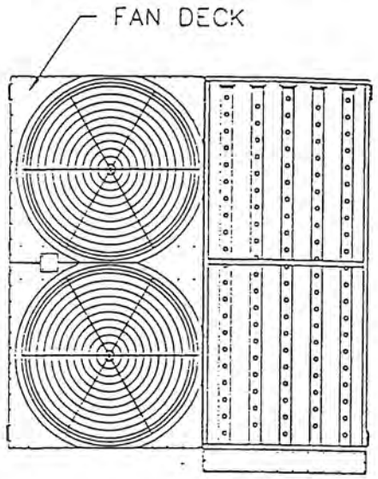
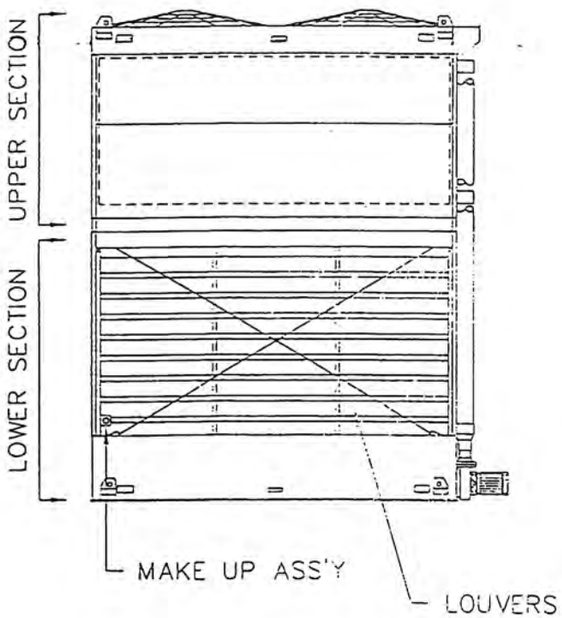


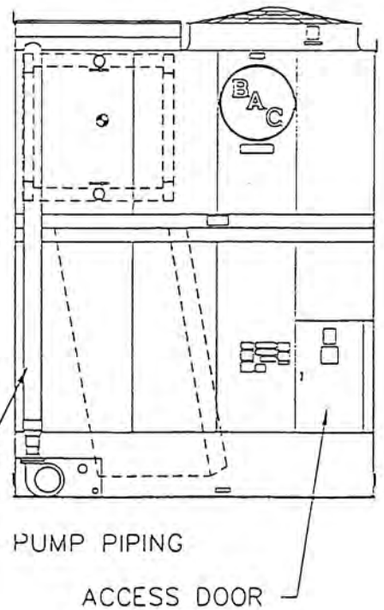
PLAN VIEW
– LH UNIT –



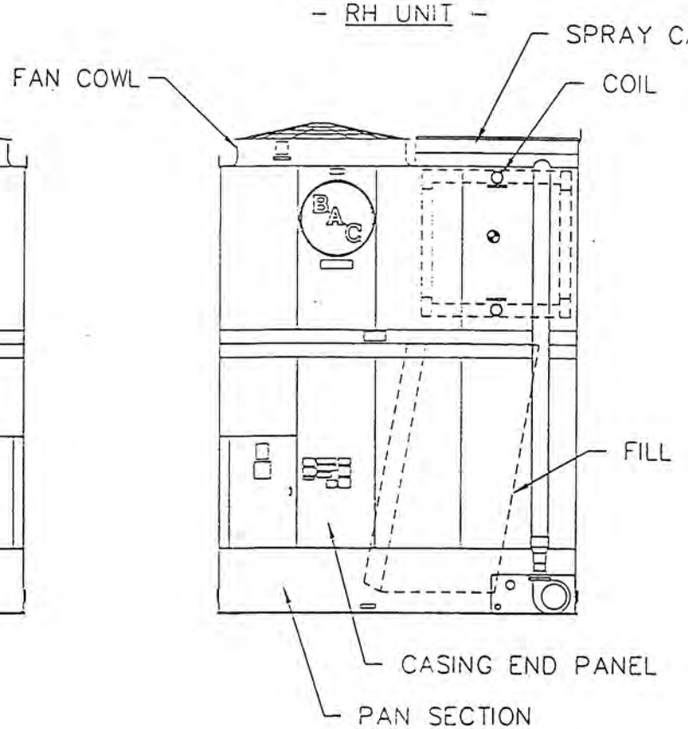
PLAN VIEW
– RH UNIT –



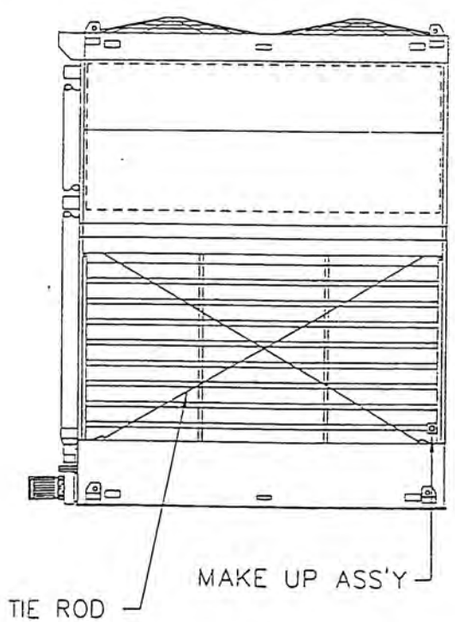
LOUVER FACE ELEVATION
– LH UNIT –



LH UNIT CONN END ELEVATION



RH UNIT CONN END ELEVATION



LOUVER FACE ELEVATION
– RH UNIT –

REVISION DATE: 02/25/98 FXV, A	BALTIMORE AIRCOIL COMPANY	
	OVER VIEW : FXV & CXV	DWG NO: 9C4203 R
	DWG BY: JSK CHK BY: WHS DATE: 10/11/96	PAGE NO: 3

I. INTRODUCTION

The purpose of these instructions is to provide a step-by-step assembly procedure for the cooling tower. It is strongly recommended that these instructions be reviewed carefully in their entirety and fully understood before assembling the cooling tower. Throughout these instructions, reference is made to the unit box size and fill height. The table below gives this information for each model number.

FLUID COOLER (FXV) UNIT			
BOX SIZE	COIL ROW	FILL HEIGHT	MOTOR HP
12' x 12'	6 ROW	96" LOWER SECTION	15
	8 ROW		20
	10 ROW		25
	12 ROW		30
	QUAD 16 ROW		
	QUAD 24 ROW		

EVAP. CONDENSER (CXV) UNIT			
BOX SIZE	COIL ROW	FILL HEIGHT	MOTOR HP
12' x 12'	6 ROW	96" LOWER SECTION	15
	8 ROW		20
	10 ROW		25
	12 ROW		30

II. IDENTIFICATION

Each part is tagged with an item number which is listed on the parts list. The item number does not indicate the assembly sequence. Parts are listed in assembly sequence order on the parts list. Item numbers are assigned within the following groupings.

Items 1 thru 99	Parts for pan section
Items 100 thru 449	Parts for Standard unit
Items 450 thru 469	Miscellaneous Parts
Items 470 thru 499	Labels
Items 500 thru 599	Hardware & Miscellaneous

III. UNPACKING INFORMATION

When the cooling tower is unpacked, the quantities of each part should be checked against the quantities on the itemized part list. Any shortages or damaged parts should be reported immediately to your Baltimore Aircoil Company representative.

IV. TOOLS

The following tools are required for assembly:

100 ft-lb capacity torque wrench
caulking gun
electric drill
electric or pneumatic impact gun (recommended)
socket wrench and extension
sockets 3/8", 9/16", 1/2"
open end wrenches 3/8", 9/16", 1/2"
adjustable crescent wrench
pliers
vise grips
putty knife
claw hammer
rubber mallet
two drift pins
drill bits .193", 1/4", 19/64", 11/32", 7/16"
leather gloves and protective arm sleeves - It is highly advisable for these to be worn during assembly while handling sheet metal parts to reduce the potential for skin lacerations especially when handling stainless steel parts.

V. CREW SIZE

A minimum crew size of three men is recommended for assembly. The foreman of the crew must be familiar with the complete step-by-step instructions and assembly techniques before starting assembly.

VI. FOUNDATION

Recommended support drawings are furnished by Baltimore Aircoil for each cooling tower. Please refer to these drawings for location and size of anchor bolts.

VII. ASSEMBLY COMMENTS

This section covers the proper methods for fastening and sealing the unit. It is very important that these procedures be used to prevent damage to the unit during assembly and to provide a reliable, long-lasting, water-tight seal. Refer to the illustrations on page 7 and 8 which show the different type fasteners used to join parts, tools required to help align holes and position panels as well as the types of sealers to be used.

Sealing - Sealers are used to assure a water-tight joint. Two types of sealers are supplied with the unit. One is a roll type butyl sealer tape.

Surfaces on which the butyl sealer tape are to be applied should be clean of oil and debris. The butyl sealer tape is also a strong adhesive. It is difficult to separate pieces once they have been joined: therefore, drift pins are used to help guide the parts together. This is done by putting the drift pin through the hole of one of the parts to be joined and through the appropriate hole in the second part to be joined. Care should be exercised to prevent repositioning of the joined parts

The second sealer to be used is a caulkable sealer. The sealer is in a caulk gun cartridge as shown on page 10. This sealer is used as a secondary precaution to prevent water leakage. It is used to seal all seams (including resealing of seams already sealed by butyl sealer tape) of joining parts, self-tappers and nuts and bolts that protrude into the wetted area of the unit. The sealer is also used around any parts that are inside the wetted area of unit where water could accumulate behind the attached part and cause corrosion.

Pages 8 and 9 give important instructions regarding proper installation of sealers.

There is no welding required during field assembly of the cooling tower.

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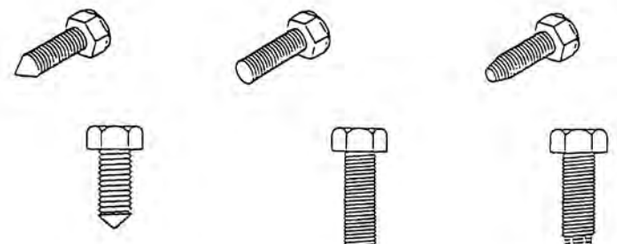
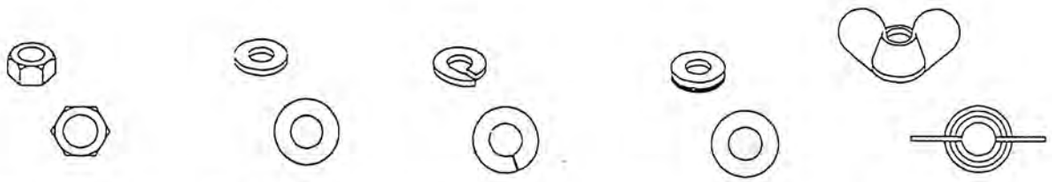


SELF TAPPING SCREW

HEXAGONAL SCREW

HEXAGONAL SELF CUTTING SCREW



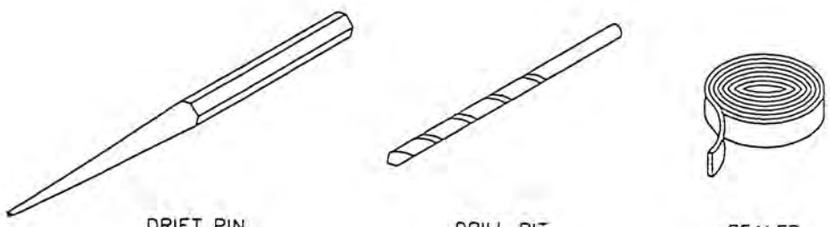
HEXAGONAL NUT

FLATWASHER

LOCKWASHER

SEALWASHER

WING NUT

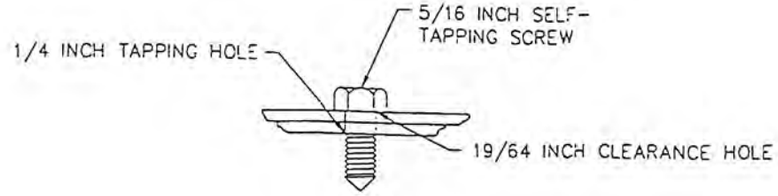


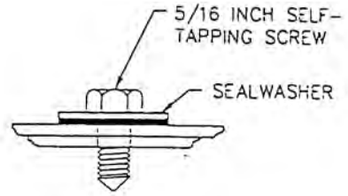
DRIFT PIN

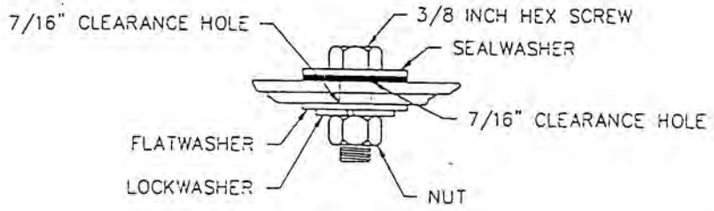
DRILL BIT

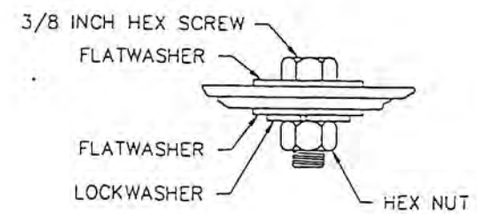
SEALER

TOOLS AND MATERIAL USED IN ASSEMBLY









COMMON FASTENING METHODS IN ASSEMBLY

BALTIMORE AIRCOIL COMPANY		
GENERAL INSTRUCTION		DWG NO: 9C4171 RB
DWG BY: JSK CHK BY: WHS DATE: 08/08/95		PAGE NO: 5

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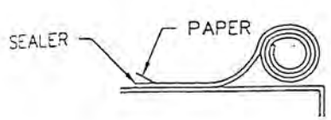
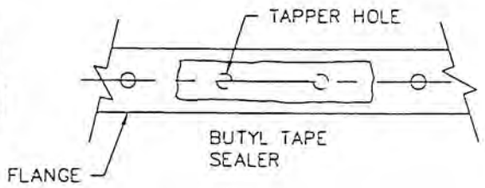
IMPORTANT SEALING INSTRUCTIONS

1. Let the sealer tape roll on naturally (sketch A). Make sure the butyl tape is centered over the tapper holes on the part to be joined and sealed (sketch B). Be sure the butyl sealer tape is smooth and even all around.

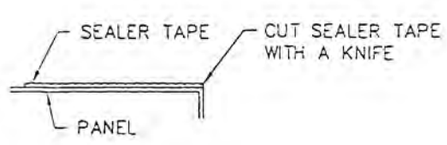
2. When cutting off a piece of butyl sealer tape, be sure to avoid streching and "necking down" the tape. Always cut the butyl sealer tape; never tear (sketch C).



SKETCH A



SKETCH B



SKETCH C

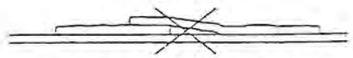
3. Care should be exercised when the butyl sealer tape must be overlapped, such as splices, or in corners, not to leave large mounds of tape. Feather edges together as shown in sketch D and then squeeze out the butyl sealer tape carefully so it is even (sketch E). Uneven heights of layers of sealer will not compress uniformly under pressue and gaps will remain (sketch F).

EDGES FEATHERED TOGETHER

SKETCH D

SQUEEZE OUT EVENLY

SKETCH E



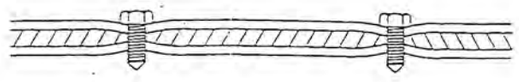
DOUBLE THICKNESS IS TOO BULKY FOR FLANGE TO EVEN OUT

SKETCH F

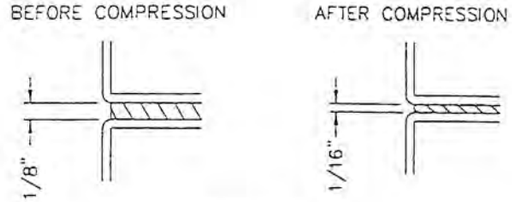
4. Do not use any lubricants, such as tube and tire compounds, on the joint to be sealed or on the butyl sealer tape. While a lubricant may help in assembly, it adversely affects the sealer's adhesive characteristics.

   - All areas (corners and seams) should be clean of weld slag and debris and must be dry before sealer is applied.

5. The rule of thumb for compressing butyl tape sealer is to stop tightening tappers just after the flanges start to bow and before the two pieces touch as shown in sketch G. 50% compression is desired on the butyl tape sealer (sketch H).

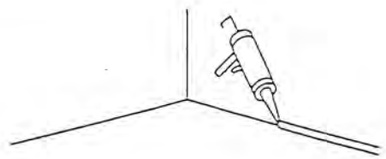


SKETCH G



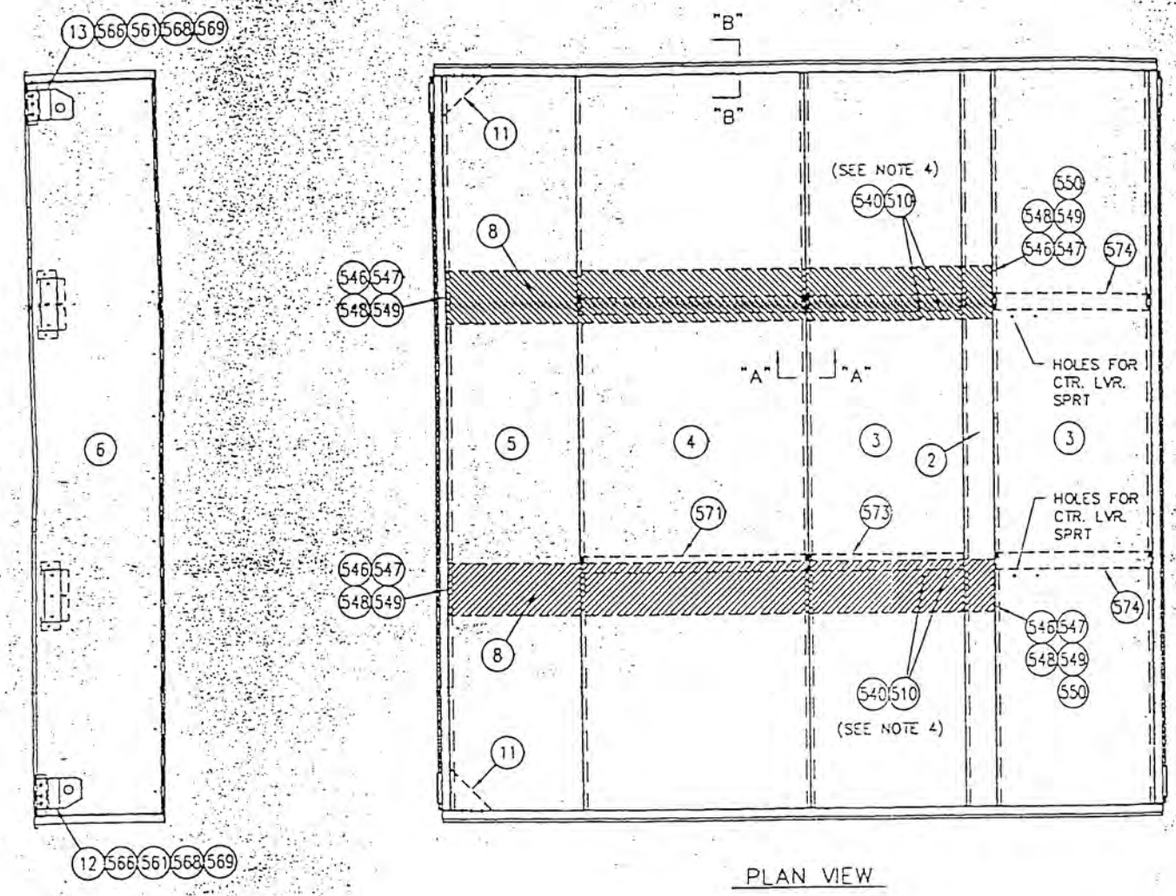
SKETCH H

6. After the excess butyl sealer tape has been cut away from the joined parts, a bead of caulkable sealer is applied neatly, without air bubbes. Recaulk those areas as required.

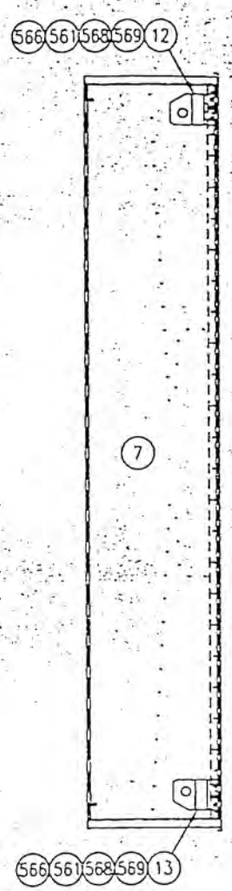


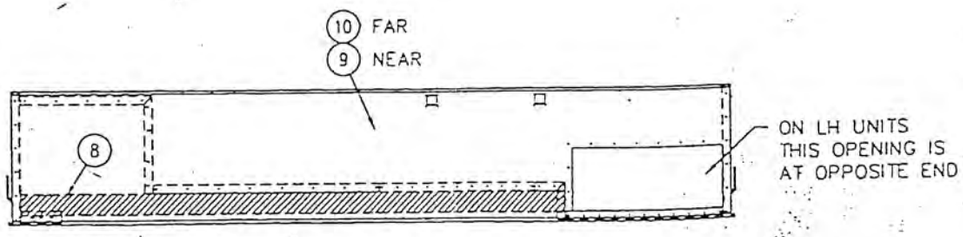
BALTIMORE AIRCOIL COMPANY		
	GENERAL INSTRUCTION	DWG NO: 9C4172 RE
DATE	DWG BY: JSK CHK BY: WHS DATE: 08/08/96	PAGE NO: 6

IGHT 1996, BALTIMORE AIRCOIL COMPANY



PLAN VIEW





END ELEVATION

COMPONENT PARTS	UNIT SIZE	12 x 12		
	LWR FILL HEIGHT	96		
	ASS'Y BOM	–		

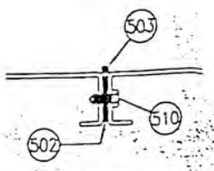
ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.
1					
2	PNL PAN STEP	1	5C3191M*		
3	PNL PAN PLATFORM	2	5C3186M*		
4	PNL PAN PLATFORM	1	5C3131M*		
5	PNL PAN STEP	1	5C3134M*		
6	PNL PAN SIDE @ BOP	1	5C3137M*		
7	PNL PAN SIDE @ LVR	1	SEE BOM		
8	CHNL FORK LIFT	2	5C3135M*		
9	PNL PAN END CONN RH	1	SEE BOM		
10	PNL PAN END CONN LH	1	SEE BOM		
11	ANG LIFT GUSSET	2	6C3152M*		
12	LIFTING EAR RH	2	686264		
13	LIFTING EAR LH	2	686265		
502	BUTYL SEALER	5	554009		
503	SILAPRENE TUBE	2	160211		
510	5/16 x 3/4 SELF TAPPER	240	210109M*	256	
540	5/16 SEALWASHER	4	210006M*		
546	3/8 X 1 BOLT	12	210054M*		
547	3/8 NUT	12	210028M*		
548	3/8 LOCKWASHER	12	210033M*		
549	3/8 FLATWASHER	18	210038M*	12	
550	3/8 SEALWASHER	6	210191M*		
566	5/8 X 2 BOLT GR-5	18	210242M1		
561	5/8 NUT A194	18	210243M1		
568	5/8 LOCKWASHER	18	210035M1		
569	5/8 FLATWASHER	36	210244M1		
571	CHNL STIFFENER	2	5C5810M*		
572	CHNL STIFFENER	2	5C5803M*		
573	CHNL STIFFENER	2	5C5802M*		

NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.

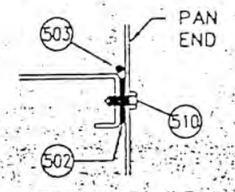
HARDWARE SCHEDULE UNLESS SPECIFIED }

	DESCRIPTION	ITEM NO.
V/88D	5/16 SELF TAPPER	

NOTES:
1. APPLY ITEM 502 AT ALL JOINTS.
2. CAULK ALL JOINTS WITH ITEM 503 AFTER ASSEMBLY.
3. THE PAN MUST BE WATERTIGHT.
4. BE SURE TO PLUG & SEAL THESE HOLES.

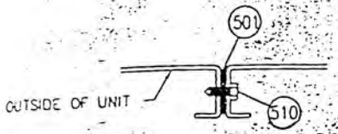


SECTION A – A

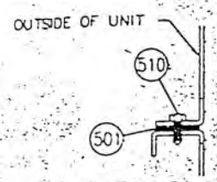


SECTION B – B

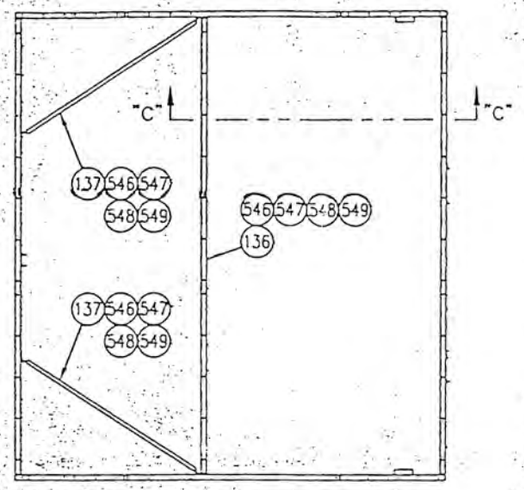
REV. A	DWG 08/30/01 REVISION	BALTIMORE AIRCOIL COMPANY	
		PAN – STANDARD	DWG NO: 9C4205 RB
		DWG BY: JSK CHK BY: WHS DATE: 10/11/96	PAGE NO: 7A



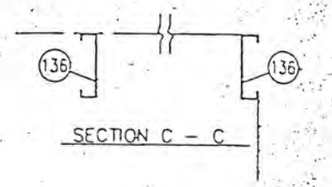
SECTION A – A
– TYP. PANEL JOINT DETAIL –



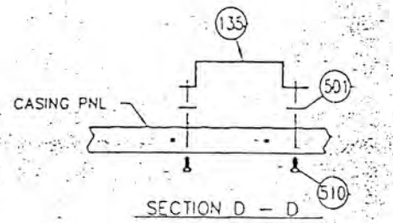
SECTION B – B
– TYP. PANEL JOINT DETAIL –



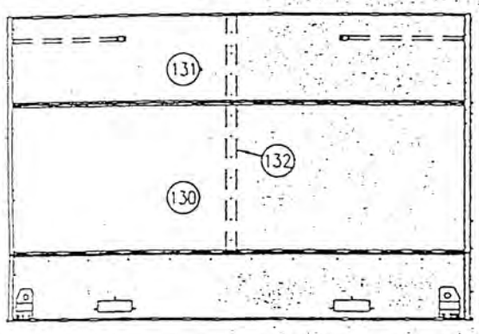
PLAN VIEW
LOUVER PLENUM



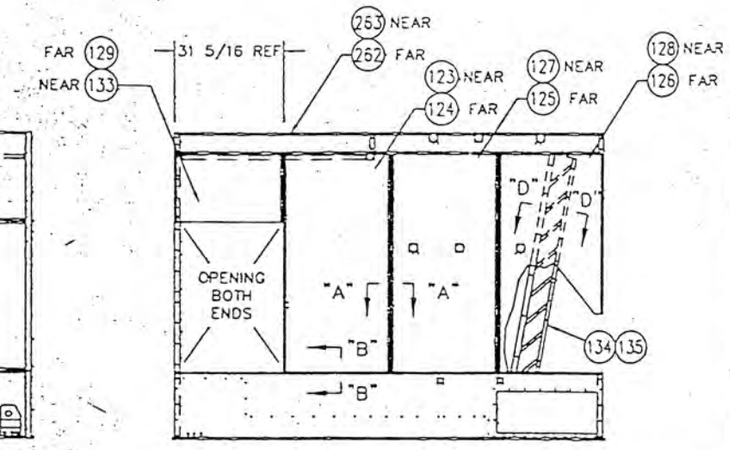
SECTION C – C



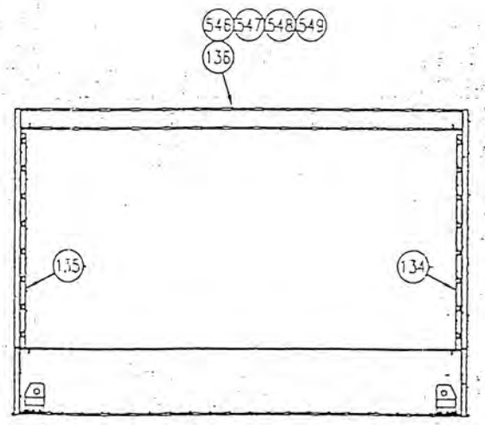
SECTION D – D



BOP ELEVATION



END ELEVATION



LOUVER FACE ELEVATION

COMPONENT PARTS	UNIT SIZE	12 x 12		
	LWR FILL HEIGHT	96		
	ASS'Y BOM	–		

ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.
123	PNL CSG END CTR LH	1	6C4191M*		
127	PNL CSG END CTR LH KD	1	6C4997M*		
128	PNL CSG END ⊖ LVR LH KD	1	6C4994M*		
263	CHNL END TRANS SPRT KD LH	1	6C6033M*		
124	PNL CSG END CTR RH	1	6C4190M*		
125	PNL CSG END CTR RH KD	1	6C4996M*		
126	PNL CSG END ⊖ LVR RH KD	1	6C4993M*		
262	CHNL END TRANS SPRT KD RH	1	6C6032M*		
136	CHNL LONG SPRT	2	6C6814M*		
129	PNL CSG END ⊖ BOP RH	1	6C4193M*		
130	PNL BOP BOTTOM	1	6C3207M*	✓	
131	PNL BOP TOP	1	6C4195M*		
132	CHNL BOP STIFFENER	1	6C3366M*		
133	PNL CSG END ⊖ BOP LH	1	6C4194M*		
137	PIPE BRACE	2	6C3485M2		
134	PNL LVR SPRT END RH	1	6C8004M*		
135	PNL LVR SPRT END LH	1	6C8005M*		
501	BUTYL SEALER	2	554000		
510	5/16 x 3/4 SELF TAPPER	290	210109M*		
546	3/8 X 1 BOLT	12	210054M*		
547	3/8 NUT	12	210028M*		
548	3/8 LOCKWASHER	12	210033M*		
549	3/8 FLATWASHER	24	210038M*		

NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.

RDWARE SCHEDULE UNLESS SPECIFIED]

	DESCRIPTION	ITEM NO.
6BD	5/16 SELF TAPPER	

NOTES:
1. APPLY SEALER TAPE (ITEM 501) AT ALL JOINTS.

REVISION		
KY. B	DATE: 05/30/01	
KY. A	DATE: 10/09/97	

BALTIMORE AIRCOIL COMPANY

CASING : LOWER SECTION — DWG NO: 9C4206 RB

DWG BY: JSK CHK BY: WHS DATE: 10/11/95 — PAGE NO: 8

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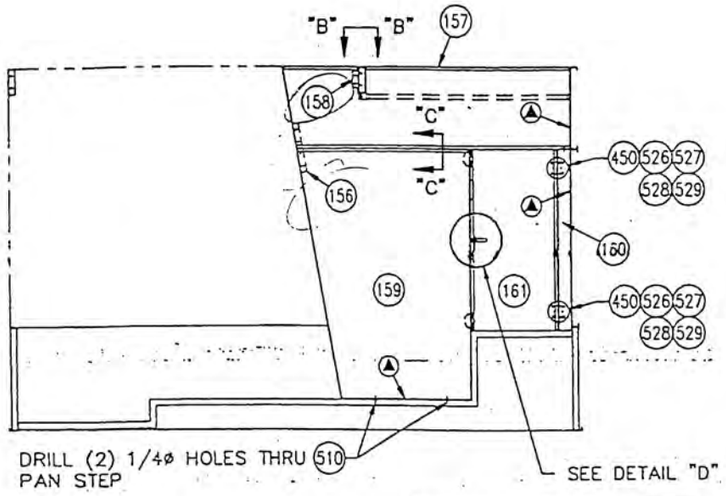
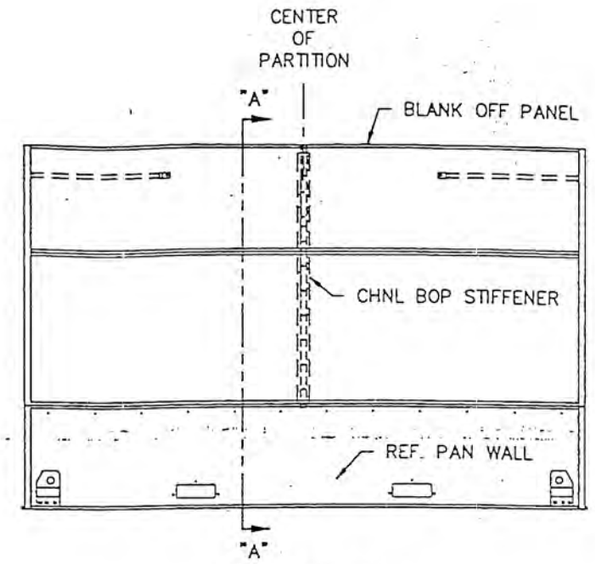
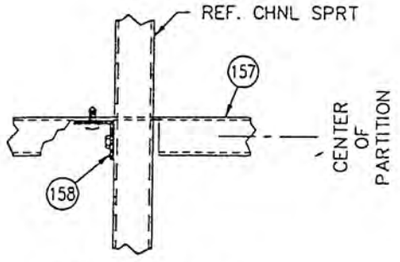


SECTION "A"–"A"



BOP ELEVATION



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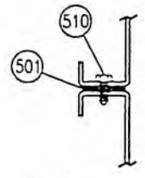

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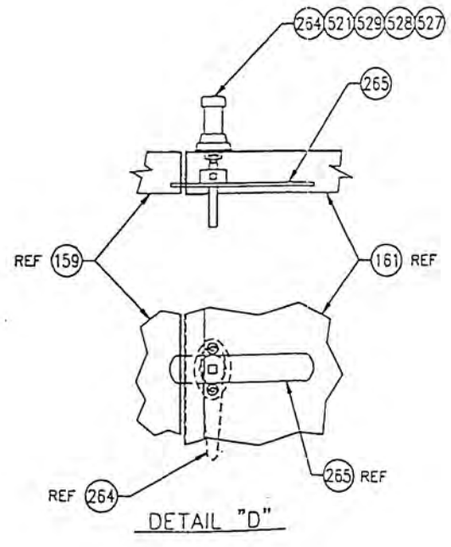

DETAIL "D"

COMPONENT PARTS	UNIT SIZE	12 x 12			
	LWR FILL HEIGHT	96			
	MTR ARRANGEMENT	DUAL MOTOR			

ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.
157	PNL PARTITION UPR	1	6C3988M*		
158	ANG PTN SPRT	1	6C3991M*	✓	
159	PNL PARTITION LWR	1	6C3989M*		
156	ANG PTN STIFFENER	1	6C3987M*	✓	
160	CHNL PTN DOOR FRAME	1	6C3990M*		
161	PNL PTN ACCESS DOOR	1	6C4057M*		
264	HANDLE	1	260799		
265	HANDLE LATCH	1	260800		
501	BUTYL SEALER TAPE 1/8 x 1	1	554000		
510	5/16 x 3/4 SELF TAPPER	22	210109M*		
450	SST HINGE 3 x 3	2	260474M3		
526	#10 x 3/4 SCREW	12	210214M*		
521	#10 x 3/4 FH SCREW	2	211203M*		
527	#10 NUT	14	210217M*		
528	#10 LOCKWASHER	14	210216M*		
529	#10 FLATWASHER	26	210215M*		

NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.

[HARDWARE SCHEDULE UNLESS SPECIFIED]

QTY/BBD	DESCRIPTION	ITEM NO.
	5/16 SELF TAPPER	510

REV.	DATE	REVISION
-		-

BALTIMORE AIRCOIL COMPANY

OPTIONAL PARTITION – 12 x 12 LOWER | DWG NO: 9C4207 RE

DWG BY: JSK CHK BY: WHS DATE: 10/11/96 | PAGE NO: 9A

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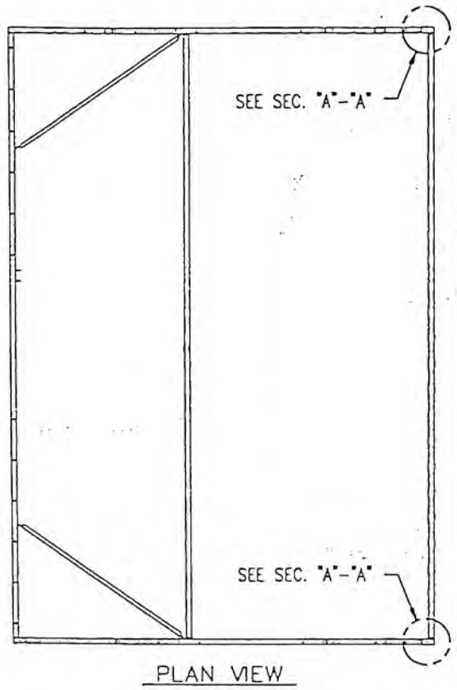
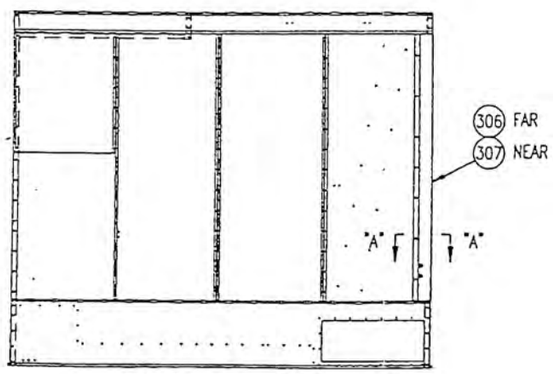
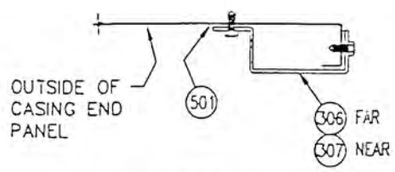


PLAN VIEW



END ELEVATION



SEC. A-A
(2 CORNERS)

COMPONENT PARTS	UNIT SIZE	8.5 x 6, 9, 12		12 x 12, 18	
	LWR FILL HEIGHT	64		95	
ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.
306	CHNL CORNER SPRT RH			1	6C4199M*
307	CHNL CORNER SPRT LH			1	6C4200M*
501	BUTYL SEALER TAPE 1/8 x 1			1	554000
510	5/16 x 3/4 SELF TAPPER			44	210109M*

NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.

HARDWARE SCHEDULE UNLESS SPECIFIED]

	DESCRIPTION	ITEM NO.
W/BBD	5/16 SELF TAPPER	510

REV - DATE - REVISION	BALTIMORE AIRCOIL COMPANY	
	LOWER CASING CORNER SPRT	DWG NO: 9C4198 RB
	DWG BY: JSK CHK BY: WHS DATE: 09/19/96	PAGE NO: 10

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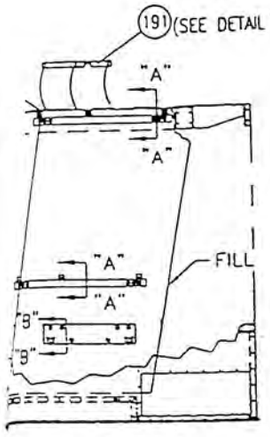
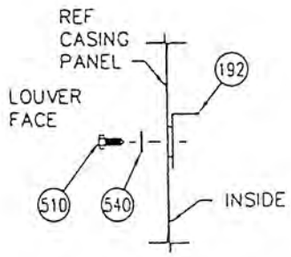
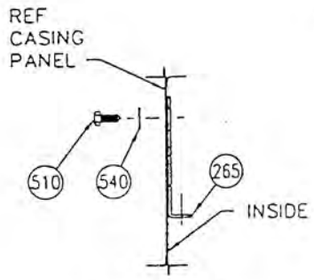


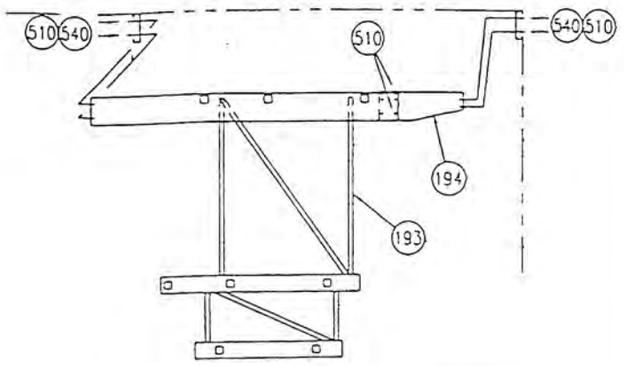
END VIEW



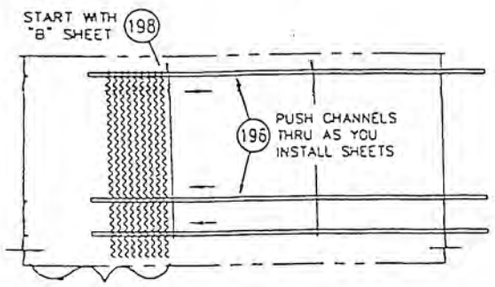
SEC. "A"–"A"
(TYP 4 PLACES)
[STEP # 1]



SEC. "B"–"B"
(TYP 2 PLACES)
[STEP # 2]

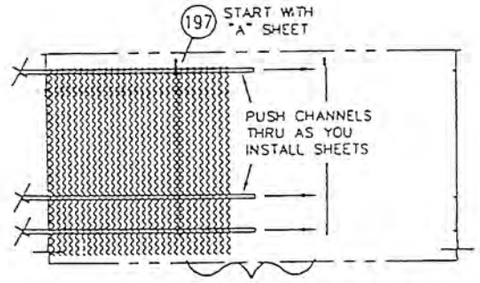


– INTERMEDIATE FILL HANGER INST'L –
(2 PLACES)
[STEP # 3]



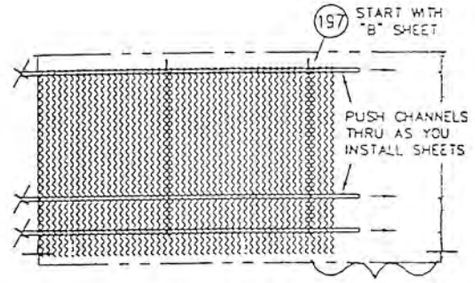
INSTALL (32) "A" SHEETS (ITEM #197)
AND (32) "B" SHEETS (ITEM #198)
ALTERNATE SHEETS
STARTING WITH "B" SHEET
FINISHING WITH "A" SHEET

(VIEW FROM LOUVER FACE)
[STEP # 4]



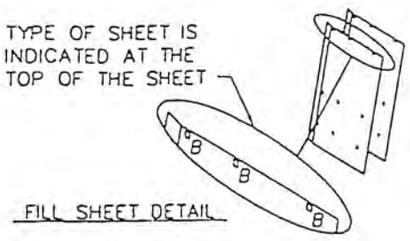
INSTALL (35) "A" SHEETS (ITEM #197)
AND (34) "B" SHEETS (ITEM #198)
ALTERNATE SHEETS
STARTING WITH "A" SHEET
FINISHING WITH "A" SHEET

(VIEW FROM LOUVER FACE)
[STEP # 5]

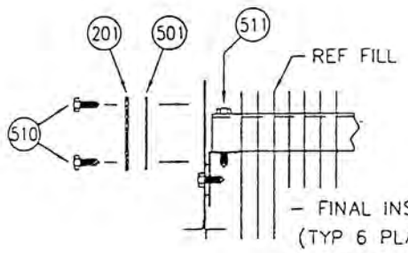


INSTALL (31) "A" SHEETS (ITEM #197)
AND (32) "B" SHEETS (ITEM #198)
ALTERNATE SHEETS
STARTING WITH "B" SHEET
FINISHING WITH "B" SHEET

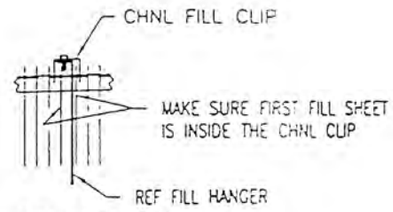
(VIEW FROM LOUVER FACE)
[STEP # 6]



FILL SHEET DETAIL



– FINAL INST'L –
(TYP 6 PLACES)
[STEP # 7]



DETAIL "C" (LVR END VIEW)
– 2 PLACES –

COMPONENT PARTS	UNIT SIZE	12 x 12			
	FILL HEIGHT	96			

ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.
192	ANG FILL SPRT END	4	6E054AM*		
265	ANG FILL SPRT 2 HOLE	2	6C5152M*		
193	FILL HANGER ASSY	2	6C8121M*		
194	CHNL FILL HANGER SPRT	2	6C6963M*		
196	CHNL FILL SPRT	8	6C3341M*		✓
197	PVC FILL "A" SHEET	98	6E337FP1		
198	PVC FILL "B" SHEET	98	6E337GP1		
201	PLT COVER	16	590591M*		
191	MTL CHNL FILL CLIP	2	6C6113M*		
501	BUTYL SEALER	1	554000		
510	5/16 x 3/4 SELF TAPPER	44	210109M*		
511	5/16 x 2 SELF TAPPER	16	210535M*		
540	5/16 SEALWASHER	28	210006M*		

NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.

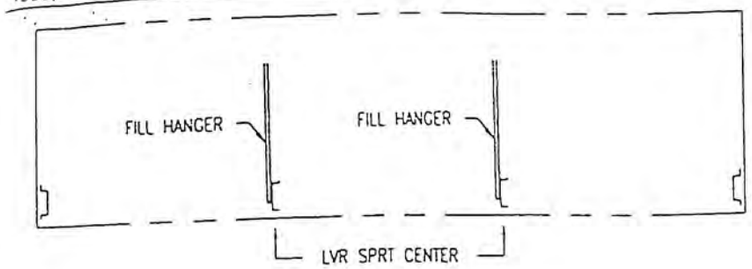
REVISION	DATE
REV. B	DATE: 8/30/01
REV. A	DATE: 7/21/97

BALTIMORE AIRCOIL COMPANY

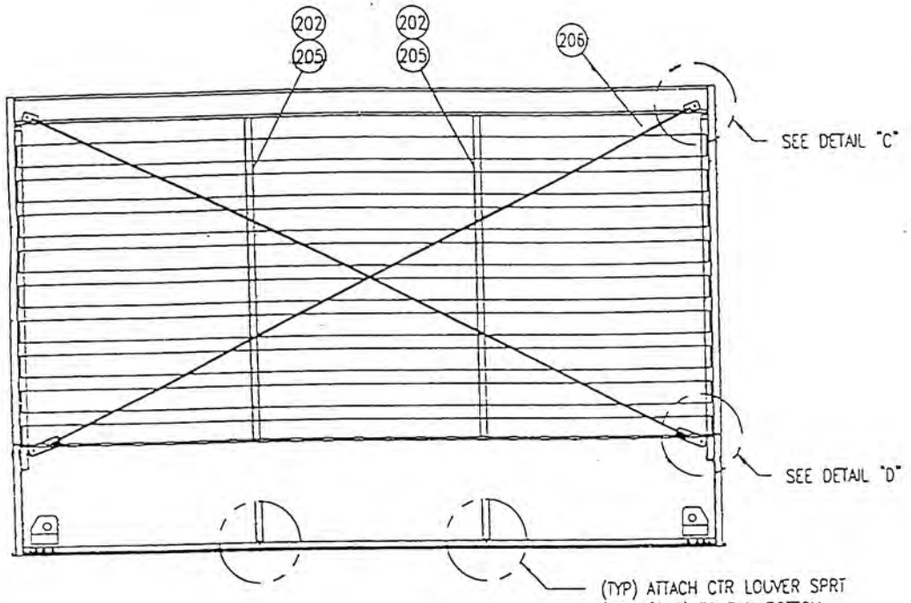
FILL & SUPPORTS – LOWER | DWG NO: 9C4208 RB

DWG BY: JSK CHK BY: WHS DATE: 10/11/96 | PAGE NO: 11A

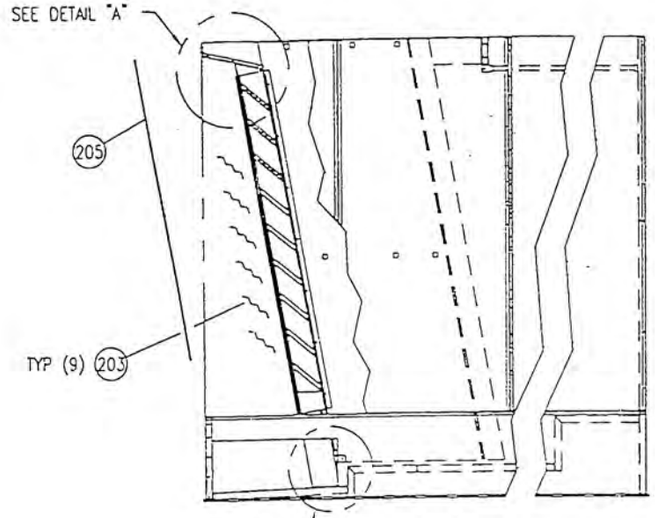
1996, BALTIMORE AIRCOIL COMPANY



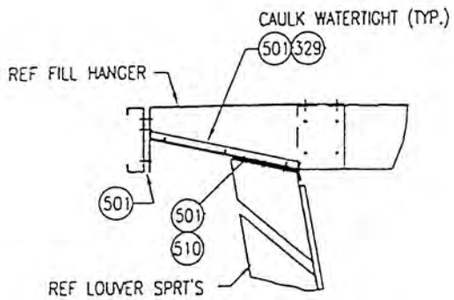
PLAN VIEW OF CTR LOUVER SPRT



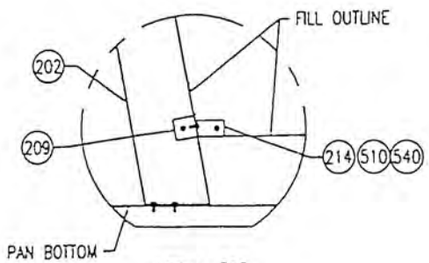
LOUVER END VIEW



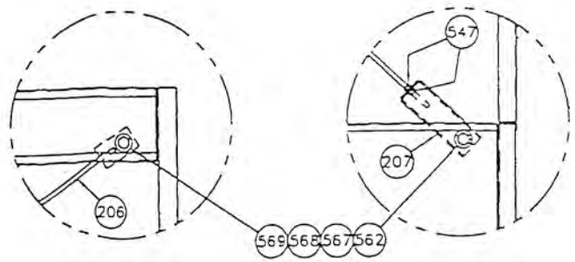
END ELEVATION



DETAIL "A"



DETAIL "B"



DETAIL "C" DETAIL "D"

COMPONENT PARTS	UNIT SIZE	12 x 12		
	FILL HEIGHT	96		

ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.
214	ANG FILL SPRT RETAINER	1	6C4052M*		
329	PNL WATER BAFFLE @ LVR RH	1	6C8039M*		
202	PNL LVR SPRT CTR LWR	2	6C6485M*		
203	FRP LOUVER	9	321137PF		
205	CHNL LVR CAP	2	6C8048M*		
206	TIE ROD	2	6C3333M*		
207	BRACKET TIE ROD	2	6E6040M*		
209	FILL RETAINER CLIP	2	6C8043M*		
501	BUTYL SEALER	1	554000		
510	5/16 x 3/4 SELF TAPPER	22	210109M*		
540	5/16 SEALWASHER	4	210006M*		
547	3/8 NUT	4	210028M*		
562	5/8 X 1 1/4 BOLT	4	210241M*		
567	5/8 NUT	4	210030M*		
568	5/8 LOCKWASHER	4	210035M*		
569	5/8 FLATWASHER	8	210041M*		

NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.

ARDWARE SCHEDULE UNLESS SPECIFIED]

	DESCRIPTION	ITEM NO.
/8801	5/16 SELF TAPPER	510

REV. A	DATE: 8/20/01 REVISION	BALTIMORE AIRCOIL COMPANY	
		LOUVER & SUPPORTS – LOWER	DWG NO: 9C4209 RB
		DWG BY: JSK CHK BY: WHS DATE: 10/11/96	PAGE NO: 12A

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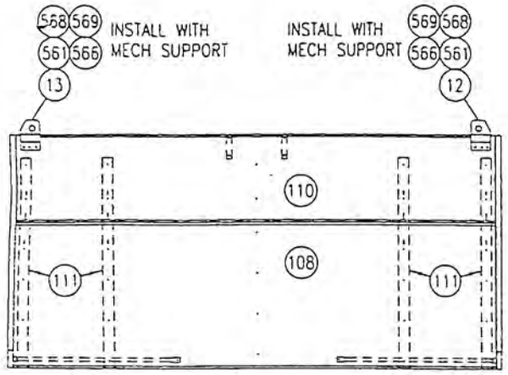
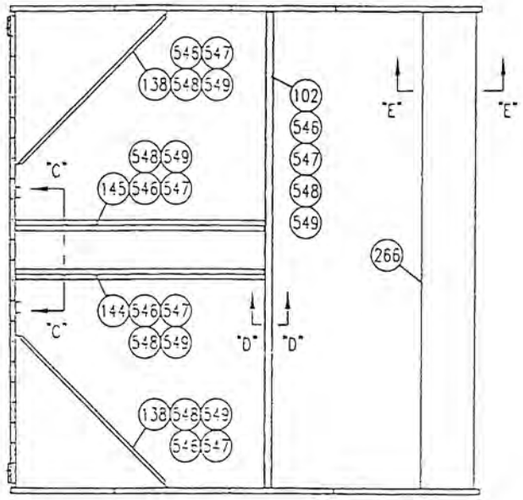
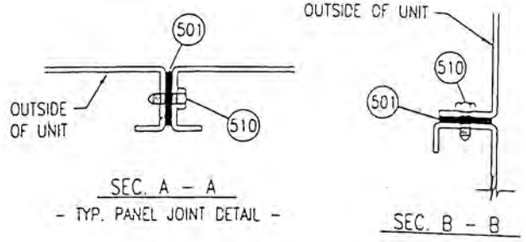


BOP ELEVATION

- UNIT WITH INDIVIDUAL (DUAL) MOTOR ONLY -



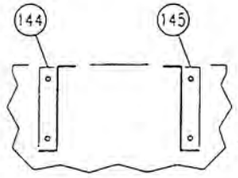
PLAN VIEW



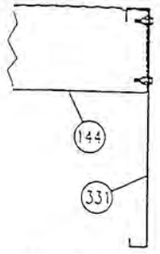
SEC. A - A

- TYP. PANEL JOINT DETAIL -

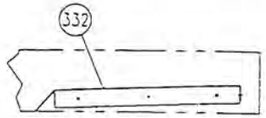
SEC. B - B



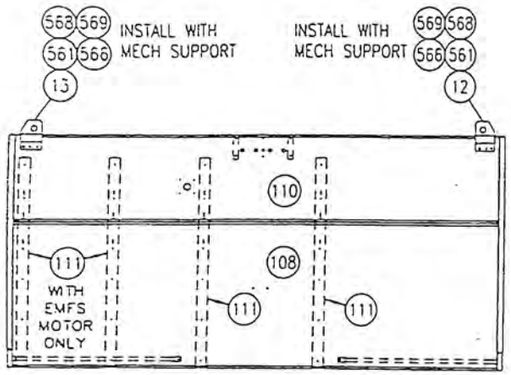
SEC. C - C



SEC. D - D

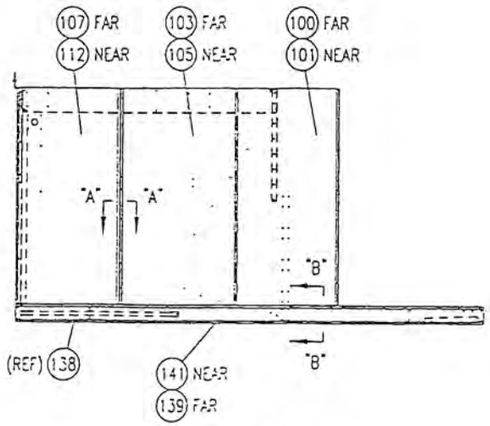


SEC. E - E

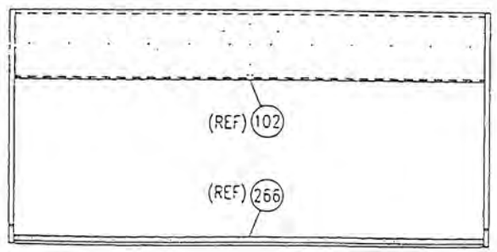


BOP ELEVATION

- UNIT WITH STD OR EMFS MOTOR ONLY -



END ELEVATION



COIL FACE ELEVATION

COMPONENT PARTS	UNIT SIZE	12 x 12		12 x 12	
	MTR ARRANGEMENT	STD & EMFS		DUAL MOTOR	
ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.
139	CHNL BASE END RH	1	6C6145M*	1	6C6145M*
266	PNL BAFFLE COIL BTM	1	6C4235M*	1	6C4235M*
141	CHNL BASE END LH	1	6C6146M*	1	6C6146M*
108	PNL BOP BOTTOM	1	6C3933M*	1	6C4050M*
138	PIPE BRACE	2	6C3330M2	2	6C3330M2
100	PNL CSG END CTR RH	1	6C6149M*	1	6C6149M*
101	PNL CSG END CTR LH	1	6C6150M*	1	6C6150M*
102	PNL ME/DECK SPRT	1	6C6147M*	1	6C6147M*
105	PNL CSG END CTR LH	1	6C6153M*	1	6C6153M*
112	PNL CSG END @ BOP LH	1	6C3931M*	1	6C3931M*
110	PNL BOP TOP	1	6C3932M*	1	6C4049M*
103	PNL CSG END CTR RH	1	6C6152M*	1	6C6152M*
107	PNL CSG END @ BOP RH	1	6C3930M*	1	6C3930M*
111	CHNL STIFFENER (STD MOTOR)	2	6C3860M*	–	–
	CHNL STIFFENER (EMFS MTR)	4	6C3860M*	–	–
	CHNL STIFFENER (DUAL MTR)	–	–	4	6C3860M*
144	ZEE ME/DECK SPRT RH	1	6C4210M*	1	6C4210M*
145	ZEE ME/DECK SPRT LH	1	6C4211M*	1	6C4211M*
12	LIFTING EAR RH	1	686264	1	686264
13	LIFTING EAR LH	1	686265	1	686265
501	BUTYL SEALER	2	554000	2	554000
510	5/16 x 3/4 SELF TAPPER	190	210109M*	190	210109M*
545	3/8 X 1 BOLT	12	210054M*	12	210054M*
547	3/8 NUT	12	210028M*	12	210028M*
548	3/8 LOCKWASHER	12	210033M*	12	210033M*
549	3/8 FLATWASHER	24	210038M*	24	210038M*
566	5/8 X 2 BOLT GR-5	6	210242M1	6	210242M1
561	5/8 NUT A194	6	210243M1	6	210243M1
568	5/8 LOCKWASHER	6	210035M1	6	210035M1
569	5/8 FLATWASHER	12	210244M1	12	210244M1

NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.

HARDWARE SCHEDULE UNLESS SPECIFIED]

	DESCRIPTION	ITEM NO.
1/980	5/16 SELF TAPPER	510

NOTE :
1. APPLY SEALER TAPE (ITEM #501) AT ALL JOINTS.

10/09/97	BALTIMORE AIRCOIL COMPANY	
REVISED TO	CASING – 12 x 12 UPPER	DWG NO: 9C4210 RB
	DWG BY: JSK CHK BY: WHS DATE: 10/11/96	PAGE NO: 13

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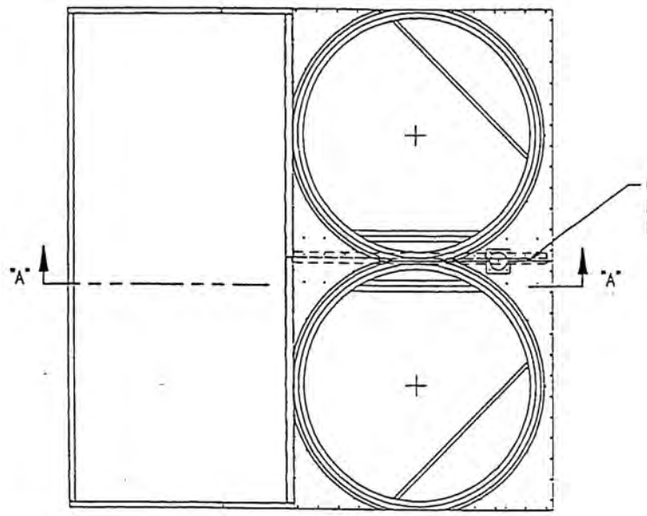
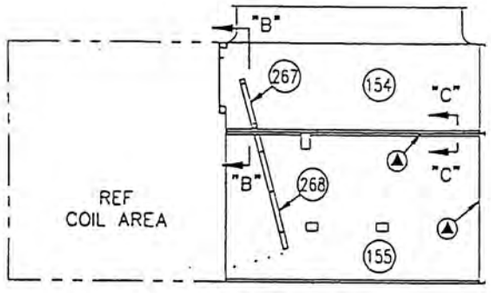
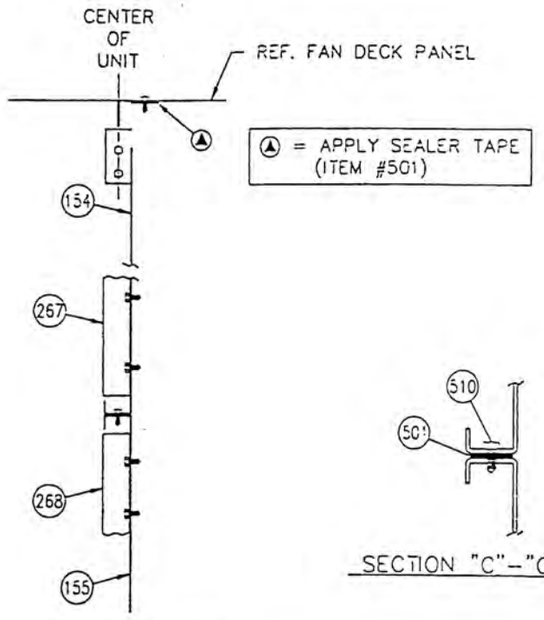
9C4211 RB





SECTION "A" – "A"

▲ = APPLY SEALER TAPE
(ITEM #501)



SECTION "B"–"B"

SECTION "C"–"C"

COMPONENT PARTS	UNIT SIZE	12 x 18			
		COIL UNIT			
	MTR ARRANGEMENT	DUAL MTR			
ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.
154	PNL PARTITION UPR	1	6C4282M*		
155	PNL PARTITION LWR	1	6C4283M*		
267	ANG PTN ELIM PTN SPACER	1	6C4285M*		
268	ANG PTN ELIM PTN SPACER	1	6C4284M*		
501	BUTYL SEALER TAPE	1	554000		
510	5/16 x 3/4 SELF TAPPER	35	210109M*		

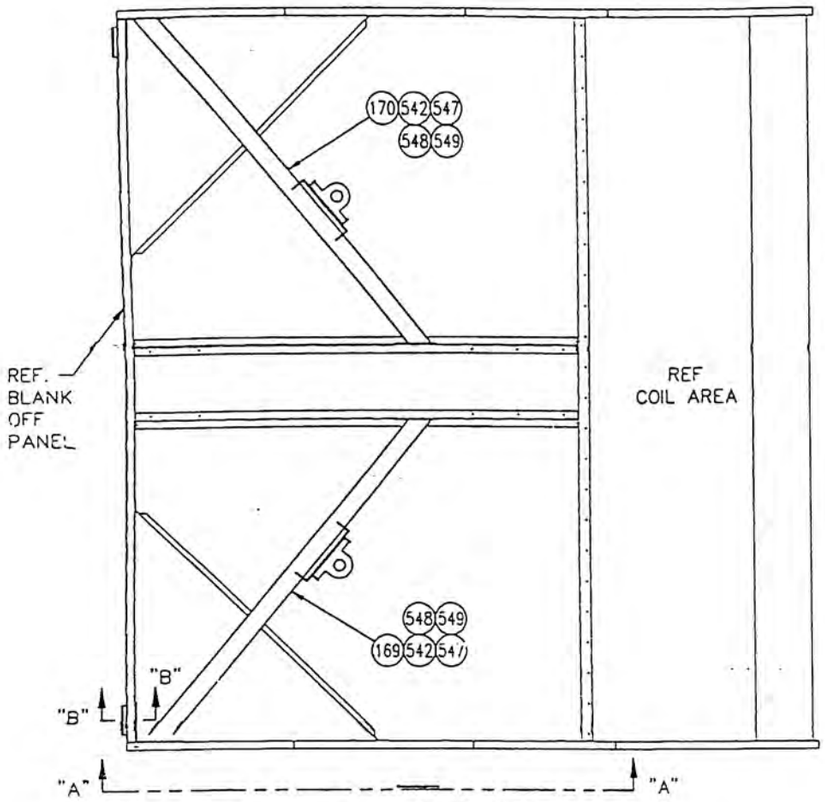
NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.

[HARDWARE SCHEDULE UNLESS SPECIFIED]

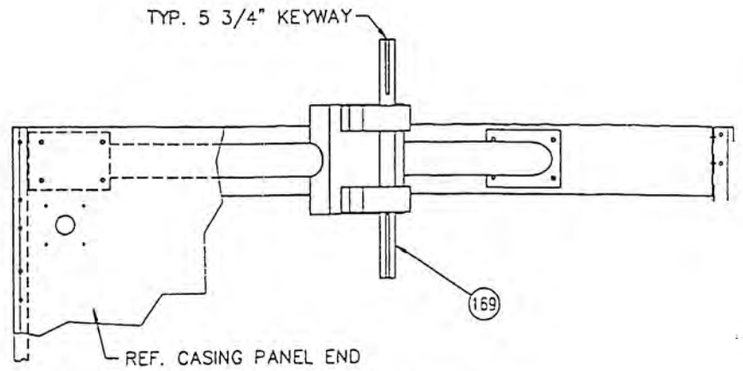
DESCRIPTION	ITEM NO.
QTY/BBD 5/16 SELF TAPPER	510

BALTIMORE AIRCOIL COMPANY		
OPTIONAL PARTITION : 12 x 12 UPPER		DWG NO: 9C4211 RB
DWG BY: JSK CHK BY: WHS DATE: 10/11/96		PAGE NO: 14

RIGHT 1996, BALTIMORE AIRCOIL COMPANY

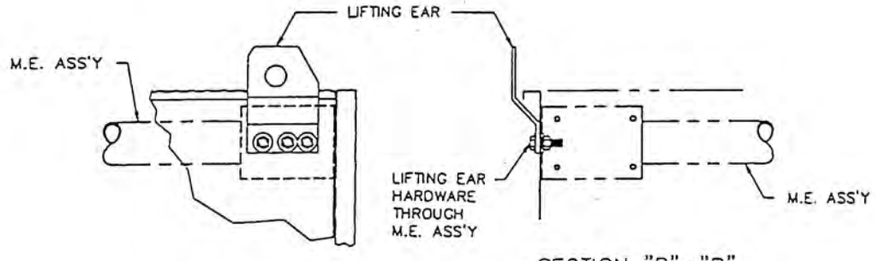


PLAN VIEW



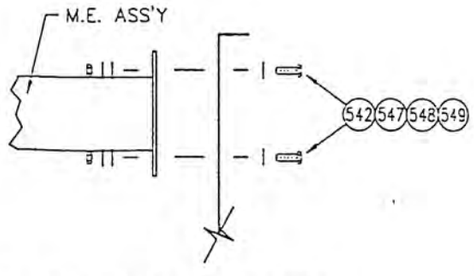
SECTION "A"–"A"

R.H. ASS'Y SHOWN
L.H. ASS'Y (ITEM 170) MIRROR IMAGE



– BLANK OFF VIEW –

SECTION "B"–"B"
(2 PLACES)



M.E. ASS'Y ATTACHMENT DETAIL

COMPONENT PARTS	UNIT SIZE	12 x 18			
ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.
169	M.E. PRE-ASSY RH	1	6C4164M*		
170	M.E. PRE-ASSY LH	1	6C4165M*		
542	3/8 X 1 1/4 BOLT	16	210055M*		
547	3/8 NUT	24	210028M*		
548	3/8 LOCKWASHER	24	210033M*		
549	3/8 FLATWASHER	40	210038M*		

NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.

	BALTIMORE AIRCOIL COMPANY	
REVISION	FAN SUPPORT SYSTEM – 12 x 12	DWG NO: 9C4212 RE
	DWG BY: JSK CHK BY: WHS DATE: 10/14/96	PAGE NO: 15

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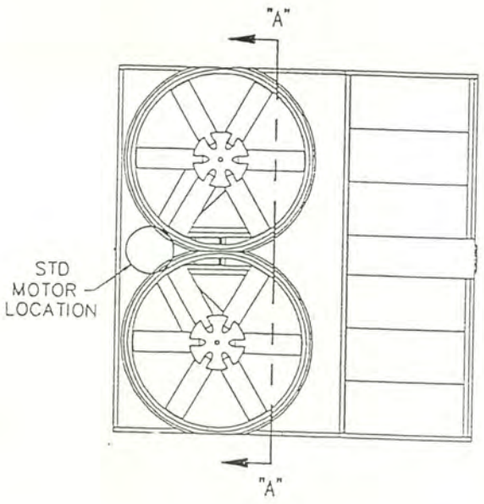
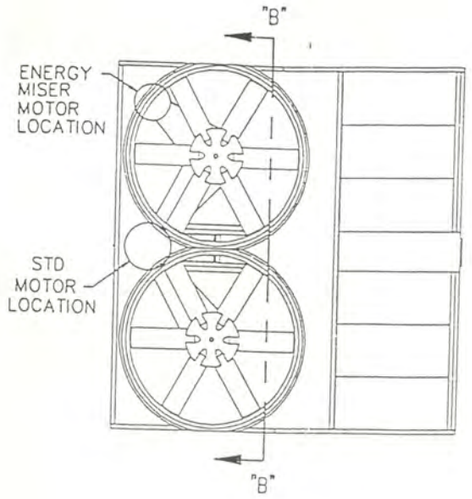
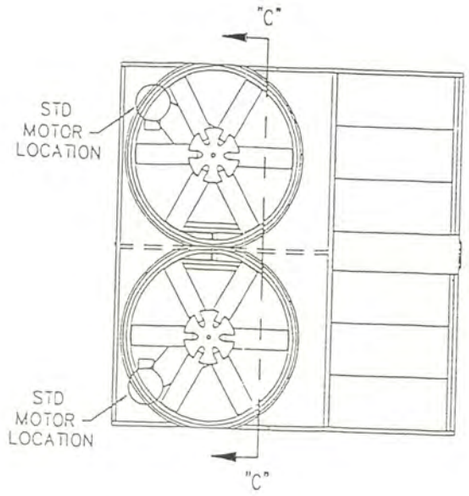


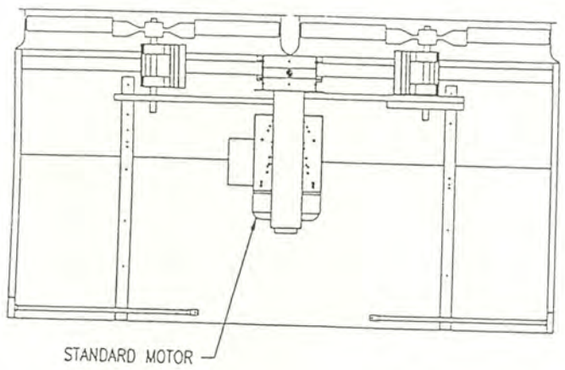
PLAN VIEW
- UNIT WITH STANDARD MOTOR ARRANGEMENT -



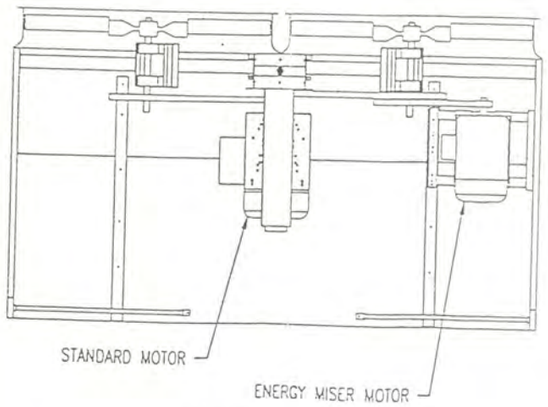
PLAN VIEW
- UNIT WITH STANDARD AND OPTIONAL E.M.F.S. MOTOR ARRANGEMENT -



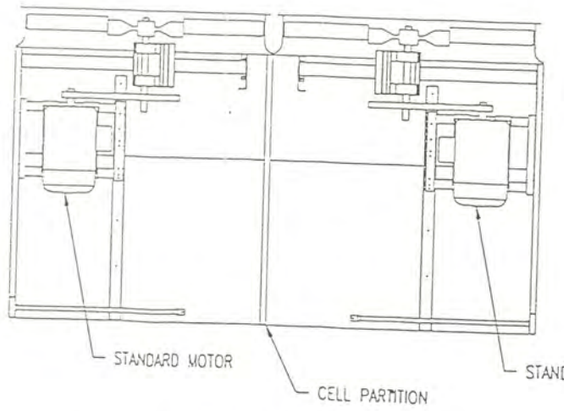
PLAN VIEW
- UNIT WITH INDIVIDUAL (2) MOTOR ARRANGEMENT -



SECTION "A" – "A"
- UNIT WITH STANDARD MOTOR ARRANGEMENT -



SECTION "B" – "B"
- UNIT WITH STANDARD AND OPTIONAL E.M.F.S. MOTOR ARRANGEMENT -



SECTION "C" – "C"
- UNIT WITH INDIVIDUAL (2) MOTOR ARRANGEMENT -

BALTIMORE AIRCOIL COMPANY		
MOTOR ARRANGEMENT – 12 x 12		DWG NO: 9C4213 RB
DWG BY: JSK CHK BY: WHS DATE: 10/14/96		PAGE NO: 16

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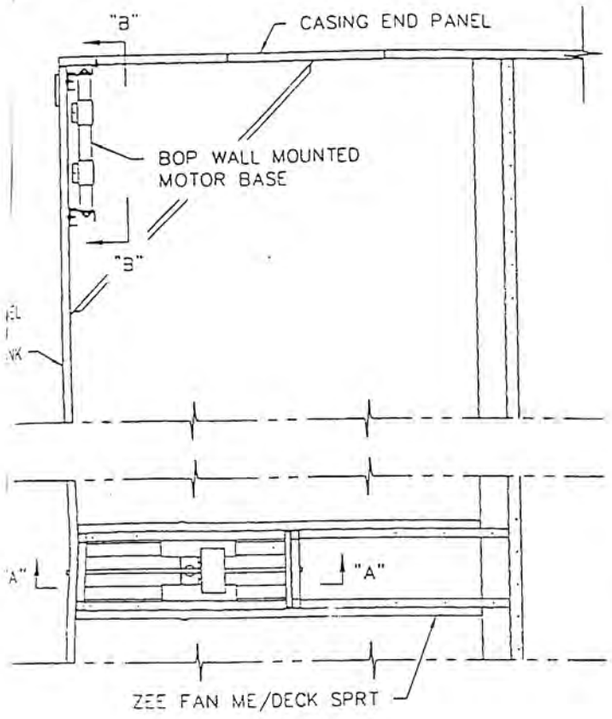
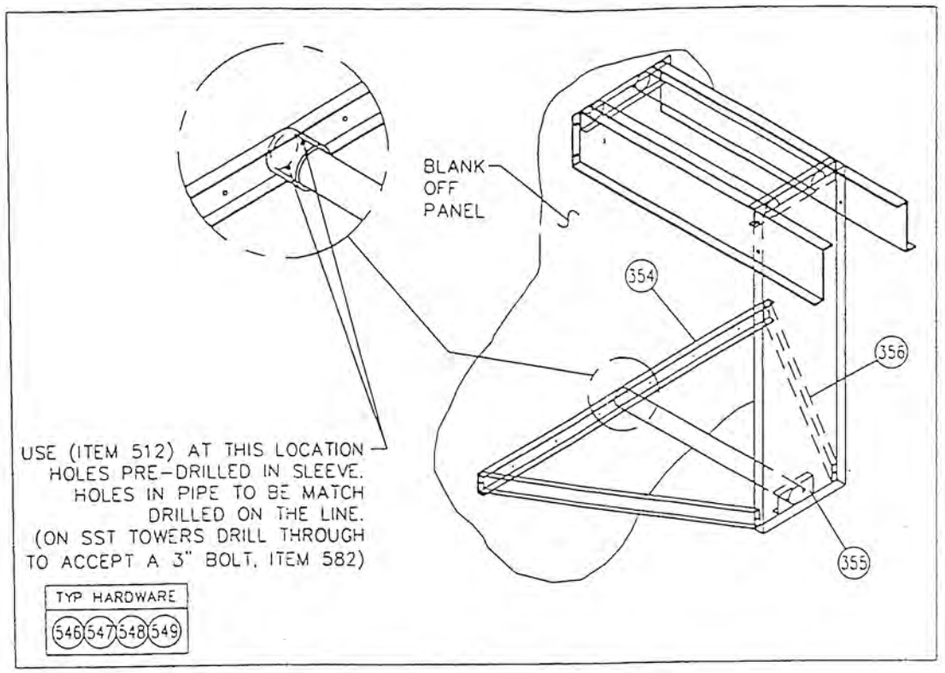
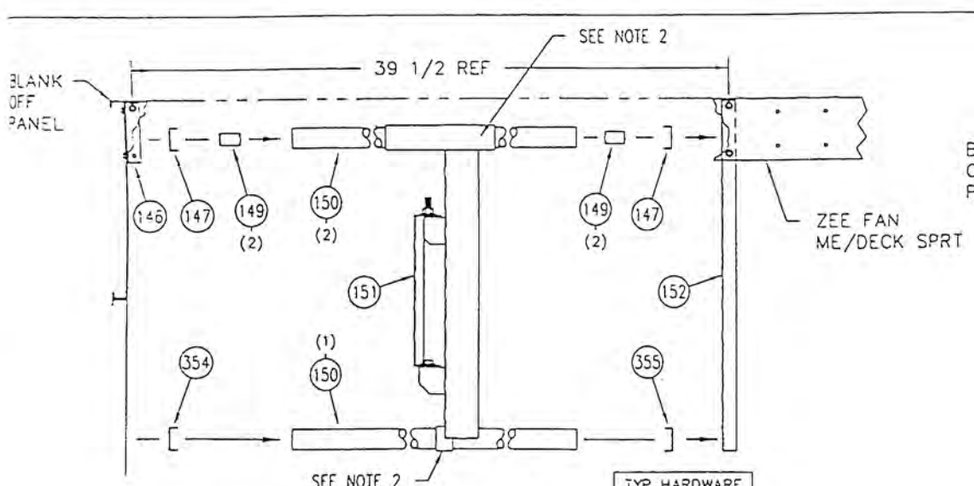


PLAN VIEW

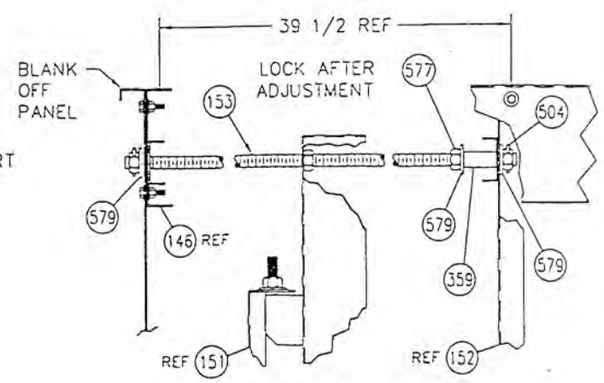


COMPONENT PARTS	UNIT SIZE	12 x 12		12 x 12		12 x 12	
	MOTOR CONFIG.	STANDARD		OPTIONAL EMFS		INDIVIDUAL (2) MTR	
ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.
146	CHNL ME SPRT END @ BOP	1	6C4029M*	1	6C4029M*		
147	CHNL MTR BASE SPRT	2	6C3116M*	2	6C3116M*		
149	CHNL MTR BASE SPRT	4	581084M*	4	581084M*		
150	PIPE SPRT 2 x 38 3/4 PBE	2	830386LL	2	830386LL		
359	PIPE SPRT 3/4 x 1 PBE	1	830010GL	1	830010GL		
151	MOTOR BASE ASSY (STD)	1	6C3245M*	1	6C3245M*		
152	CHNL ME SPRT END	1	6C3922M*	1	6C3922M*		
153	MTR BASE ADJUSTMENT (STD)	1	6C3123M1	1	6C3123M1		
118	MTR BASE ADJUSTMENT (EMFS)			1	6C3587M*	2	6C3587M*
119	MOTOR BASE ASSY (EMFS)			1	6C3590M*	2	6C3590M*
354	MTR BASE SPRT ASSY.	1	6C7862M*	1	6C7862M*		
355	MTR BASE SPRT ASSY.	1	6C7863M*	1	6C7863M*		
356	CHNL BASE DIAG.SPRT	2	6C7865M*	2	6C7865M*		
504	SST ROLL PIN 3/16 x 1 1/4	1	211497M3	2	211497M3	2	211497M3
545	3/8 X 1 BOLT	6	210054M*	28	210054M*	12	210054M*
547	3/8 NUT	10	210028M*	32	210028M*	20	210028M*
548	3/8 LOCKWASHER	10	210033M*	32	210033M*	20	210033M*
549	3/8 FLATWASHER	16	210038M*	60	210038M*	32	210038M*
577	3/4 NUT	1	210031M*	2	210031M*	2	210031M*
579	3/4 FLATWASHER	3	210040M*	6	210040M*	6	210040M*
512	3/8 X 3/4 TAPPER	2	210276M*	2	210276M*	2	210276M*
582	3/8 X 3 SCREW	2	210082M*	2	210082M*	2	210082M*

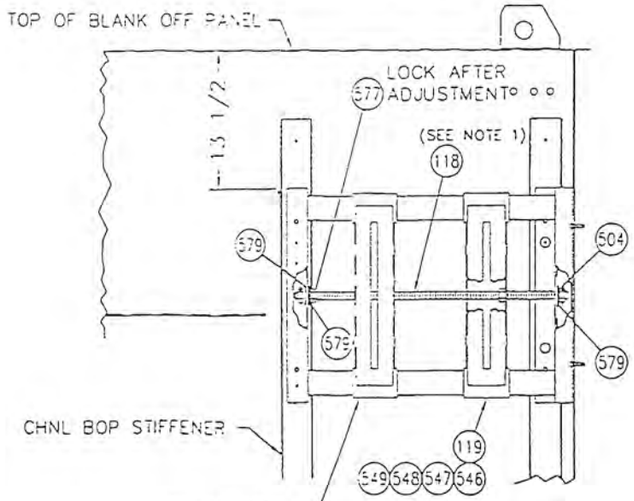
NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.



VIEW "A" – "A"
(MOTOR BASE @ BETWEEN FAN)
– EXPLODED VIEW –



VIEW "A" – "A"
(MOTOR BASE ADJUSTMENT DETAIL)



VIEW "B" – "B"
– VIEW FROM INSIDE –
(TYP BOP WALL MOUNTED MOTOR BASE)
– FOR ENERGY MISER MOTOR –
– FOR INDIVIDUAL (2) MOTOR –

NOTES:

1. INSTALL WALL MOUNTED MOTOR BASE ADJUSTMENT ROD (ITEM 118) ON MOTOR BASE PRIOR TO INSTALLING MOTOR BASE ON THE UNIT.
2. GREESE MOTOR BASE [illegible] SO THE MOTOR BASE SLIDES EASILY FOR ADJUSTM

REV	DATE	REVISION	BALTIMORE AIRCOIL COMPANY	
A	10/07/97		STD MOTOR BASE SPRT : 12 x 12	DWG NO: 9C4214 RB
			DWG BY: JSK CHK BY: WHS DATE: 10/14/96	PAGE NO: 17

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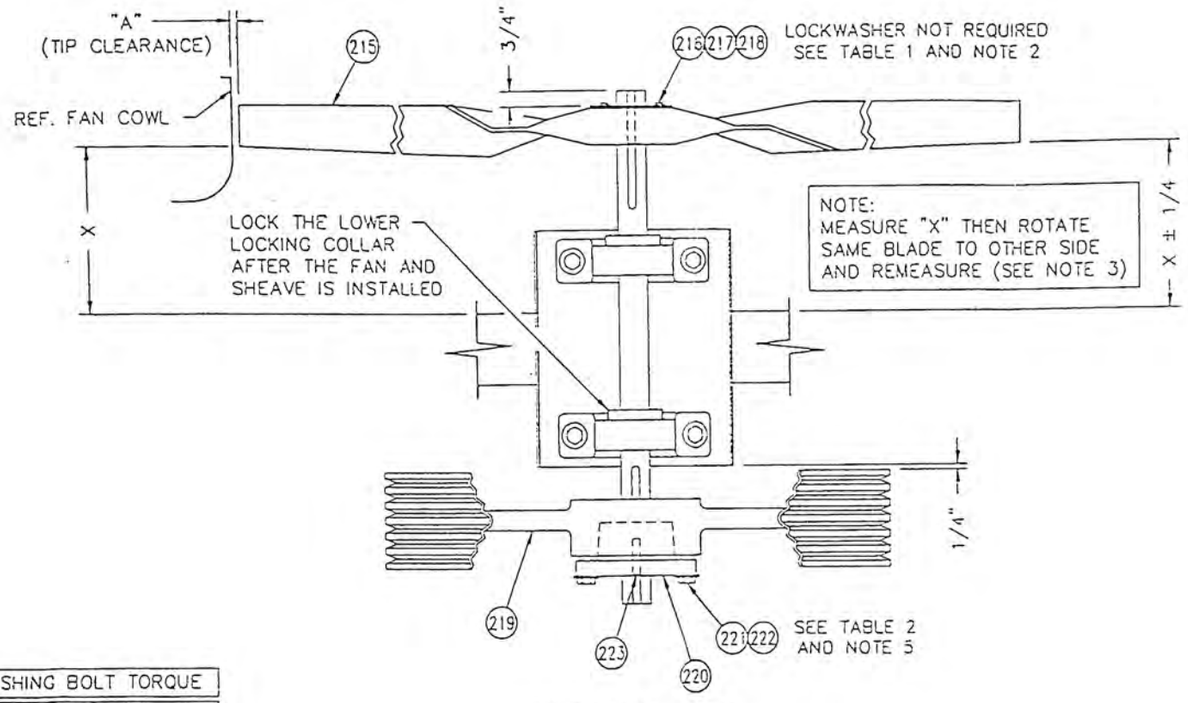
UNIT SIZE	FAN DIAMETER (INCHES)	MANUFACTURER	BUSHING BOLT TORQUE	"A" (TIP CLEARANCE)
12 x 12	66	BAILSCO	22 FT-LBS	1/4" ±1/8
12 x 18	66	BAILSCO	22 FT-LBS	1/4" ±1/8

TABLE 1



ELEVATION VIEW

BUSHING TYPE	BUSHING BOLT TORQUE
SF	22 FT-LBS
E	45 FT-LBS

TABLE 2

COMPONENT PARTS	UNIT SIZE	12 x 12		12 x 18			
	# OF FAN & DIA.	(2) 66ø		(3) 66ø			
	SHAFT DIA.	1 11/16ø		1 11/16ø			
ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.
215	ALM FAN	2	SEE BOM	3	SEE BOM		
216	: BUSHING	2	231463	3	231463		
217	: BOLT	6	210268M6	9	210268M6		
218	: STL KEY	2	–	3	–		
219	ALM FAN SHEAVE	2	SEE BOM	3	SEE BOM		
220	: BUSHING	2	SEE BOM	3	SEE BOM		
221	: LOCKWASHER	6	SEE BOM	9	SEE BOM		
222	: BOLT	6	SEE BOM	9	SEE BOM		
223	: STL KEY	2	550935	3	550935		

NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.

NOTES : FAN INSTALLATION

1. CLEAN FAN SHAFT, BUSHING BORE, BUSHING TAPPER, AND FAN HUB BORE WITH MINERAL SPIRITS TO REMOVE ANY DIRT OR OIL.
2. TIGHTEN GRADUALLY IN MANY PASSES TO SEAT THE BUSHING EVENLY INTO THE FAN HUB. CONTINUE TIGHTENING IN MANY PASSES UNTIL THE BUSHING BOLT TORQUE SPECIFIED ABOVE IS REACHED ON ALL BOLTS.
3. IF REPOSITIONING OF THE FAN SHAFT IS REQUIRED LOOSEN THE LOWER BEARING BOLTS, ADJUST THE FAN ALIGNMENT THEN RE-TIGHTEN THE BEARING BOLTS TO 80 FT-LBS.

NOTES : SHEAVE INSTALLATION

4. WIPE THE SHAFT, BUSHING BORE, BUSHING TAPPER, AND ALUMINUM SHEAVE BORE WITH MINERAL SPIRIT TO REMOVE ANY DIRT OR OIL.
5. TIGHTEN EACH BOLT A LITTLE AT A TIME SO THAT THE BUSHING DRAWS EVENLY INTO THE SHEAVE HUB WITHOUT COCKING TO ONE SIDE OR THE OTHER. TORQUE THE BOLTS AS SPECIFIED IN THE TABLE. ROTATE THE SHEAVE TO VERIFY THAT IT DOESN'T WOBBLE. DO NOT ATTEMPT TO BOTTOM OUT THE BUSHING IN THE ALUMINUM SHEAVE. AFTER PROPER BOLT TORQUE IS APPLIED, THERE SHOULD STILL BE A GAP BETWEEN BUSHING FLANGE AND SHEAVE HUB.

REV	DATE	REVISION
A	10/11/96	

BALTIMORE AIRCOIL COMPANY

FAN AND FAN SHEAVE — DWG NO: 9C4183 RB

DWG BY: JSK CHK BY: WHS DATE: 10/02/96 — PAGE NO: 18

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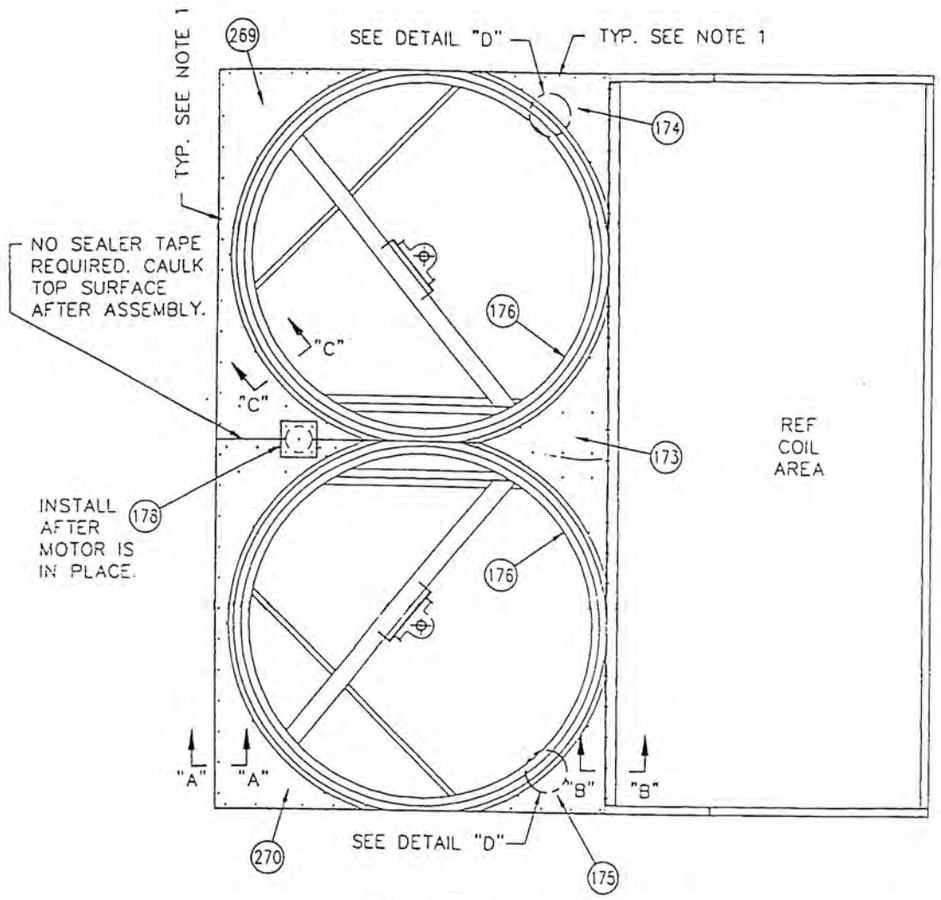
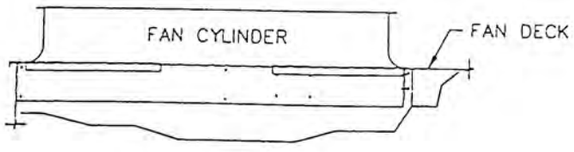
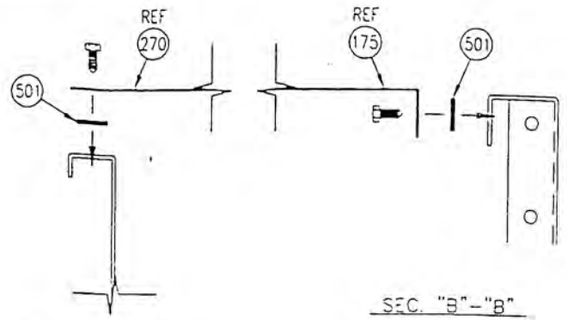


PLAN VIEW

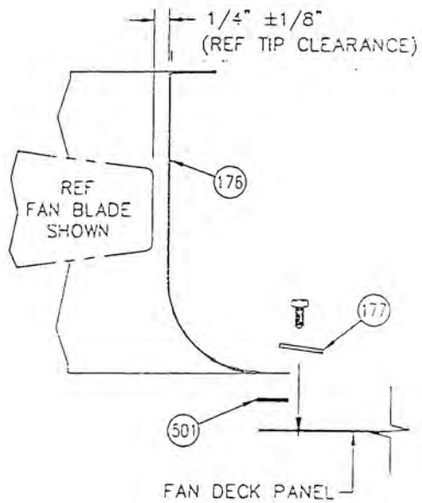


ELEVATION VIEW

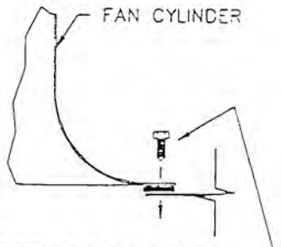


SEC. "A"–"A"

SEC. "B"–"B"



SEC. "C"–"C"
(TYP FAN COWL INST'L)



DETAIL "D"
(20 PLACES)

COMPONENT PARTS	UNIT SIZE (FAN ø)	12 x 12 ((2)-66ø)		
ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.
173	PNL FAN DECK	1	6C4205M*		
174	PNL FAN DECK	1	6C4207M*		
175	PNL FAN DECK	1	6C4208M*		
269	PNL FAN DECK	1	6C3225M*		
270	PNL FAN DECK	1	6C3226M*		
176	FAN COWL CYLINDER	2	6C5479M*		
178	PLT FAN DECK COVER	1	6C3954M*		
177	SST COWL CLIP	20	670640M3		
501	BUTYL SEALER	2	554000		
510	5/16 x 3/4 SELF TAPPER	105	210109M*		

NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.

[HARDWARE SCHEDULE UNLESS SPECIFIED]

DESCRIPTION	ITEM NO.
AV/BBD 5/16 SELF TAPPER	510

NOTES:
1. APPLY SEALER TAPE (ITEM 501) ALL AROUND FAN DECK PANELS AND THE FAN CYLINDER.

REV	DATE	REVISION
-	-	-

BALTIMORE AIRCOIL COMPANY

FAN DECK & COWL : 12 x 12 — DWG NO: 9C4215 RB

DWG BY: JSK CHK BY: WHS DATE: 10/14/96 — PAGE NO: 19

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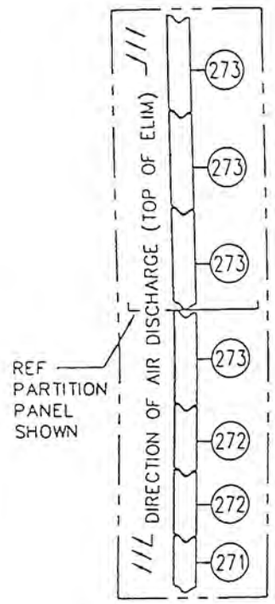
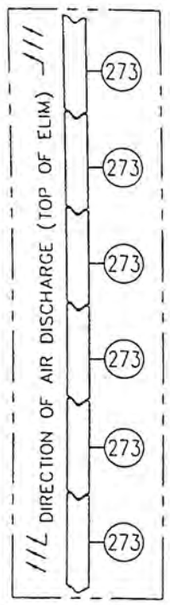
9C4216

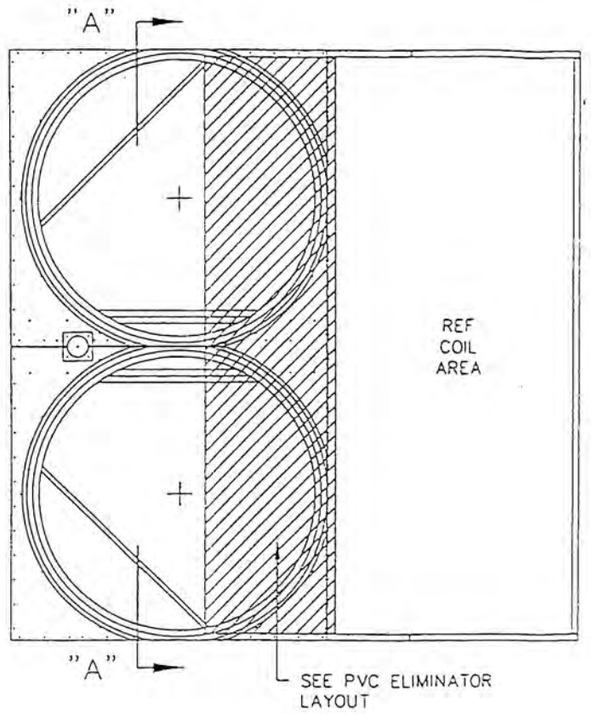


W/ OPTIONAL DUAL MTR WITH PARTITION WALL

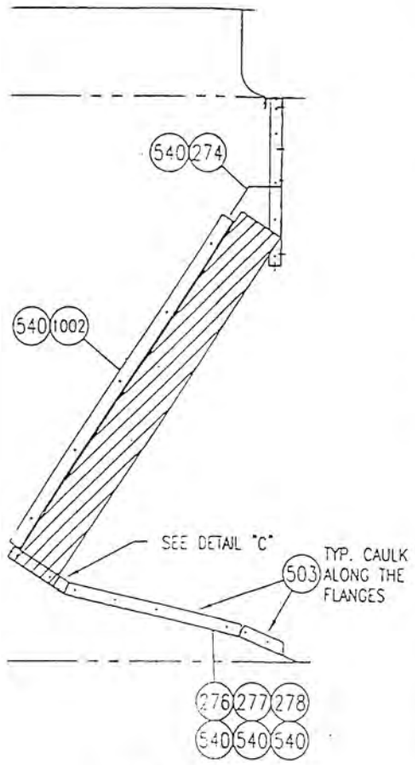


W/ STANDARD MTR WITHOUT PARTITION WALL

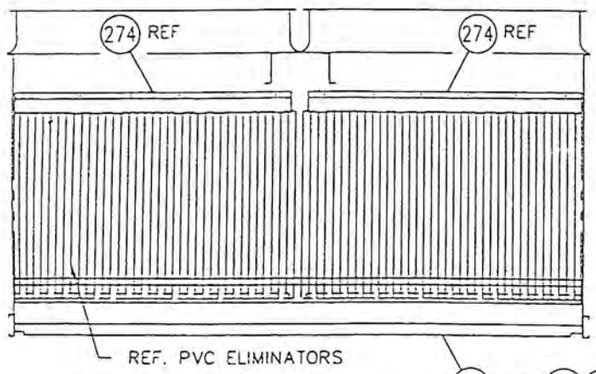
PVC ELIMINATOR LAYOUT
PLAN VIEW



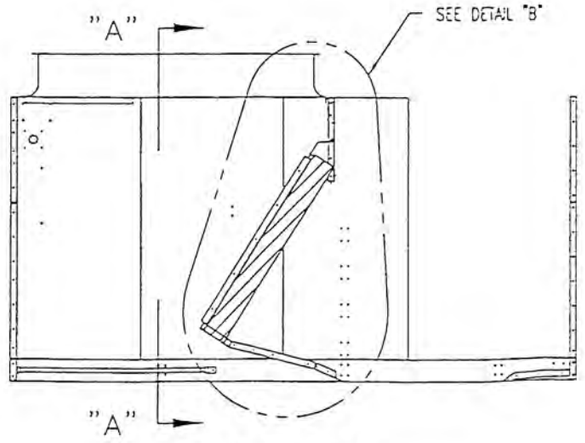
PLAN VIEW
LH UNIT MIRROR IMAGE



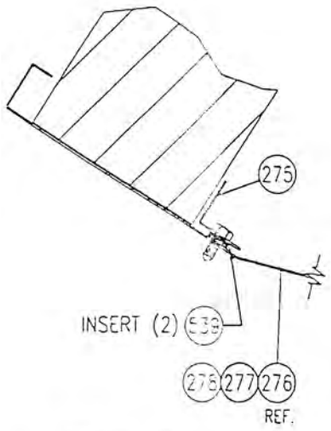
DETAIL B



SECTION "A"–"A"



END ELEVATION
INSIDE OF UNIT
LH UNIT MIRROR IMAGE



DETAIL C

COMPONENT PARTS	UNIT SIZE	12 x 12		12 x 12	
	MOTOR CONFIG.	STD MOTOR		DUAL MOTC	
ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.	QTY.	COMPON PART
274	ZEE ELIM SPRT TOP	2	6C6065M*	2	6C6065
276	PNL ELIM SPRT BTM	1	6C6437M*		
277	PNL ELIM SPRT BTM RH			1	6C6438
278	PNL ELIM SPRT BTM LH			1	6C6439
275	ANG ELIM SPRT BTM	2	6C4278M*	2	6C4276
1002	ANG ELIM SPRT SPACER	2	6C6068M*	2	6C6068
271	PVC ELIM 14 BLADE			1	281091
272	PVC ELIM 18 BLADE			2	281288
273	PVC ELIM 26 BLADE	6	281111P1	4	281111
503	SILAPRENE TUBE	1	160211	1	160211
510	5/16 x 3/4 SELF TAPPER	50	210109M*	58	210109
539	5/16 FLATWASHER	24	210037M*	24	210037
540	5/16 SEALWASHER	38	210006M*	38	210006

NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.

[HARDWARE SCHEDULE UNLESS SPECIFIED]

	DESCRIPTION	ITEM NO.
V/BBD	5/16 SELF TAPPER	510

REV. A DATE: 07/10/98 REVISION

BALTIMORE AIRCOIL COMPANY

PVC ELIMINATOR : 12 x 12 | DWG NO: 9C4216 RE

DWG BY: JSK CHK BY: WHS DATE: 10/14/96 | PAGE NO: 20

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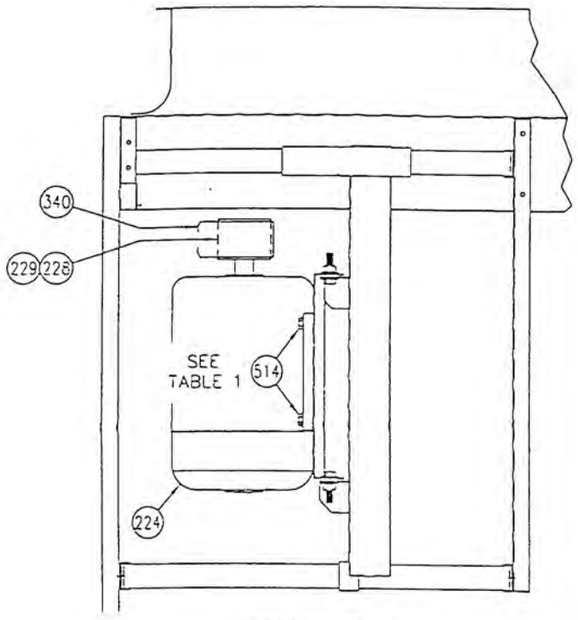
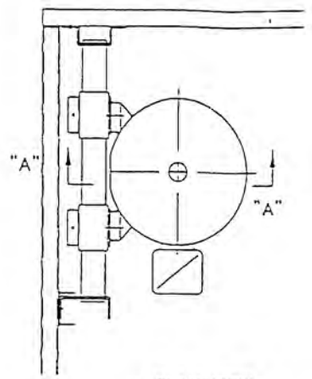


– SECTION VIEW –

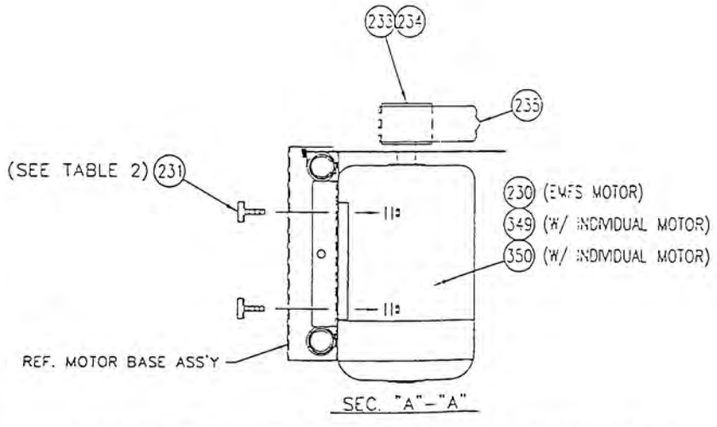
[STD MOTOR LOCATED @ BETWEEN FANS]

MTR FRAME SIZE	BOLT SIZE	NUT, L/W, F/W
215T	3/8 x 1 1/2	3/8"
254T THRU 286T	1/2 x 2	1/2"
324T THRU 365T	5/8 x 2 1/2	5/8"

[TABLE 1]



– PLAN VIEW –



[UNITS WITH MOTOR LOCATED AT END OF UNIT]

– TYP EMFS OR INDIVIDUAL MOTORS –

MTR FRAME SIZE	ASS'Y BOLT DIA.	NUT, L/W, F/W
145T	5/16"	5/16"
182T THRU 215T	3/8"	3/8"
254T THRU 286T	1/2"	1/2"
324T THRU 365T	5/8"	5/8"

[TABLE 2]

COMPONENT PARTS	UNIT SIZE	12 x 12		12 x 12		12 x 12	
	MOTOR CONFIG.	STANDARD		EMFS		INDIVIDUAL	
ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.
224	MOTOR : STANDARD	1	SEE BOM	1	SEE BOM		
514	MOTOR HDWR: BOLT, NUT, L/W, (F/W)	4EA/(8)	SEE BOM	4EA/8	SEE BOM		
228	MOTOR SHEAVE	1	SEE BOM	1	SEE BOM		
229	MOTOR SHEAVE BUSHING	1	SEE BOM	1	SEE BOM		
230	MOTOR : E.M.F.S.			1	SEE BOM		
349	MOTOR					1	SEE BOM
350	MOTOR					1	SEE BOM
231	MOTOR MOUNT ASSY			4	SEE BOM	8	SEE BOM
	MOTOR HARDWARE : NUT, L/W, F/W			4 EA	SEE BOM	8 EA	SEE BOM
233	MOTOR SHEAVE			1	SEE BOM	2	SEE BOM
234	MOTOR SHEAVE BUSHING			1	SEE BOM	2	SEE BOM
235	V-BELT	2	SEE BOM	3	SEE BOM	2	SEE BOM

NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.

REV B DATE 10/09/97 REVISION

BALTIMORE AIRCOIL COMPANY

MOTOR, SHEAVE AND ENCLOSURE — DWG NO: 9C4217 R:

DWG BY: JSK CHK BY: WHS DATE: 10/14/95 — PAGE NO: 21

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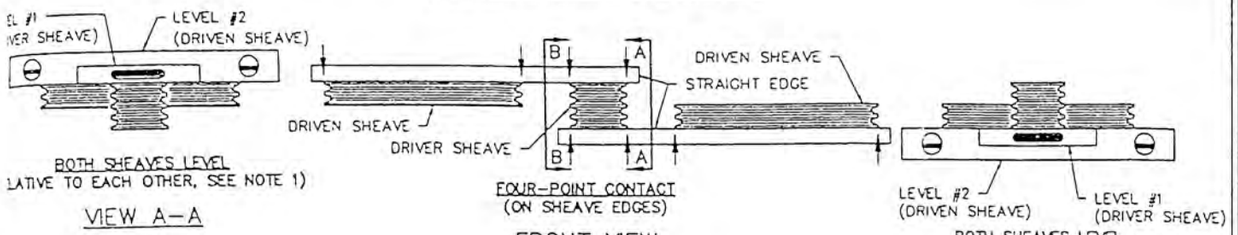
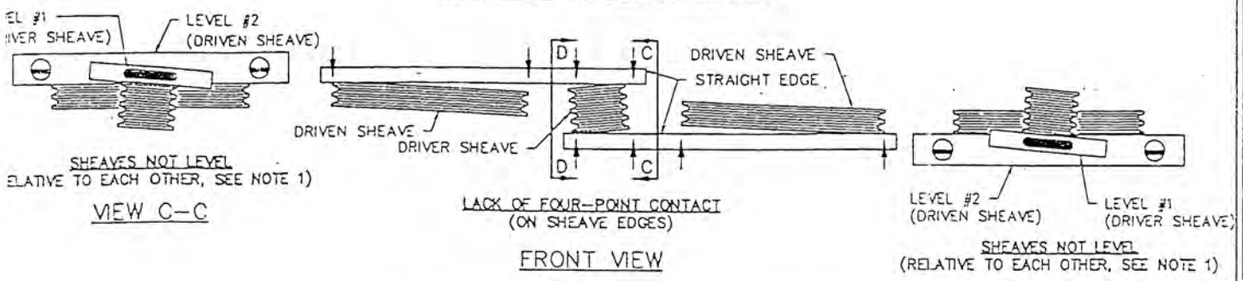
GOOD SHEAVE ALIGNMENT

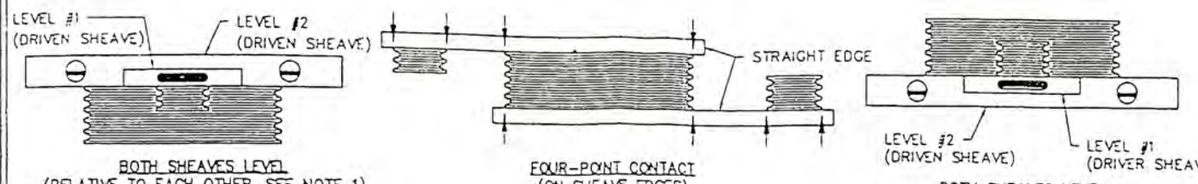


POOR SHEAVE ALIGNMENT

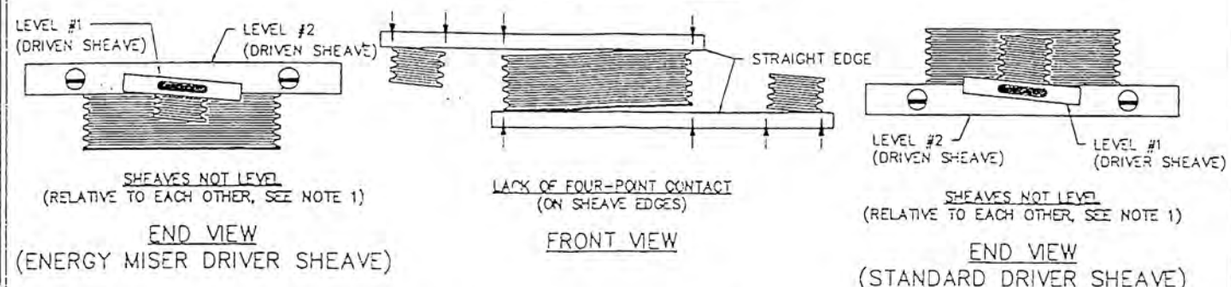


[MOTOR @ BETWEEN FAN]

GOOD SHEAVE ALIGNMENT

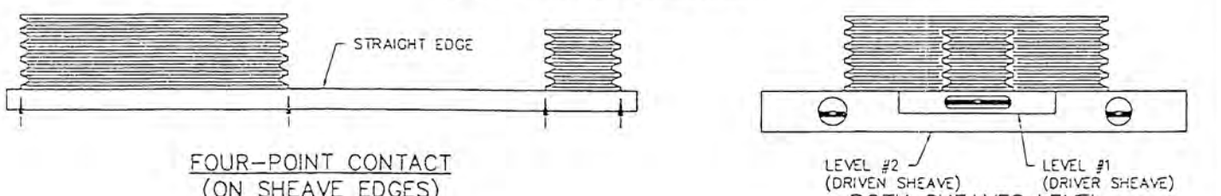


POOR SHEAVE ALIGNMENT

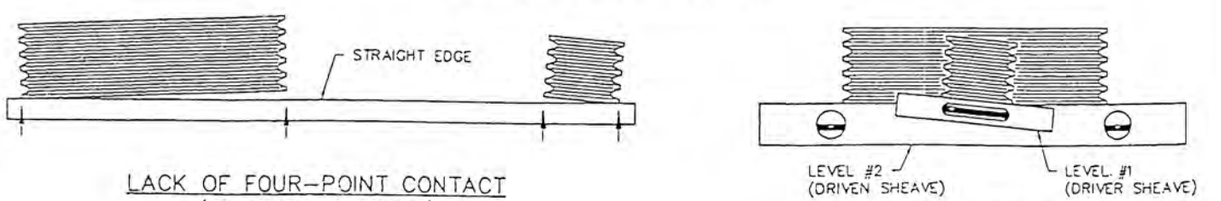


[ENERGY MISER DRIVE SYSTEM]

GOOD SHEAVE ALIGNMENT



POOR SHEAVE ALIGNMENT

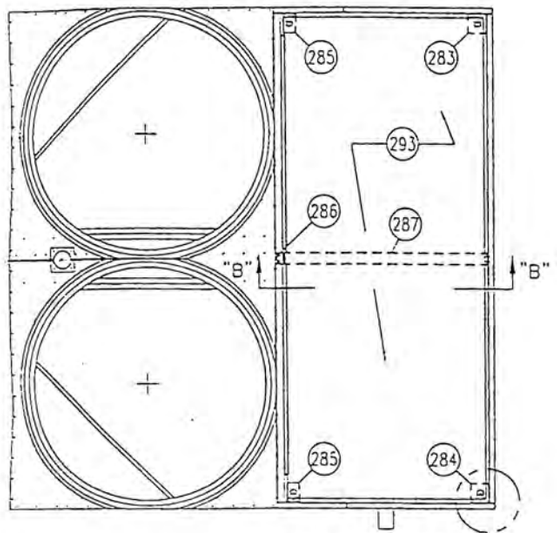


[INDIVIDUAL MOTOR]

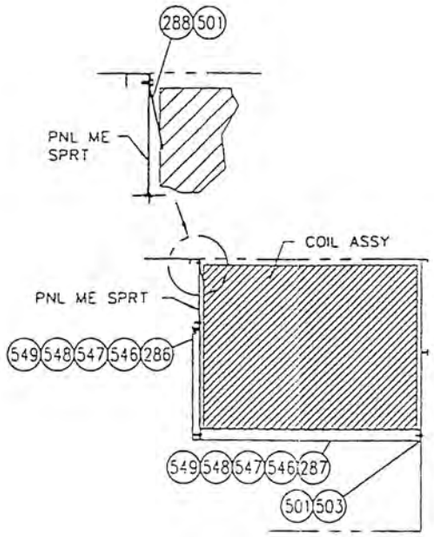
NOTES:

1. SHEAVES NEED NOT BE PERFECTLY LEVEL AS LONG AS THEY "BUBBLE MATCH", i.e. THE BUBBLES IN BOTH LEVELS ARE DISPLACED FROM CENTER BY THE SAME AMOUNT. THIS INDICATES THAT THE SHEAVES ARE IN THE SAME PLANE, WHICH IS THE DESIRED CONDITION.
2. CHECK ALIGNMENT AGAIN AFTER BELTS ARE INSTALLED AND TENSIONED. EXCESS BELT TENSION CAN SOMETIMES CREATE AN OUT-OF-ALIGNMENT CONDITION.

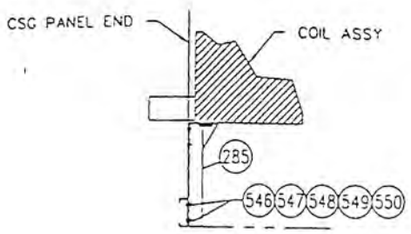
NO. – DATE – REVISION	BALTIMORE AIRCOIL COMPANY	
	SHEAVE ALIGNMENT	DWG NO: 9C4187 RB
	DWG BY: JSK CHK BY: WHS DATE: 10/03/96	PAGE NO: 22



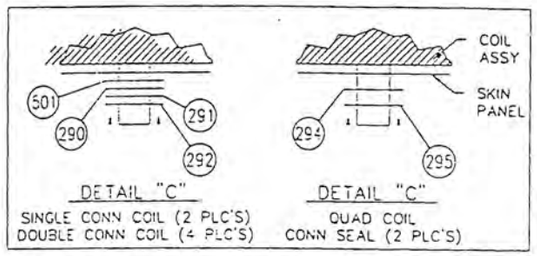
PLAN VIEW
LH UNIT MIRROR IMAGE



SEC. "B"-"B"

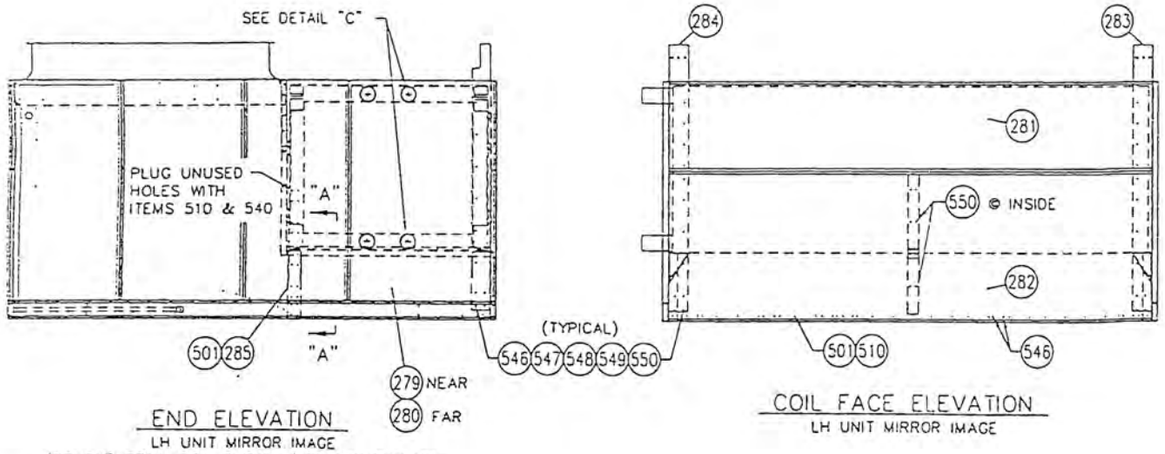


SEC. "A"-"A"



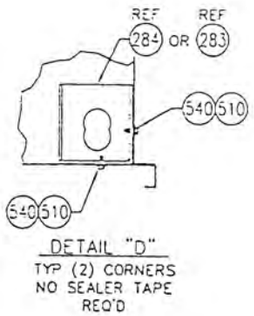
COMPONENT PARTS		UNIT SIZE	12 x 12		12 x 12	
		COIL TYPE	SINGLE OR DOUBLE CONN		QUAD COIL	
		ROW	6 THRU 12 ROW		16 & 24 ROW	
ITEM NO.	COMPONENT DESCRIPTION		QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.
279	PNL END CONN		1	SEE BOM	1	SEE BOM
280	PNL END REAR		1	SEE BOM	1	SEE BOM
285	COIL LEG SPRT		1	SEE BOM	1	SEE BOM
283	ANG COLM CORNER SPRT RH		1	SEE BOM	1	SEE BOM
284	ANG COLM CORNER SPRT LH		1	SEE BOM	1	SEE BOM
282	PNL COIL SIDE BTM	✓	1	6C5277M*	1	6C5277M*
281	PNL COIL SIDE TOP		1	6C4215M*	1	6C4215M*
286	CHNL COIL INTM CTR SPRT		1	SEE BOM	1	SEE BOM
287	CHNL COIL INTM CTR SPRT		1	6C6173M*	1	6C6173M*
288	ANG COIL SIDE BAFFLE		1	6C5186M*	1	6C5186M*
293	COIL ASSY		1	SEE BOM	1	SEE BOM
289	COIL WASHER MOUNTING		4	600371M*	4	600371M*
290	PLT RING BACK UP		SEE BOM	6C5181M*	–	–
291	O RING		SEE BOM	651396	–	–
292	PLT GASKET		SEE BOM	6C5180M*	–	–
294	NPR GASKET		–	–	1	SEE BOM
295	PLT CONN SEAL		–	–	1	SEE BOM
501	BUTYL SEALER		1	554000	1	554000
503	SILAPRENE TUBE		1	160211	1	160211
510	5/16 x 3/4 SELF TAPPER		200	210109M*	200	210109M*
540	5/16 SEALWASHER		85	210006M*	85	210006M*
546	3/8 X 1 BOLT		50	210054M*	50	210054M*
547	3/8 NUT		40	210028M*	40	210028M*
548	3/8 LOCKWASHER		40	210033M*	40	210033M*
549	3/8 FLATWASHER		46	210038M*	46	210038M*
550	3/8 SEALWASHER		34	210191M*	34	210191M*
565	5/8 X 1 1/2 BOLT GR-5		4	210494M*	4	210494M*
568	5/8 LOCKWASHER		4	210035M*	4	210035M*

NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.

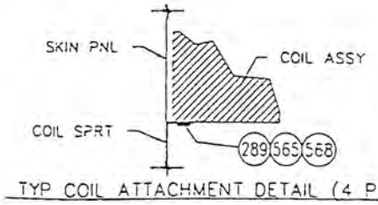


END ELEVATION
LH UNIT MIRROR IMAGE
(DOUBLE CONN COIL SHOWN / OTHERS SIMILAR)

COIL FACE ELEVATION
LH UNIT MIRROR IMAGE



DETAIL "D"
TYP (2) CORNERS
NO SEALER TAPE REQ'D



TYP COIL ATTACHMENT DETAIL (4 PLC'S)

SCHEDULE UNLESS SPECIFIED]

DESCRIPTION	ITEM NO.
5 SELF TAPPER	510

REV	REVISION	
A	DCN 3/27/97	

BALTIMORE AIRCOIL COMPANY

COIL AND SUPPORT — DWG NO: 9C4218 RB

DWG BY: JSK CHK BY: WHS DATE: 10/14/96 — PAGE NO: 23

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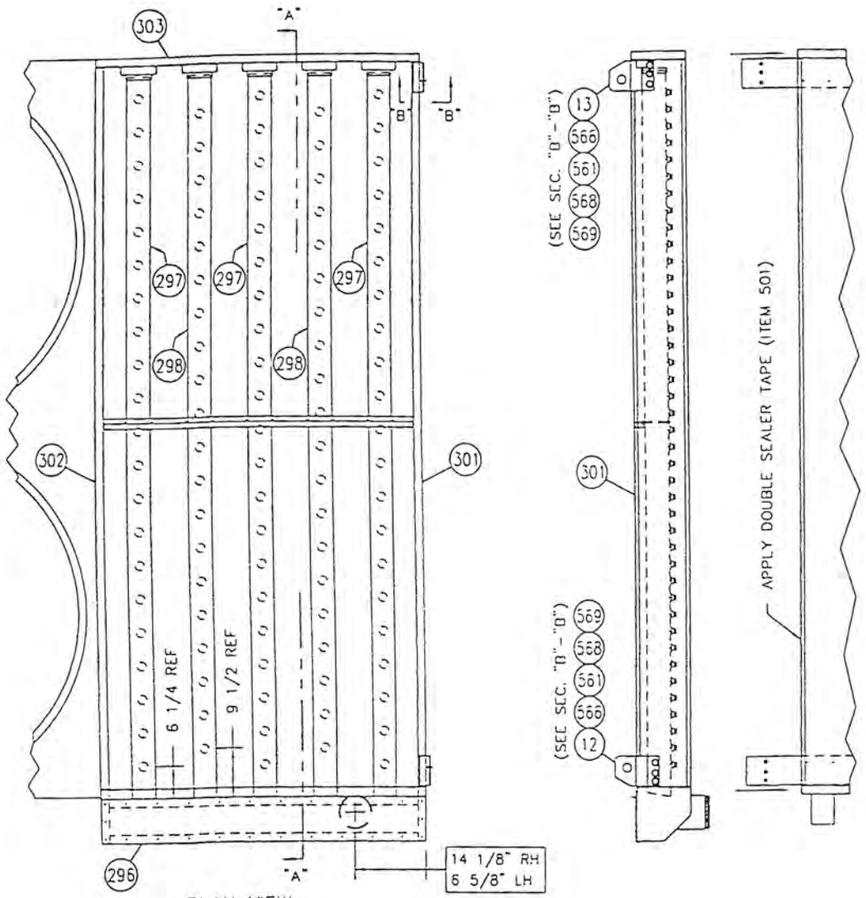
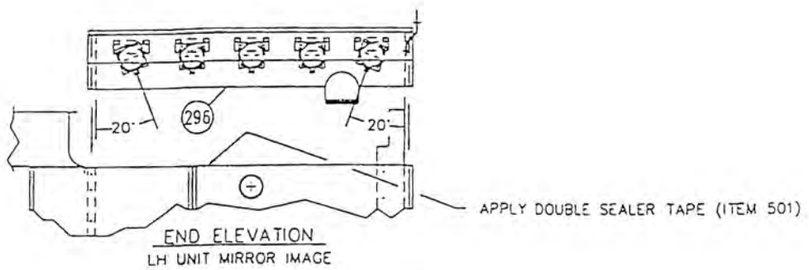
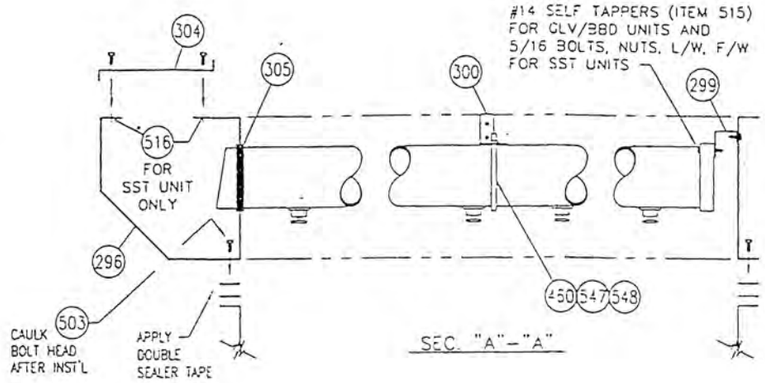


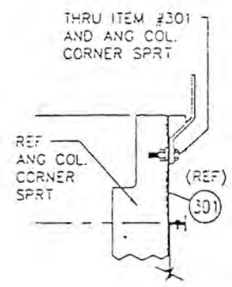
PLAN VIEW
LH UNIT MIRROR IMAGE



END ELEVATION
LH UNIT MIRROR IMAGE



SEC. "A"-"A"



SEC. "B"-"B"

NOTES:
1. PRE-ASSEMBLE SPRAY CASING ON THE GROUND.
2. APPLY SEALER TAPE (ITEM 501) AT ALL JOINTS.

COMPONENT PARTS

ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.	QTY.	COMPC PART
296	FEED BOX ASSY	1	SEE BOM		
301	PNL CSG SIDE	1	6C4294M*		
302	PNL CSG SIDE FAN	1	6C4295M*		
303	PNL CSG END REAR	1	6C4296M*		
299	CHNL BRANCH SPRT END	5	6C4292M*		
300	CHNL BRANCH SPRT INTM	1	6C4293M*		
305	ISP HEADER GROMMET	5	270514		
297	PVC BRANCH OUTER & CTR	3	6C4287P1		
298	PVC BRANCH INNER	2	6C4288P1		
460	3/8 U-BOLT	5 OR 4	600289M*		
12	LIFTING EAR RH	1	686264		
13	LIFTING EAR LH	1	686265		
304	PNL FEED BOX COVER	1	6C4935M*		
501	BUTYL SEALER	1	554000		
503	SILAPRENE TUBE	1	160211		
515	#14 x 1 1/2 SELF TAPPER	10	210347M*		
510	5/16 x 3/4 SELF TAPPER	125	210109M*		
547	3/8 NUT	10	210028M*		
548	3/8 LOCKWASHER	10	210033M*		
549	3/8 FLATWASHER	10	210038M*		
566	5/8 X 2 BOLT GR-5	6 OR 4	210242M1		
561	5/8 NUT A194	6 OR 4	210243M1		
568	5/8 LOCKWASHER	6	210035M9		
569	5/8 FLATWASHER	12 OR 8	210244M1		
	[FOR SST UNIT]				
516	5/16 NYL NUT	28	210633P9		

NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.

HARDWARE SCHEDULE UNLESS SPECIFIED]

DESCRIPTION	ITEM NO.
5/16 SELF TAPPER	510

REV	DATE	REVISION
A	10-11-07/25/95	

BALTIMORE AIRCOIL COMPANY

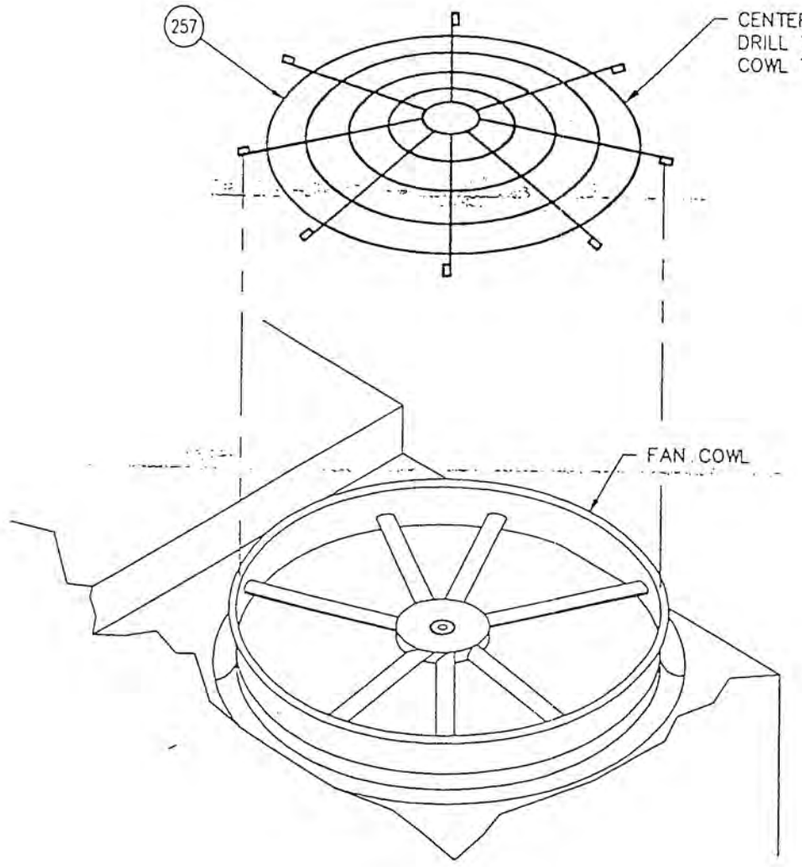
PVC SPRAY SYSTEM : 12 x 12 — DWG NO: 9C4219 F

DWG BY: JSK CHK BY: WHS DATE: 10/14/96 — PAGE NO: 24A

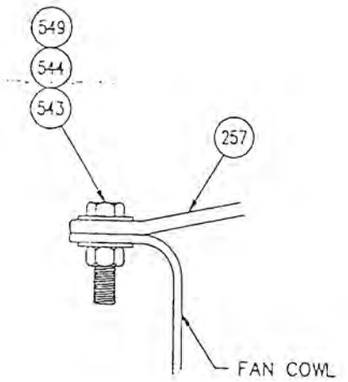
GHT 1995, BALTIMORE AIRCOIL COMPANY

COMPONENT PARTS	UNIT SIZE	12 x 12		12 x 18	
	(QTY) FAN DIA.	(2) 66ø		(3) 66ø	
ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.
257	HDG FAN GUARD	2	260561M2	3	260561M*
543	3/8 x 1 1/2 BOLT				
544	3/8 LOCKNUT				
549	3/8 FLATWASHER				

* NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.



[TYPICAL DETAIL PER FAN COWL]



[8 PLACES PER COWL]

REV.	DATE	REVISION
-	-	-

BALTIMORE AIRCOIL COMPANY

FAN GUARD — DWG NO: 9C4190 RB

DWG BY: JSK CHK BY: WHS DATE: 10/04/96 — PAGE NO: 25

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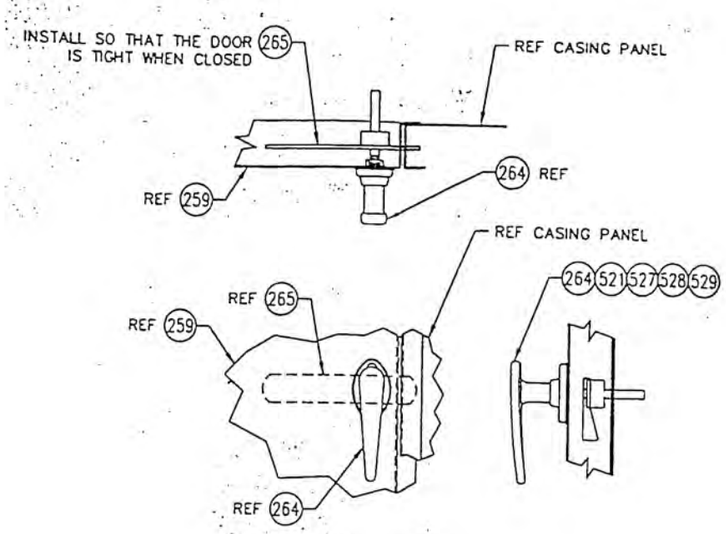
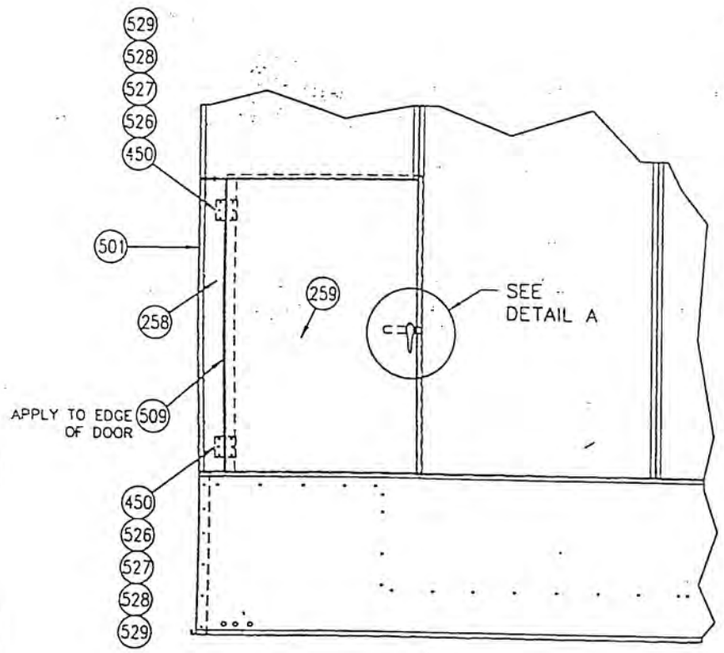
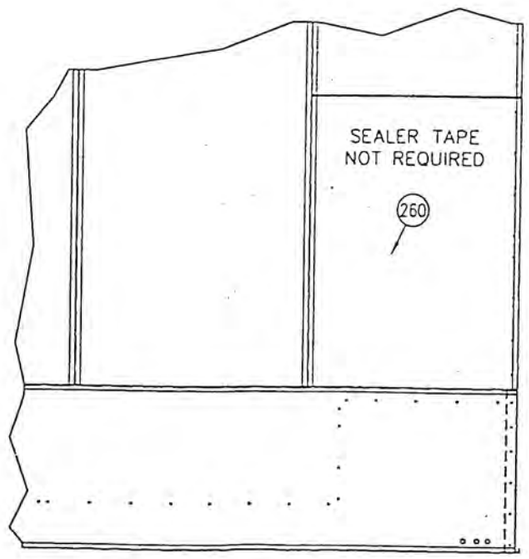


DETAIL "A"



TYP. ACCESS DOOR END ELEVATION

– RH UNIT SHOWN / LH UNIT MIRROR IMAGE –
– ACCESS DOORS ARE PROVIDED ON BOTH ENDS ON MULTI-CELL UNITS –



ACCESS ENCLOSURE END ELEVATION

– FOR SINGLE CELL UNIT UNIT –
– RH REAR END SHOWN / LH UNIT MIRROR IMAGE –

COMPONENT PARTS	UNIT SIZE	8.5 x 9 SINGLE CELL UNIT		12 x 12 & 18 SINGLE CELL UNIT		12 x 2 – CEL	
ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.	QTY.	CO PA
258	CHNL DOOR FRAME	1	6C4433M*	1	6C3200M*	4	6C
259	PNL ACCESS DOOR	1	6C5140M*	1	6C5139M*	4	6C
264	HANDLE	1	260799	1	260799	2	2
265	HANDLE LATCH	1	260800	1	260800	4	2
260	PNL ACCESS ENCLOSURE	1	6C4434M*	1	6C4131M*	–	
501	BYTYL SEALER TAPE						
510	5/16 x 3/4 SELF TAPPER	30	210109M*	35	210109M*	20	210
450	SST HINGE 3 x 3	2	260474M3	2	260474M3	8	260
526	#10 x 3/4 SCREW	12	210214M*	12	210214M*	24	210
521	#10 x 3/4 FH SCREW	2	211203M*	2	211203M*	8	211
527	#10 NUT	14	210217M*	14	210217M*	28	210
528	#10 LOCKWASHER	14	210216M*	14	210216M*	28	210
529	#10 FLATWASHER	26	210215M*	26	210215M*	52	210
509	FOAM TAPE 1/8" X 1"	4	270049	4	270049	4	27

NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.

[HARDWARE SCHEDULE UNLESS SPECIFIED]

	DESCRIPTION	ITEM NO.
BD	5/16 SELF TAPPER	510

REV	DATE	REVISION
A	7/21/97	

BALTIMORE AIRCOIL COMPANY

ACCESS DOOR AND ENCLOSURE — DWG NO: 9C4191

DWG BY: JSK CHK BY: WHS DATE: 10/04/96 — PAGE NO: 26

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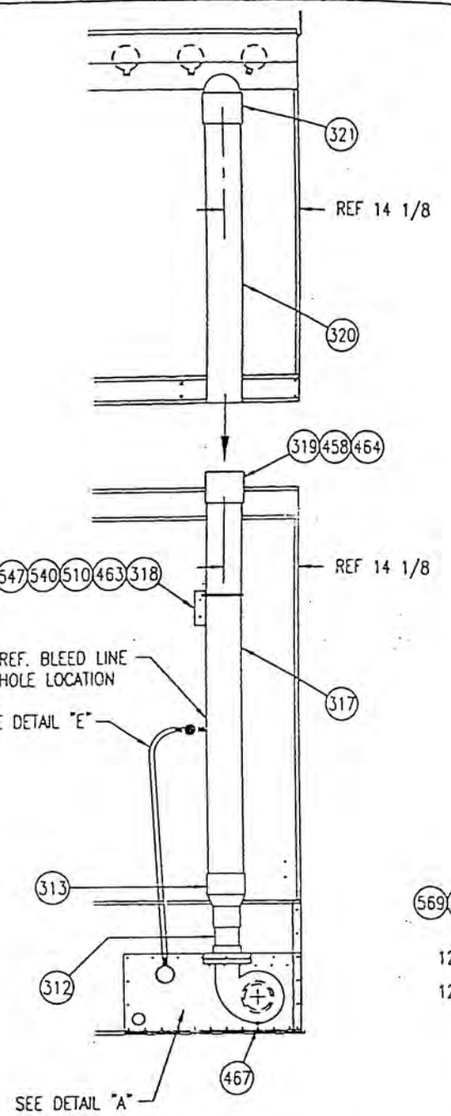
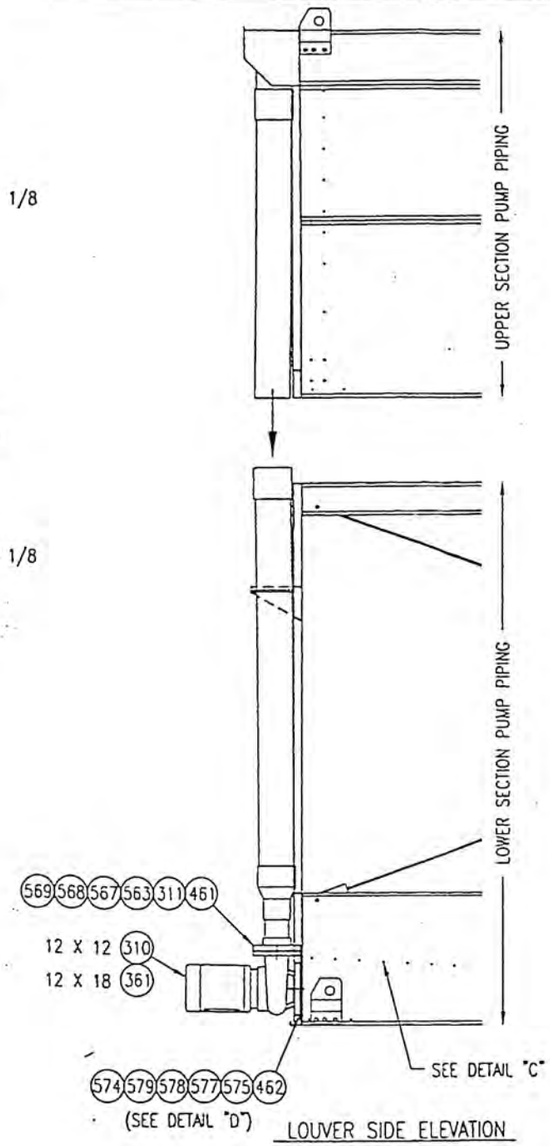
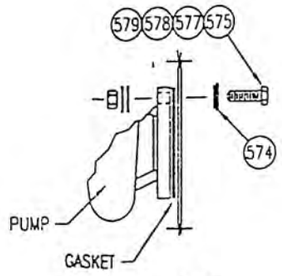


RH UNIT END ELEVATION

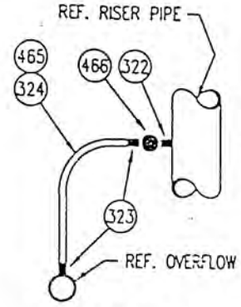


LOUVER SIDE ELEVATION



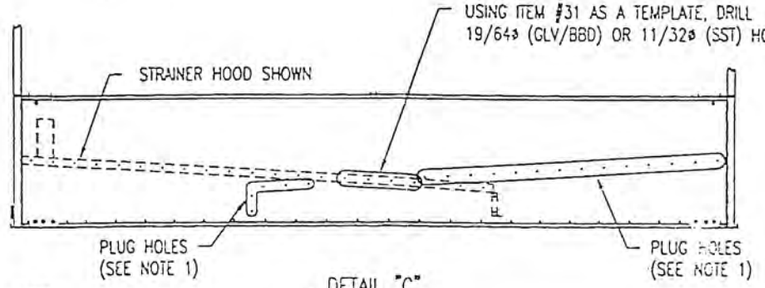
DETAIL "D"

SEALWASHER ITEM # 574 MUST BE USED AT INSIDE OF PAN AS SHOWN.



DETAIL "E"

- BLEED LINE DETAIL -



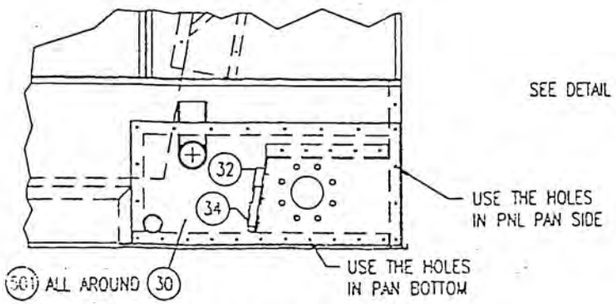
DETAIL "C"

NOTE:
1. USE THE FOLLOWING TO PLUG UNUSED HOLES:
   GLV PAN – 3/8 SELF TAPPERS AND SEALWASHERS. (ITEM #546 & 550)
   SST PAN – 5/16 BOLTS, NUTS, FLATWASHERS, LOCKWASHERS AND SEALWASHERS.

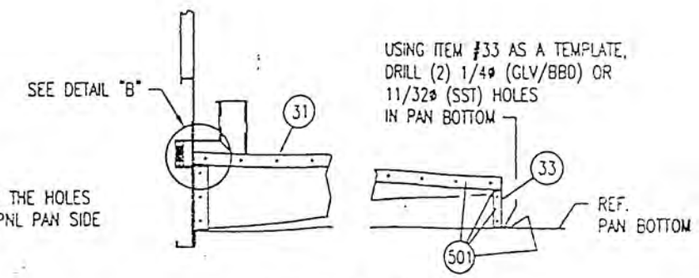
COMPONENT PARTS	UNIT SIZE	12 x 12
		RH UNIT

ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPON PART
30	PLT CONN END ASS'Y	1	SEE B
310	PUMP	1	3005
462	GASKET 5	1	2702
461	GASKET 4	1	2702
311	PVC FLANGE 4	1	28051
312	PVC PIPE 4 X 9 1/4	1	88009
313	PVC RED COUPLING 6 x 4	1	28119
361	PUMP	1	3009
317	PVC PIPE RISER	1	5C3465
318	GUSSET PIPE SDPRT	1	5C3459
463	U-BOLT 6	1	586208
319	RBR SLEEVE	1	58620
320	PVC PIPE 6 x 65 3/8	1	880653
321	PVC COUPLING 6	1	280414
467	BRS DRAIN VALVE 1/4	1	26052
322	CLOSE NIPPLE 1	1	20013
466	VALVE 1	1	28003
323	GLV PIPE 1 x 3	1	830030
324	VINYL TUBE	1	890600
31	PNL STRAINER HOOD	1	5C3533
32	ZEE STRAINER SPRT FRONT	1	570136M
33	CHNL STRAINER SPRT REAR	1	5C3536M
34	STRAINER SCREEN	1	5C3154M
468	PVC PRIMER CLEANER	0	280227
469	PVC SOLVENT CEMENT	0	280228
	PVC CEMENTING INSTRUCTION	0	MEMO-00
458	CLAMP	2	26005C
464	CLAMP	2	26000E
465	CLAMP	2	26005E
510	5/16 x 3/4 SELF TAPPER	2	210109M
540	5/16 SEALWASHER	2 OR	210006M
546	3/8 X 3/4 SELF TAPPER	19	210276M
550	3/8 SEALWASHER	19	210191M
547	3/8 NUT	2	210028M
548	3/8 LOCKWASHER	2	210033M
563	5/8 x 3 1/2 BOLT	8	210415M
567	5/8 NUT	8 OR	210030M
568	5/8 LOCKWASHER	8	210035M
569	5/8 FLATWASHER	16	210041M
575	3/4 x 2 1/2 BOLT	8	210324M
577	3/4 NUT	8	210031M
578	3/4 LOCKWASHER	8 OR	210036M
579	3/4 FLATWASHER	8	210040M
574	3/4 RBR WASHER	8 OR	211447M

NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONL

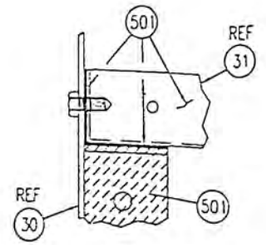


DETAIL "A" (END ELEV)



DETAIL "A" (LOUVER ELEV)

- PAN SIDE PANEL NOT SHOWN FOR CLARITY -



DETAIL "B"

(APPLY #501 BETWEEN #30 & #31)

DTE:
E "MEMO-0025" FOR PROPER PVC PIPE SOLVENT CEMENTING INSTRUCTION.

DWARE SCHEDULE UNLESS SPECIFIED]

	DESCRIPTION	ITEM NO.
80	5/16 SELF TAPPER	510

BALTIMORE AIRCOIL COMPANY

PVC PUMP PIPING RH : 12 x 12 & 18 | DWG NO: 9C4192 RE

DWN BY: JSK CHK BY: WHS DATE: 10/04/96 PAGE NO: 27A

REVISION DATE: 07/26/93

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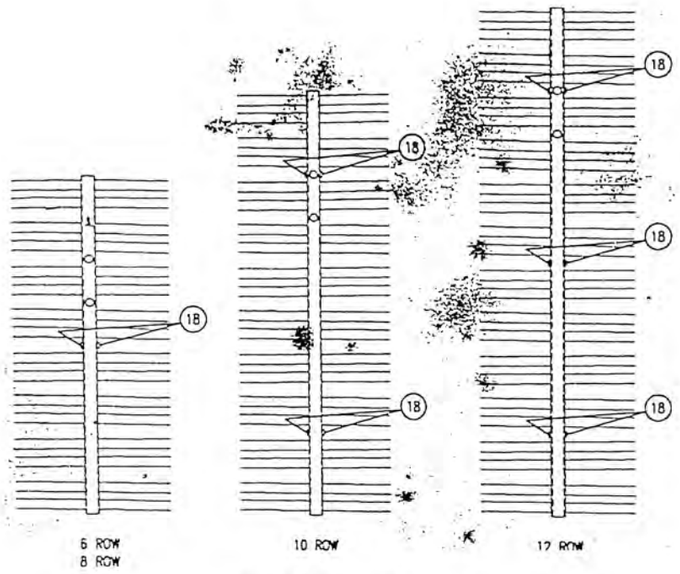
6C4551



STRIP LOCATIONS

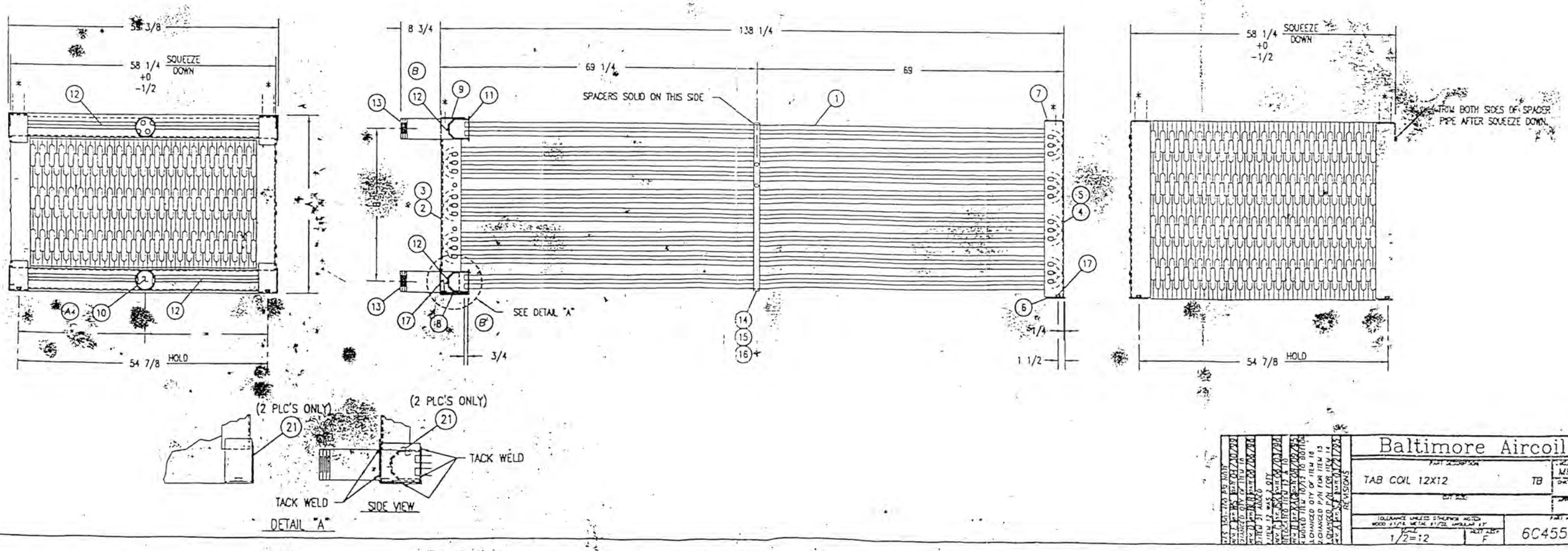
	QTY				ITEM	PART NO.	DESCRIPTION
A1				1	14	6C4687W6SA	FRAME FRONT
			1			6C4688W6SA	
		1				6C4689W6SA	
	1					6C4690W6SA	
A2				1	15	6866381W6PA	CHANNEL FRONT
			1			6866411W6PA	
		1				6866431W6PA	
	1					6866451W6PA	
A3				55	16	6C4389W6PA	SPACER CENTER FRONT
			55			6C4390W6PA	
		55				6C4391W6PA	
	55					6C4392W6PA	
	4	4	4	4	17	2100304QP	5/8" HEX NUT
	6	4	2	2	18	6C4582W6PA	BLK STRIP
	.0001	.0001	.0001	.0001	19	686595 RX	REF COIL CONN. CUTOFF
	.0001	.0001	.0001	.0001	20	6C4551 TB	TAB COIL 12X12
B1	2	2	2	2	21	6C6092W6PA	PLT CONN END BAFFLE
	12 ROW COIL 6C4546W2ST	10 ROW COIL 6C4545W2ST	8 ROW COIL 6C4544W2ST	6 ROW COIL 6C4543W2ST			
	-D	-D	-D	-D	[REVISIONS]		

(E) * = U-BOLTS FOR LIFTING.
TEST: 375 LBS. PRESSURE FOR 10-15 MINUTES UNDER WATER BEFORE GALVANIZING.

NOTES:
1. HEADER ASSEMBLY CENTERED ON COIL HEADER PLATE.
2. ITEM 17 NUT, TO BE ADDED AFTER H.D.G.

	A	B
6 ROW	29 1/2	24
8 ROW	38 3/4	33 1/4
10 ROW	48	42 1/2
12 ROW	57 1/4	51 3/4

	QTY				ITEM	PART NO.	DESCRIPTION
				56	1	6C4557W6PA	BLK COIL CIRCUIT 137 1/2" LG
			56			6C4558W6PA	
		56				6C4559W6PA	
	56					6C4560W6PA	
				1	2	6C4584W6SA	BLK COIL CLIP FRONT
			1			6C4585W6SA	
		1				6C4586W6SA	
	1					6C4587W6SA	
				1	3	6865539W6PA	BLK COIL ANGLE FRONT
			1			6865569W6PA	
		1				6865589W6PA	
	1					6865609W6PA	
				1	4	6C4588W6SA	BLK COIL CLIP REAR
			1			6C4589W6SA	
		1				6C4590W6SA	
	1					6C4591W6SA	
				1	5	6865671W6PA	BLK COIL ANGLE REAR
			1			6865691W6PA	
		1				6865711W6PA	
	1					6865731W6PA	
	2	2	2	2	6	600074 PA	FOOT BOTTOM
	2	2	2	2	7	600093 PA	FOOT TOP
	2	2	2	2	8	600447 PA	EXTENSION BOTTOM
	2	2	2	2	9	600952 PA	EXTENSION TOP
	1	1	1	1	10	600075 PA	BAFFLE
	2	2	2	2	11	6C4569W6PA	BLK HEADER PLATE
(B1)	4	4	4	4	12	6C4570W6PA	BLK ANG BAFFLE END
	2	2	2	2	13	6C4572W6SA	BLK ASSY HEADER 4" CONN
	12 ROW COIL 6C4546W2ST	10 ROW COIL 6C4545W2ST	8 ROW COIL 6C4544W2ST	6 ROW COIL 6C4543W2ST			

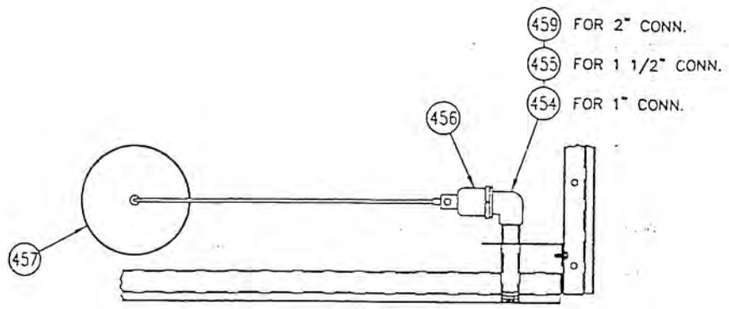


REVISIONS	Baltimore Aircoil Co.		
	PART DESCRIPTION: TAB COIL 12X12 TB	DRAWN: MH 11/0	
	CUT SIZE	CHKD	
	TOLERANCE UNLESS OTHERWISE NOTED WOOD ±1/8, METAL ±1/32, UNDERCUT ±1°	SCALE: 1/2=1	SHT SIZE: F
		PART NUMBER: 6C4551	TI

IGHT 1996, BALTIMORE AIRCOIL COMPANY

UNIT SIZE	(QTY) VALVE & CONN. SIZE	
	1 CELL	2 CELL
8.5 x 6	(1) 1/2"	(1) 1/2"
8.5 x 9	(1) 1/2"	(1) 1"
8.5 x 12	(1) 1/2"	(1) 1"
12 x 12	(1) 1"	(1) 1"
12 x 18	(1) 1"	(1) 1-1/2"

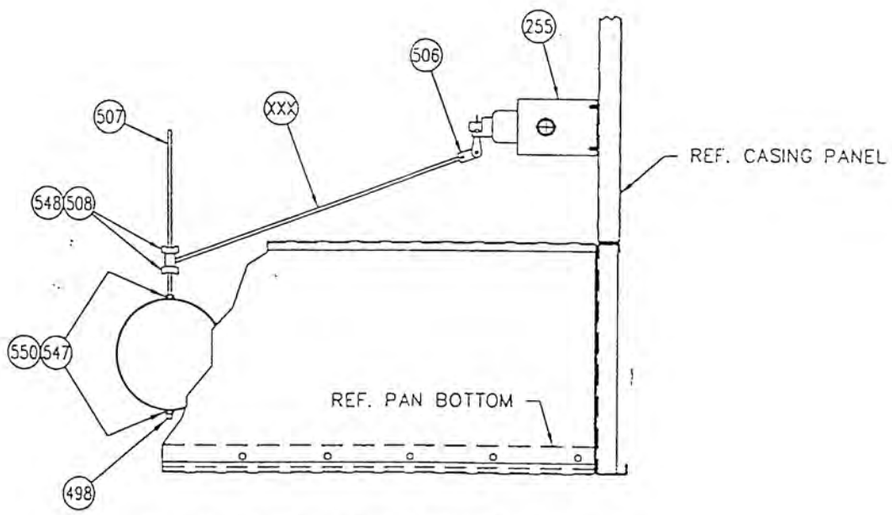
MAKE UP CONN. SIZE TABLE



PLAN VIEW

COMPONENT PARTS / CONNECTION SIZE		1"		1 1/2"		2"	
ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.	QTY.	COMPONENT PART NO.	QTY.	COMPON PART N
255	MAKE UP CONN ASS'Y	1	5C3122M*	1	5C3128M*	1	5C323
454	STREET ELBOW 1 x 90°	1	200018M*				
455	STREET ELBOW 1 1/2 x 90°			1	200020M*		
459	STREET ELBOW 2 x 90°					1	200021
456	BRASS FLOAT VALVE	1	280489	1	280490	1	28048
506	ROLL PIN 1/8 x 11/16	1	211202M*	1	211202M*	1	211202
256	FLOAT ARM	1	SEE B.O.M.	1	SEE B.O.M.	1	SEE B.C
507	CAD ALL THREAD 3/8 x 20	1	260183	1	260183	1	26018
	SST ALL THREAD 3/8 x 20	1	260406M3	1	260406M3	1	260406
508	3/8 WING NUT	2	210229M*	2	210229M*	2	210229
457	PLS FLOAT BALL	1	280046	1	280046	1	28004
498	PLS CAP .312 X 1/2	1	280464P1	1	280464P1	1	280464
510	5/16 x 3/4 SELF TAPPER	2	210109M*	2	210109M*	2	210109
547	3/8 NUT	2	210028M*	2	210028M*	2	210028
548	3/8 LOCKWASHER	2	210033M*	2	210033M*	2	210033
550	3/8 SEALWASHER	2	210191M*	2	210191M*	2	210191

NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.



LOUVER FACE ELEVATION VIEW

– RH UNIT SHOWN : LH MIRROR IMAGE –

NOTE:
MAKE UP ASS'Y IS NOT REQUIRED
FOR UNITS WITH GRAVITY FLOW OUTLET.
(REMOTE SUMP APPLICATION)

WARE SCHEDULE UNLESS SPECIFIED]

DESCRIPTION	ITEM NO.
5/16 SELF TAPPER	510

REV.	DATE	REVISION
A	10/01/97	

BALTIMORE AIRCOIL COMPANY

MAKE UP ASSEMBLY — DWG NO: 9C4195 R

DWG BY: JSK CHK BY: WHS DATE: 10/08/96 — PAGE NO: 29

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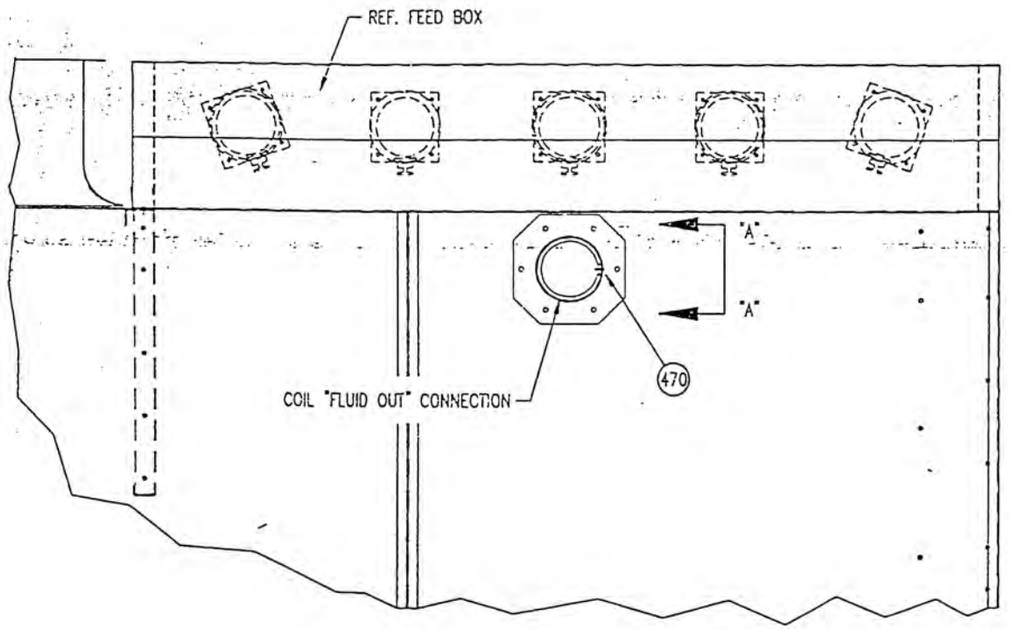
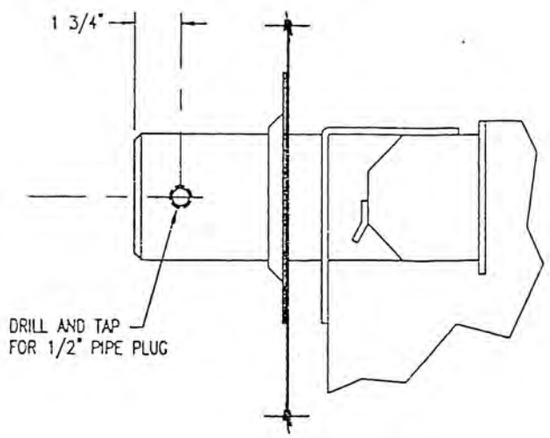
COMPONENT PARTS		ALL FXV UNIT SINGLE CONN		ALL FXV UNIT DOUBLE CONN	
ITEM NO.	COMPONENT DESCRIPTION	QTY.	COMPONENT PART NO.		
470	GLV 1/2" PLUG	1	200103	2	200103

NOTE : PARTS ARE LISTED IN ASSEMBLY ORDER.
ITEM NUMBERS ARE FOR PART IDENTIFICATION ONLY.



UPPER SECTION COIL CONNECTION ELEVATION
- SINGLE CONN. SHOWN -



SEC. "A" - "A"

BALTIMORE AIRCOIL COMPANY	
FLUID COOLER VENT PLUG	DWG NO: 9C4196 RB
DWG BY: JSK CHK BY: WHS DATE: 10/Cc/98	PAGE NO: 30

REV - DATE - REVISION

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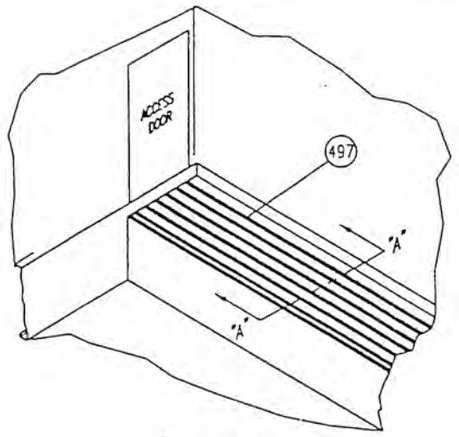
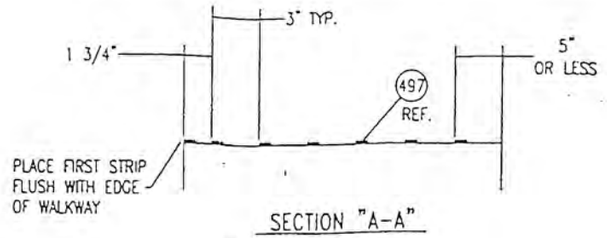


ANTI - SKID TAPE INSTALLATION

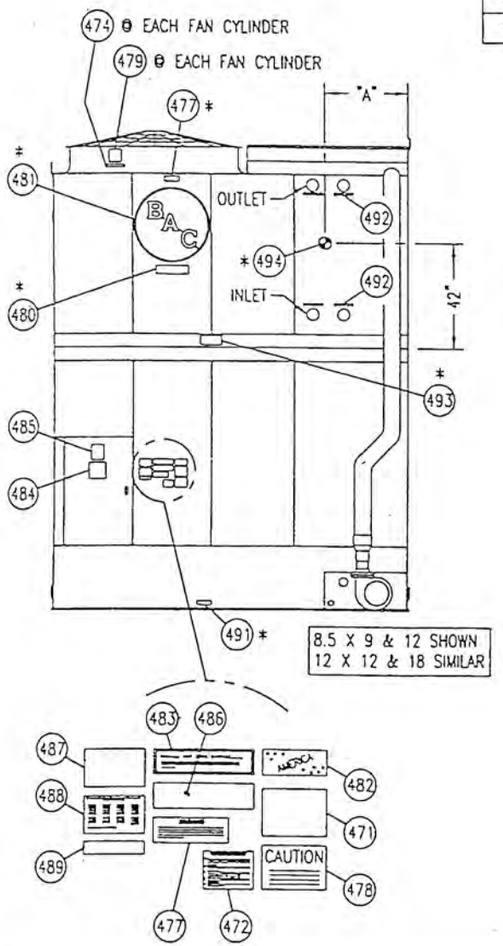


SECTION "A-A"

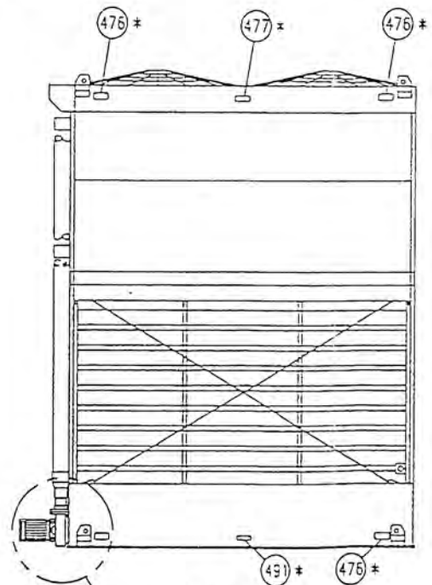
INSTALLATION NOTES:

1. WIPE SURFACE WITH ACETONE.
2. LAY OUT TAPE STARTING AT EDGE OF WALKWAY. USING A ROLLER, APPLY FIRM PRESSURE AS THE TAPE IS BEING LAYED OUT ON THE WALKWAY SURFACE. THIS MUST BE DONE TO ENSURE THAT NO AIR IS TRAPPED BETWEEN THE TAPE AND THE WALKWAY SURFACE.

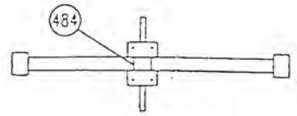
UNIT SIZE	DIM "A"
8.5 x 9 & 12	33"
12 x 12 & 18	51"



8.5 X 9 & 12 SHOWN
12 X 12 & 18 SIMILAR



12 X 12 SHOWN



M.E. SUPPORT

QUANTITY			QUANTITY			ITEM	PART NO.	DESCRIPTION
4	4	4	4	4	4	475	270454 PA	PLS LABEL CAUTION LEVEL
4	4	4	3	3	3	474	270008 PA	PLS LABEL ROTATION
1	1	1	1	1	1	487	270047 PA	ALM PLATE "BAC" BALTO DATA
8	8	8	8	8	8	476	270157 PA	PLS LABEL CAUTION LIFTING
1	–	1	1	–	1	472	270159MGPA	PLS LABEL WTR TREAT SST & BBD
–	1	–	–	1	–		270159M5PA	PLS LABEL WTR TREAT GLV
1	1	1	1	1	1	478	270238 PA	PLS LABEL CAUTION PUBLIC
3	3	3	2	2	2	479	270239 PA	PLS LABEL DANGER FAN START
1	1	1	1	1	1	482	270384P2PA	PLS LABEL "MADE IN AMERICA"
1	1	1	1	1	1	483	270385P2PA	PLS LABEL "BACROSS" 120° F
1	1	1	1	1	1	486	270386P2PA	PLS LABEL BALTIDRIVE
1	1	1	1	1	1	471	270390P2PA	PLS LABEL BALL BEARING LUBE
4	4	4	3	3	3	484	270458P2PA	PLS LABEL FAN SPEED WARNING
1	1	1	1	1	1	485	270590 PA	PLS LABEL DANGER FAN ROTATE
5	5	5	5	5	5	477	270627P2PA	PLS LABEL WARNING TOP ACESS
2	2	2	2	2	2	481	271010P2PA	PLS LABEL BAC 30" DIA. LOGO
1	1	1	1	1	1	488	(SEE CHART)	ALM PATENT PLATE
2	2	2	2	2	2	492	270078 PA	PLS LABEL "FLUID IN/OUT"
2	–	–	2	–	–	480	270326 PA	PLS LBL BALTIBOND 13" LONG
1	1	1	1	1	1	489		PLS LABEL REP.
2	2	2	2	2	2	493	270039 PA	PLS LBL SEAL JOINT
2	2	2	2	2	2	494	271058P2PA	PLS LBL CTR GRAVITY
1	1	1	1	1	1	496	270211 PB	ALM CAUTION
4	4	4	4	4	3	497	270323 P-	ANTI SKID TAPE
MG	M5	M3	MG	M5	M3			
12 X 18			8.5 x 9					
			8.5 x 12					
			12 x 12					

FOR ITEM NUMBER 488 USE THE APPROPRIATE PATENT LABEL FROM THE CHART BELOW:

LOCATION	LABEL PART NUMBER
UNITED STATES	270678MAPA
CANADA	270664MAPA
U.S. OR CANADIAN EXPORT	270481MAPA
INTERNATIONAL	270481MAPA

NOTES :

1. * = BOTH SIDES
2. UNIT WITH (2) FANS SHOWN.
   UNIT WITH (3) FANS SIMILAR.
3. RH UNIT SHOWN ; LH UNIT MIRROR IMAGE.

REV. C DATE: 07/26/96 REVISION

BALTIMORE AIRCOIL COMPANY

LABEL FLUID COOLER : SINGLE CELL	DWG NO: 9C4197 RB
DWG BY: JSK CHK BY: WHS DATE: 10/08/96	PAGE NO: 31A

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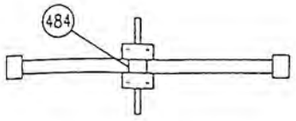
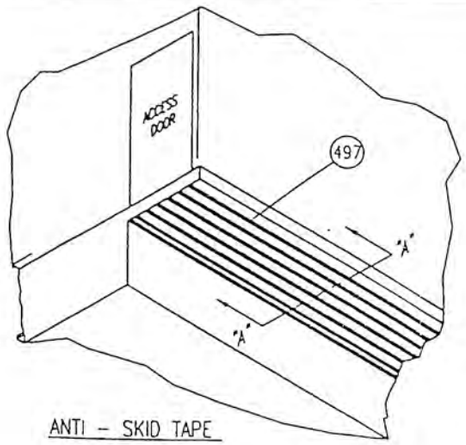
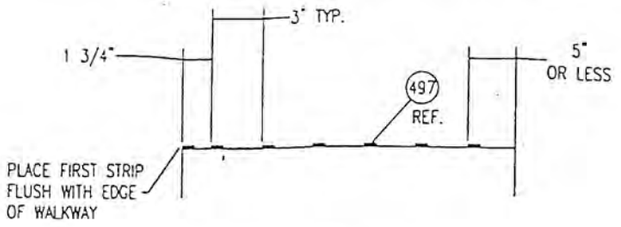
9C4231



M.E. SUPPORT



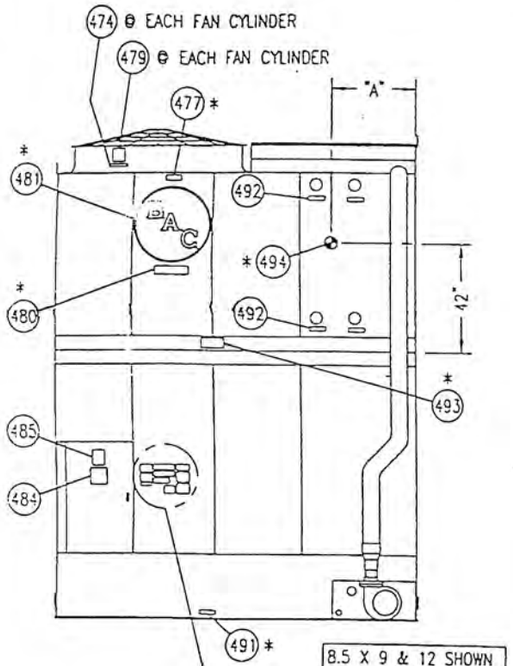
ANTI – SKID TAPE INSTALLATION



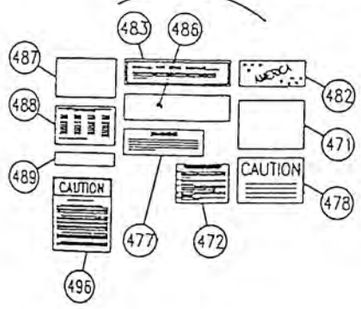
SECTION "A–A"

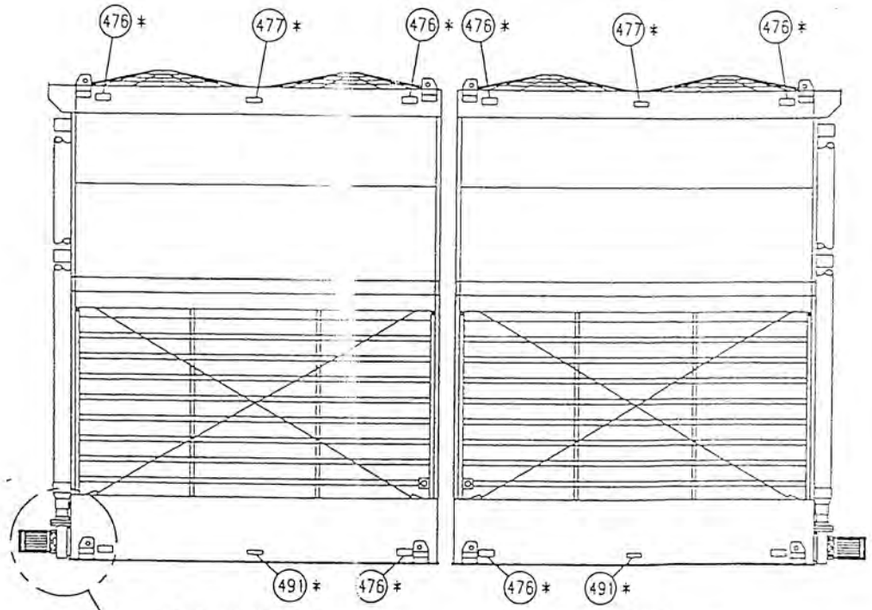
INSTALLATION NOTES:

1. WIPE SURFACE WITH ACETONE.
2. LAY OUT TAPE STARTING AT EDGE OF WALKWAY. USING A ROLLER, APPLY FIRM PRESSURE AS THE TAPE IS BEING LAYED OUT ON THE WALKWAY SURFACE. THIS MUST BE DONE TO ENSURE THAT NO AIR IS TRAPPED BETWEEN THE TAPE AND THE WALKWAY SURFACE.



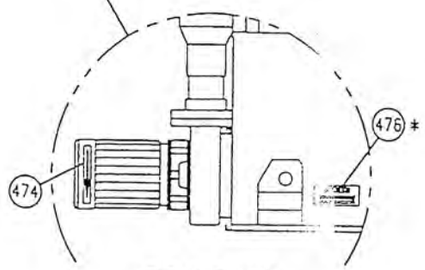
8.5 X 9 & 12 SHOWN
12 X 12 & 18 SIMILAR





12 X 12 RH SHOWN

12 X 12 LH SHOWN



TYP 2 PLACES

UNIT SIZE	DIM "A"
8.5 x 9 & 12	33"
12 x 12 & 18	51"

QUANTITY			QUANTITY			ITEM	PART NO.	DESCRIPTION
6	6	6	6	6	6	491	270454 PA	PLS LABEL CAUTION LEVEL
8	8	8	6	6	6	474	270008 PA	PLS LABEL ROTATION
1	1	1	1	1	1	487	270047 PA	ALM PLATE "BAC" BALTO DATA
16	16	16	16	16	16	476	270157 PA	PLS LABEL CAUTION LIFTING
1	–	1	1	–	1	472	270159MGPA	PLS LABEL WTR TREAT SST & BE
–	1	–	–	1	–		270159M5PA	PLS LABEL WTR TREAT GLV
1	1	1	1	1	1	478	270238 PA	PLS LABEL CAUTION PUBLIC
6	6	6	4	4	4	479	270239 PA	PLS LABEL DANGER FAN START
1	1	1	1	1	1	482	270384P2PA	PLS LABEL "MADE IN AMERICA"
1	1	1	1	1	1	483	270385P2PA	PLS LABEL "BACROSS" 120° F
1	1	1	1	1	1	486	270386P2PA	PLS LABEL BALTIDRIVE
1	1	1	1	1	1	471	270390P2PA	PLS LABEL BALL BEARING LUBE
8	8	8	6	6	6	484	270458P2PA	PLS LABEL FAN SPEED WARNING
2	2	2	2	2	2	485	270590 PA	PLS LABEL DANGER FAN ROTATE
6	6	6	6	6	6	477	270627P2PA	PLS LABEL WARNING TOP ACESS
2	2	2	2	2	2	481	271010P2PA	PLS LABEL BAC 30" DIA. LOGO
1	1	1	1	1	1	488	(SEE CHART)	ALM PATENT PLATE
2	–	–	2	–	–	480	270326 PA	PLS LBL BALTIBOND 13" LONG
1	1	1	1	1	1	489		PLS LABEL REP.
4	4	4	4	4	4	493	270039 PA	PLS LBL SEAL JOINT
4	4	4	4	4	4	494	271058P2PA	PLS LBL CTR GRAVITY
1	1	1	1	1	1	496	270211 PB	ALM CAUTION LABEL FREEZE
2	2	2	2	2	2	492	270078 PA	PLS LABEL "FLUID IN/OUT
4	4	4	4	4	4	497	270323 P–	ANTI–SKID TAPE
MG	M5	M3	MG	M5	M3			
12 X 18			8.5 x 9					
			8.5 x 12					
			12 x 12					

FOR ITEM NUMBER 488 USE THE APPROPRIATE PATENT LABEL FROM THE CHART BELOW:

LOCATION	LABEL PART NUMBER
UNITED STATES	270678MAPA
CANADA	270664MAPA
U.S. OR CANADIAN EXPORT	270481MAPA
INTERNATIONAL	270481MAPA

NOTES :

1. * = BOTH SIDES
2. UNIT WITH (2) FANS SHOWN.
   UNIT WITH (3) FANS SIMILAR.
3. RH UNIT SHOWN ; LH UNIT MIRROR IMAGE.

REV A DATE: 7/28/98 REVISION

BALTIMORE AIRCOIL COMPANY

LABEL FLUID COOLER : 2 – CELL | DWG NO: 9C4231 RB

DWG BY: DJG CHK BY: DATE: 7/22/97 | PAGE NO: 318

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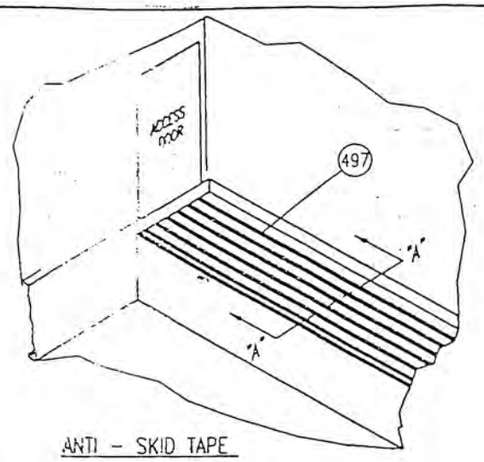
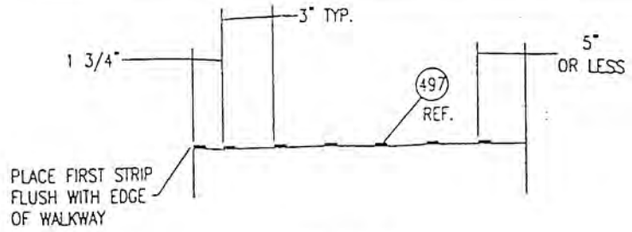
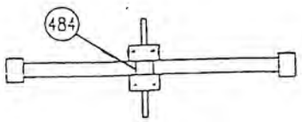


ANTI – SKID TAPE INSTALLATION

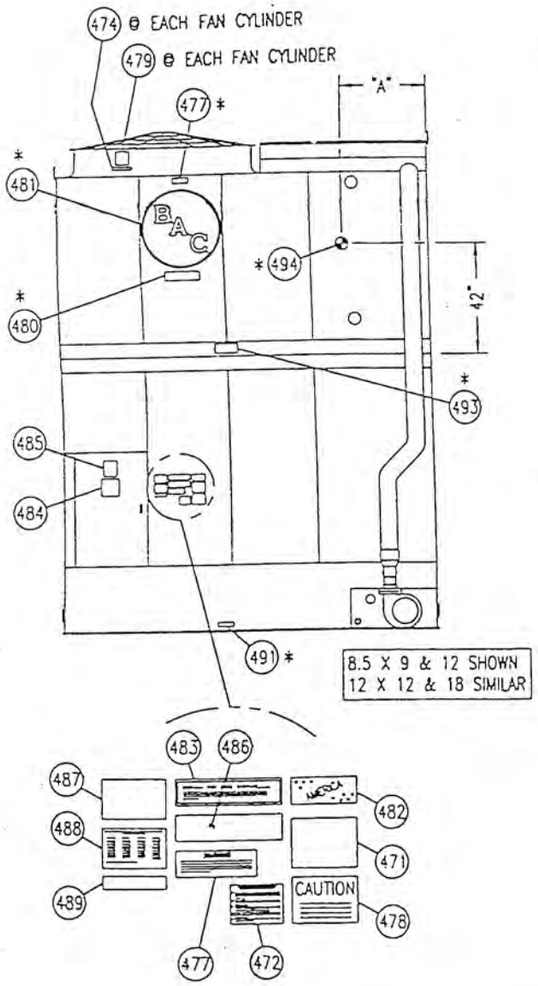


SECTION "A-A"

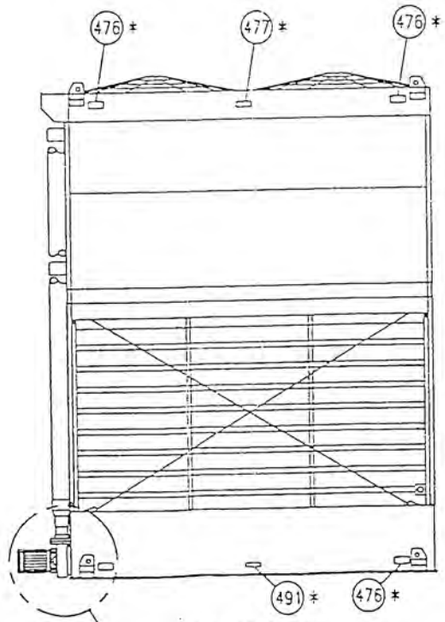


M.E. SUPPORT

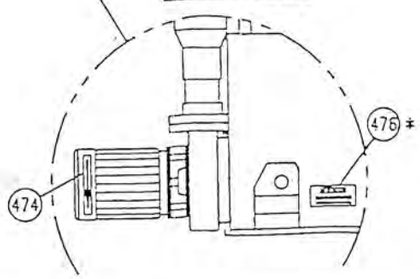
UNIT SIZE	DIM "A"
8.5 x 9 & 12	33"
12 x 12 & 18	51"



8.5 X 9 & 12 SHOWN
12 X 12 & 18 SIMILAR



12 X 12 SHOWN



QUANTITY			QUANTITY			ITEM	PART NO.	DESCRIPTION
4	4	4	4	4	4 ok	491	270006 PA	PLS LABEL CAUTION
4	4	4	3	3	3 ok	474	270008 PA	PLS LABEL ROTATION
1	1	1	1	1	1 ok	487	270047 PA	ALM PLATE "BAC" BALTO. DATA
8	8	8	8	8	8 ok	476	270157 PA	PLS LABEL CAUTION LIFTING
1	–	1	1	–	1 ok	472	270159MGPA	PLS LABEL WTR TREAT SST & BBD
–	1	–	–	1	–		270159M5PA	PLS LABEL WTR TREAT GLV
1	1	1	1	1	1 ok	478	270238 PA	PLS LABEL CAUTION PUBLIC
3	3	3	2	2	2 ok	479	270239 PA	PLS LABEL DANGER FAN START
1	1	1	1	1	1 ok	482	270384P2PA	PLS LABEL "MADE IN AMERICA"
1	1	1	1	1	1 ok	483	270385P2PA	PLS LABEL "BACROSS" 120° F
1	1	1	1	1	1 ok	486	270386P2PA	PLS LABEL BALTIDRIVE
1	1	1	1	1	1 ok	471	270390P2PA	PLS LABEL BALL BEARING LUBE
4	4	4	3	3	3 ok	484	270458P2PA	PLS LABEL FAN SPEED WARNING
1	1	1	1	1	1 ok	485	270590 PA	PLS LABEL DANGER FAN ROTATE
5	5	5	5	5	5 ok	477	270627P2PA	PLS LABEL WARNING TOP ACESS
2	2	2	2	2	2 ok	481	271010P2PA	PLS LABEL BAC 30" DIA. LOGO
1	1	1	1	1	1 ok	488	(SEE CHART)	ALM PATENT PLATE
2	–	–	2	–	–	480	270326 PA	PLS LBL BALTIBOND 13" LONG
1	1	1	1	1	1	489		PLS LABEL REP.
2	2	2	2	2	2 ok	493	270039 PA	PLS LBL SEAL JOINT
2	2	2	2	2	2 ok	494	271058P2PA	PLS LBL CTR GRAVITY
4	4	4	4	4	4	497	270323 P–	ANTI-SKID TAPE
MG	M5	M3	MG	M5	M3			
12 X 18			8.5 x 9					
			8.5 x 12					
			12 x 12					

FOR ITEM NUMBER 488 USE THE APPROPRIATE PATENT LABEL FROM THE CHART BELOW:

LOCATION	LABEL PART NUMBER
UNITED STATES	270678MAPA
CANADA	270664MAPA
U.S. OR CANADIAN EXPORT	270481MAPA
INTERNATIONAL	270481MAPA

NOTES :

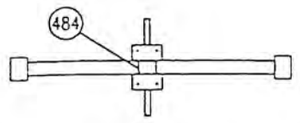
1. * = BOTH SIDES
2. UNIT WITH (2) FANS SHOWN.
   UNIT WITH (3) FANS SIMILAR.
3. RH UNIT SHOWN ; LH UNIT MIRROR IMAGE.

REV. B DATE: 07/26/98 REVISION

BALTIMORE AIRCOIL COMPANY

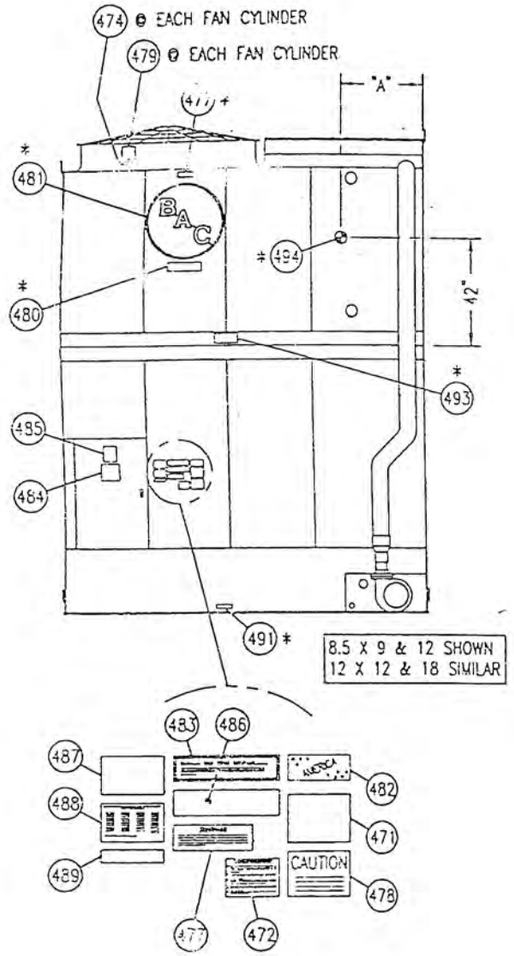
LABEL CONDENSER : SINGLE CELL | DWG NO: 9C4220 R

DWG BY: JSK CHK BY: WHS DATE: 10/22/96 | PAGE NO: 31C

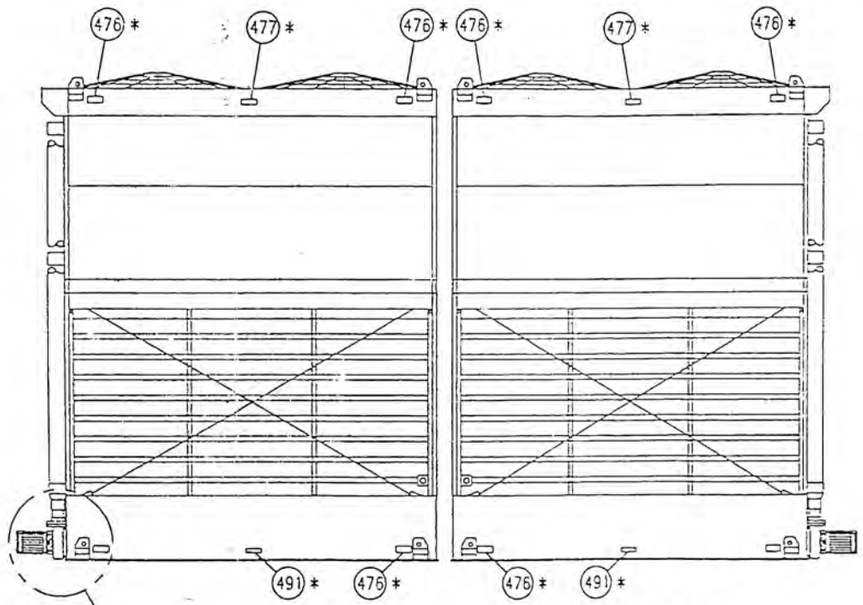


M.E. SUPPORT

UNIT SIZE	DIM "A"
8.5 x 9 & 12	33"
12 x 12 & 18	51"

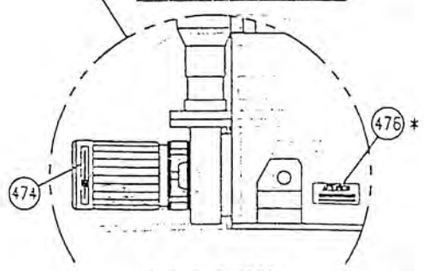


8.5 X 9 & 12 SHOWN
12 X 12 & 18 SIMILAR



12 X 12 RH SHOWN

12 X 12 LH SHOWN



TYP 2 PLACES

QUANTITY			QUANTITY			ITEM	PART NO.	DESCRIPTION
6	6	6	6	6	6 ok	491	270006 PA	PLS LABEL CAUTION LEVEL
8	8	8	6	6	6 ok	474	270008 PA	PLS LABEL ROTATION
1	1		1	1	1	487	270047 PA	ALM PLATE "BAC" BALTO DAT.
16	16	16	16	16	16 ok	476	270157 PA	PLS LABEL CAUTION LIFTING
1	–	1	1	–	1	472	270159MGPA	PLS LABEL WTR TREAT SST &
–	1	–	–	1	–		270159M5PA	PLS LABEL WTR TREAT GLV
1	1	1	1	1	1 ok	478	270238 PA	PLS LABEL CAUTION PUBLIC
6	6	6	4	4	4 ok	479	270239 PA	PLS LABEL DANGER FAN STAR
1	1	1	1	1	1 ok	482	270384P2PA	PLS LABEL "MADE IN AMERICA
1	1	1	1	1	1 ok	483	270385P2PA	PLS LABEL "BACROSS" 120° F
1	1	1	1	1	1	486	270386P2PA	PLS LABEL BALTIDRIVE
1	1	1	1	1	1	471	270390P2PA	PLS LABEL BALL BEARING LUB
8	8	8	6	6	6	484	270458P2PA	PLS LABEL FAN SPEED WARNI
2	2	2	2	2	–	485	270590 PA	PLS LABEL DANGER FAN ROTA
6	6	6	6	6	6	477	270627P2PA	PLS LABEL WARNING TOP ACE
2	2	2	2	2	2	481	271010P2PA	PLS LABEL BAC 30" DIA. LOG
1	1	1	1	1	1	488	(SEE CHART)	ALM PATENT PLATE
2	–	–	2	–	–	480	270326 PA	PLS LBL BALTIBOND 13" LONG
1	1	1	1	1	1	489		PLS LABEL REP.
4	4	4	4	4	4 ok	493	270039 PA	PLS LBL SEAL JOINT
4	4	4	4	4	4 ok	494	271058P2PA	PLS LBL CTR GRAVITY
MG	M5	M3	MG	M5	M3			
12 X 18			8.5 x 9					
			8.5 x 12					
			12 x 12					

FOR ITEM NUMBER 488 USE THE APPROPRIATE PATENT LABEL FROM THE CHART BELOW:

LOCATION	LABEL PART NUMBER
UNITED STATES	270678MAPA
CANADA	270664MAPA
U.S. OR CANADIAN EXPORT	270481MAPA
INTERNATIONAL	270481MAPA

NOTES :

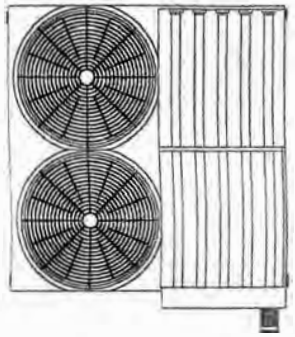
1. * = BOTH SIDES
2. UNIT WITH (2) FANS SHOWN.
   UNIT WITH (3) FANS SIMILAR.
3. RH UNIT SHOWN ; LH UNIT MIRROR IMAGE.

REV. A DATE: 07/25/96 REVISION

BALTIMORE AIRCOIL COMPANY

LABEL CONDENSER : 2 – CELL | DWG NO: 9C4221

DWG BY: JSK CHK BY: WHS DATE: 10/22/96 | PAGE NO: 31D

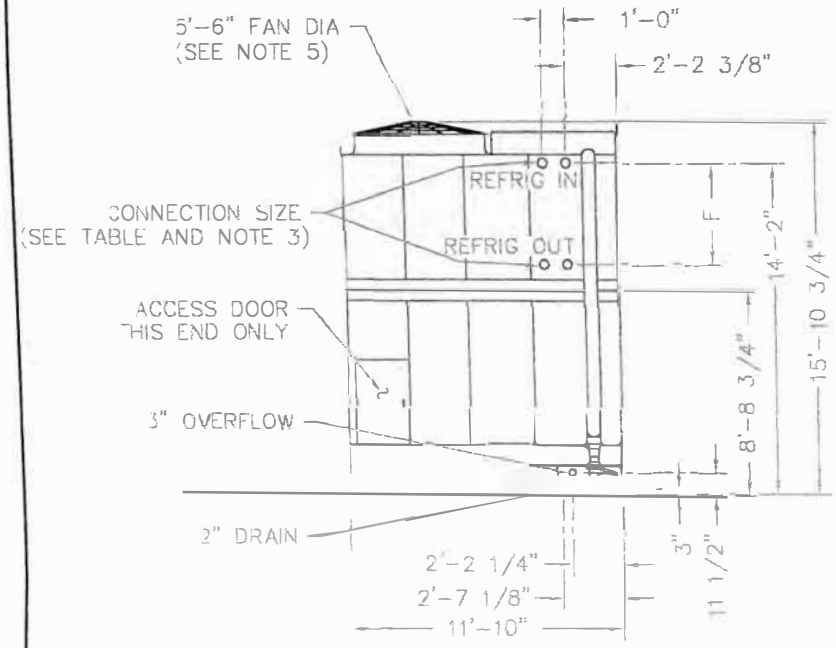


PLAN VIEW

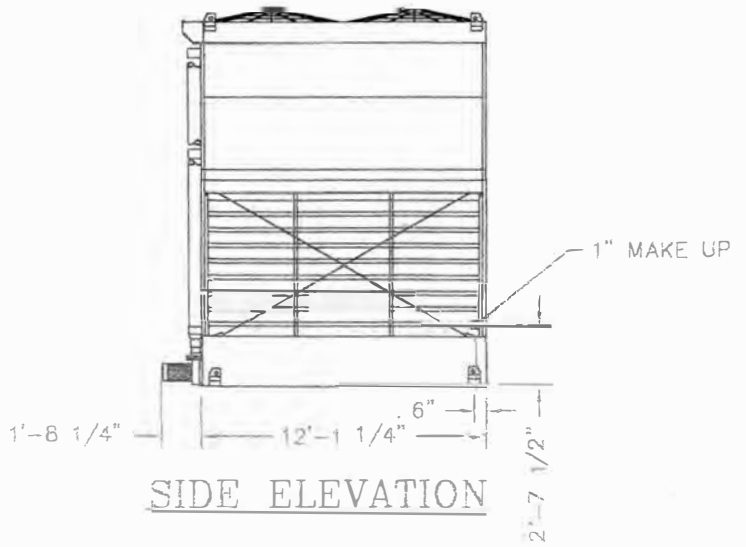
MODEL NUMBER	SHIPPING WEIGHT	OPERATING WEIGHT	HEAVIEST SECTION (UPPER)	CONNECTION SIZE	F
CXV-196	10,740	17,480	6580	4"	24"
CXV-210	10,790	17,530	6630	4"	24"
CXV-220	10,840	17,580	6680	4"	24"
CXV-235	11,780	18,670	7620	4"	33 1/4"
CXV-253	11,830	18,720	7670	4"	33 1/4"
CXV-264	12,830	19,870	8670	4"	42 1/2"
CXV-283	12,880	19,920	8720	4"	42 1/2"
CXV-290	13,920	21,110	9760	4"	51 3/4"
CXV-305	13,970	21,160	9810	4"	51 3/4"

NOTES:

1. ALL DIMENSIONS ARE IN FEET AND INCHES. WEIGHTS ARE IN POUNDS.
2. DIMENSIONS SHOWING LOCATION OF COIL CONNECTIONS ARE APPROXIMATE AND SHOULD NOT BE USED FOR PREFABRICATION OF CONNECTING PIPING.
3. COIL CONNECTIONS ARE IPS BEVELLED FOR WELDING.
4. CONNECTIONS 3" & SMALLER ARE MPT.
5. THE AREA ABOVE THE DISCHARGE OF THE FAN MUST BE UNOBSTRUCTED.
6. FOR WEIGHT LOADING AND SUPPORT REQUIREMENTS REFER TO THE SUGGESTED STEEL SUPPORT DRAWING.



END ELEVATION



SIDE ELEVATION

RH UNIT

B.A.C. WORK NO:

DATE:

BALTIMORE AIRCOIL COMPANY

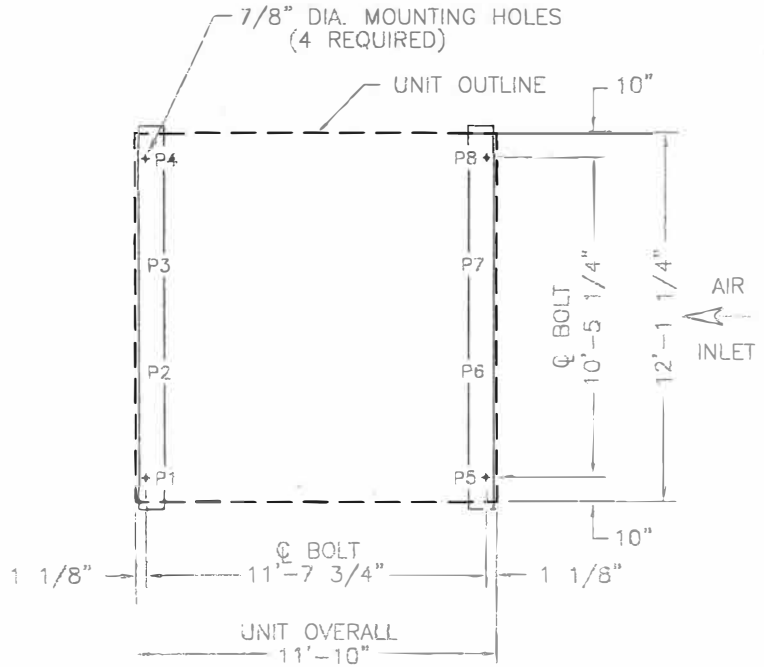
SERIES 1500
EVAPORATIVE CONDENSER

DRAWING NUMBER:
BAC-17024A

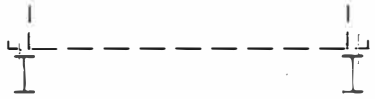
A

MODEL NUMBER	SHIPPING WEIGHT	WEIGHT LOADING (LBS.)								
		OPER. WEIGHT	P1	P2	P3	P4	P5	P6	P7	P8
CXV-196	10,740	17,480	2006	1220	1220	2006	4913	601	601	4913
CXV-210	10,790	17,530	2012	1226	1226	2012	4926	601	601	4926
CXV-220	10,840	17,580	2018	1233	1233	2018	4938	601	601	4938
CXV-235	11,780	18,670	2176	1222	1222	2176	5336	601	601	5336
CXV-253	11,830	18,720	2182	1228	1228	2182	5349	601	601	5349
CXV-264	12,830	19,870	2347	1225	1225	2347	5762	601	601	5762
CXV-283	12,880	19,920	2353	1231	1231	2353	5775	601	601	5775
CXV-290	13,920	21,110	2523	1233	1233	2523	6198	601	601	6198
CXV-305	13,970	21,160	2529	1240	1240	2529	6210	601	601	6210

NOTES:
1. SUPPORTING STEELWORK AND ANCHOR BOLTS TO BE DESIGNED AND FURNISHED BY OTHERS.
2. ALL SUPPORTING STEEL MUST BE LEVEL AT TOP.
3. BEAMS SHOULD BE SELECTED IN ACCORDANCE WITH ACCEPTED STRUCTURAL PRACTICE, MAXIMUM DEFLECTION OF BEAM UNDER UNIT TO BE 1/360 OF SPAN, NOT TO EXCEED 1/2 INCH.
4. ALTERNATELY THE UNIT MAY BE SUPPORTED ON COLUMNS AT THE FOUR CORNERS OF THE UNIT. CONSULT YOUR BAC REPRESENTATIVE FOR DETAILS.
5. IF VIBRATION ISOLATION RAILS ARE USED BETWEEN UNIT AND SUPPORTING STEEL, BE CERTAIN TO ALLOW FOR THE LENGTH OF THE VIBRATION RAILS WHEN DETERMINING LENGTH OF SUPPORTING STEEL. VIBRATION RAIL LENGTH AND MOUNTING HOLE LOCATIONS MAY DIFFER FROM THOSE OF THE UNIT. REFER TO VIBRATION ISOLATOR DRAWINGS FOR THIS DATA.
6. DO NOT USE THIS DRAWING TO SIZE POINT VIBRATION SOLATORS. SEE YOUR BAC REPRESENTATIVE FOR DETAILS.

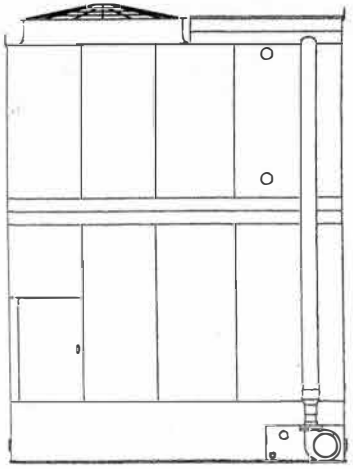


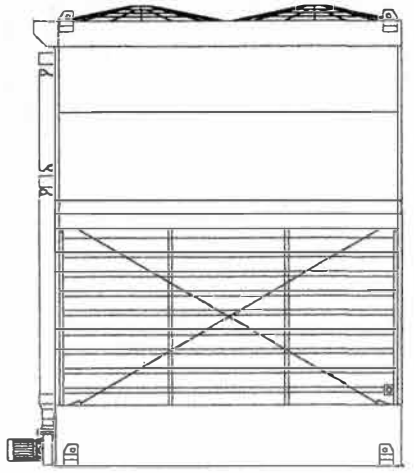
PLAN VIEW



END ELEVATION

B.A.C. ORDER NO:	BALTIMORE AIRCOIL COMPANY	SERIES 1500, EVAPORATIVE CONDENSER STANDARD STEEL SUPPORT
DATE:		DRAWING NUMBER: BAC-17064A A





(RH UNIT)

B.A.C. ORDER NO: DATE:	BALTIMORE AIRCOIL COMPANY	SERIES 1500 EVAPORATIVE CONDENSER DRAWING NUMBER: BAC-17004A A