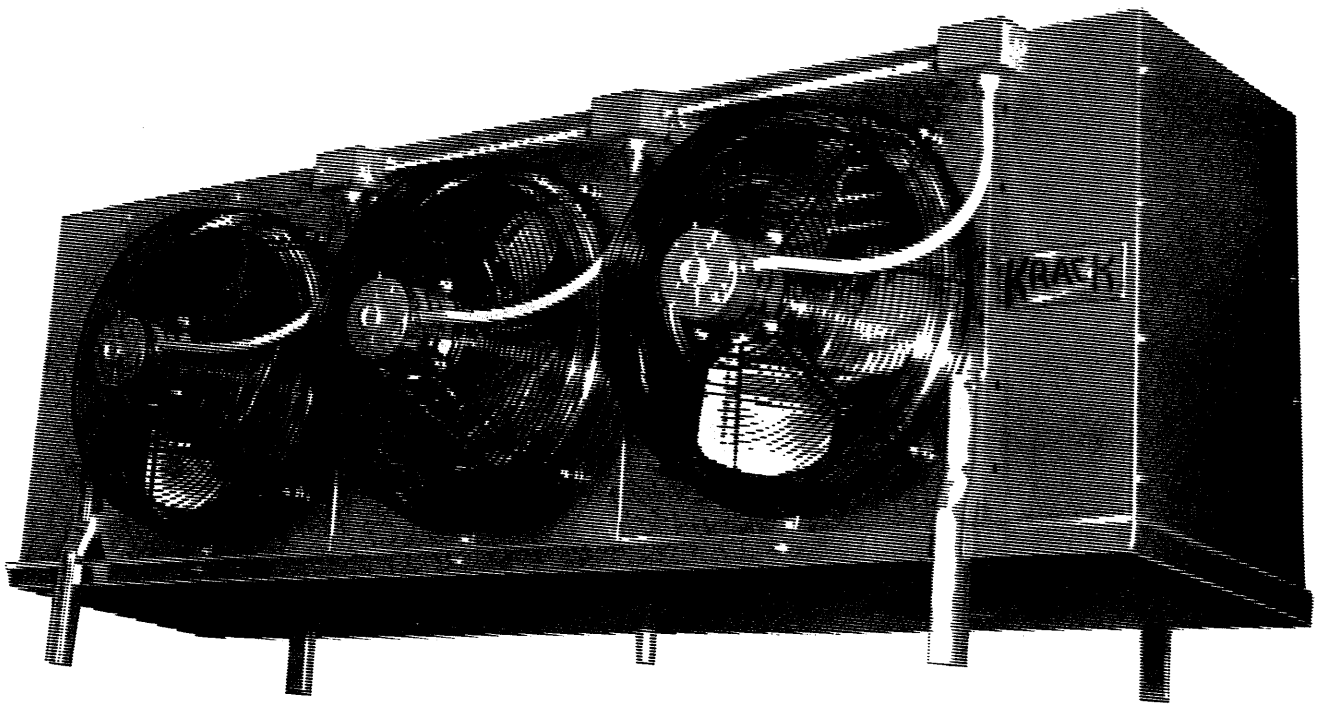
Bulletin: DT/BT 485
Supersedes: DT 181

KRACK

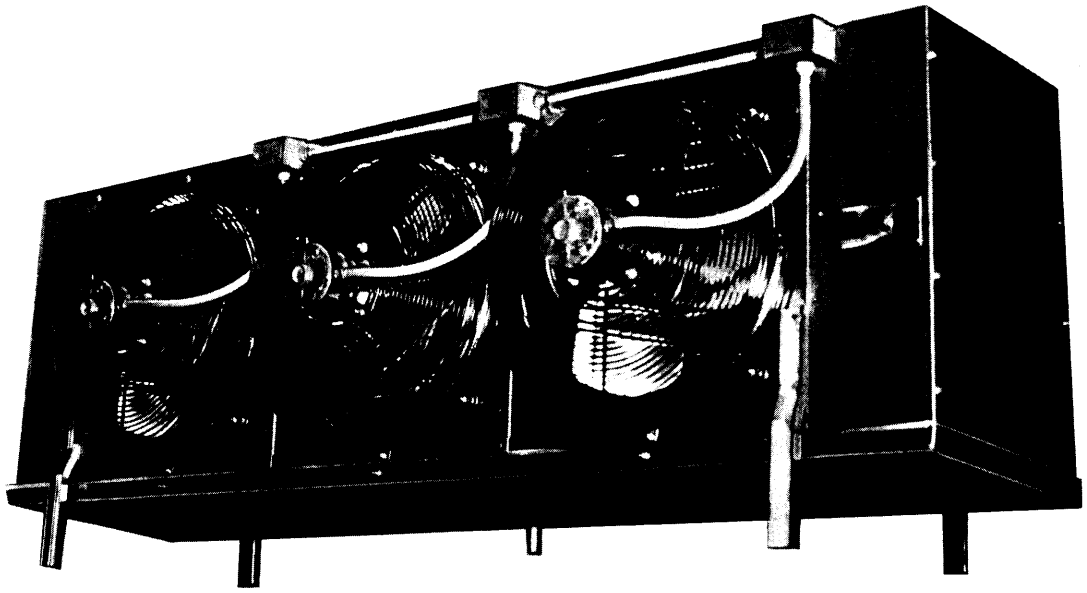
Ceiling Mounted Unit Cooler



DT/DTX Draw Thru BT/BTX Blow Thru
Galvanized Steel Coil
Air, Hot Gas, Water Defrost
2 Thru 25 Tons Capacity

KRACK

FEATURES



Air, Hot Gas or Water Defrost

Coil

Maximum heat transfer is achieved by staggering ¾ OD steel tubes in direction of air flow. Circuits are cross fed with vertical headers resulting in equal circuit loading for horizontal air flow. Coils are 6 rows deep with steel fins spaced by Turbo-Spacers. The entire coil assembly, including internal framing, is hot dip galvanized after assembly. Coils are tested, under water, with 300 psig air pressure, both before and after galvanizing. Coils can be circuited for heat reclaim or for brine refrigerants.

Fans and Motors

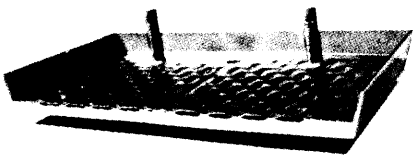
Full guarded, 22 inch diameter, aluminum bladed propeller fans are direct driven at 1140 RPM by TEAO motors with internal thermal overload protection for both single and three phase service. When specified, motors will be factory wired to junction boxes with the service connection on the front side opposite the refrigerant connection end. All fan motors on a given unit can be cycled with one contractor. External overload devices are not required. Fan guards conform to UL requirements and have a 10–15 mil fluidic bath coating of black vinyl PVC for corrosion resistance.

Housing

Corrosion resistant heavy gauge mill galvanized steel is used for the outer wrapper. Fans are individually compartmented by continuous tube sheets for uniform air flow and to prevent reverse rotation in the event of motor failure. End covers are removable for easy access to TEV and pan to coil check valves.

Drain Pan

For applications above freezing, the full coverage drain pan is aluminum with optional foamed-in-place polyurethane insulation and mill galvanized bottom cover. Krack's exclusive stainless steel "coil-less waffle" design is provided for hot gas heated pan requirements. HGU pans are insulated with foamed-in-place polyurethane and have a mill galvanized outer cover. Drain pans are factory mounted.



Accessories & Options

- Choice of coil hand when facing air discharge can reduce field piping.
- Thermostatic expansion valve.
- Liquid line solenoid valve with strainer.
- Fan motors factory wired to common junction box.
- Factory mounted fan motor disconnect means.
- Foamed-in-place polyurethane insulated drain pans with galvanized bottom cover for A or HGC models. Standard on HGU models.
- Stainless steel bottom drain pan cover with polyurethane insulation.
- Pan to coil check valve with interconnecting piping.
- Hot gas defrost control valve kits.
- Stainless steel housing.
- Surge drum assemblies, shipped loose, with factory fitted connection and internal liquid level float—less relief valve. ASME Code Stamp included where applicable. Compressor must be protected with suction trap and until height will increase.

SELECTION

Unit coolers are modular in design with one through six fans and two overall heights. DT/BT models are 34½ inches high. DTX/BTX models are 43 inches high and are more economical. Units are suitable for ammonia application above minus 40 Deg. suction temperature.

Shaded models have high face velocity and are applicable in spaces below freezing.

Non-shaded models have face velocities which normally eliminate moisture carry-over when air defrosting with the liquid solenoid valve de-energized by time clock or thermostat.

Rated capacity in BTUH/1 Deg.TD is based on sensible heat removal with a wet, dry, or frosted coil with TD's less than 20 Deg.F. Wet coil heat transfer is more efficient than frosted resulting in higher ratings. Dry ratings are between wet and frosted, however, refrigeration coils seldom operate dry. Although rated for sensible heat, a unit cooler will absorb the room total load consisting of both sensible and latent if the TD is adequate for the rated CFM. Flooded ratings are the same as recirculated.

Fan motor heat is not included in the ratings and is usually included in the load estimate.
Coolers—4,000 BTUH/HP
Freezers—4,400 BTUH/HP

TD is the temperature difference between return or room air and coil saturated refrigerant temperature. Rated capacity is multiplied by the TD to determine total sensible heat capacity in BTUH. For instance, a DT3-635 located in a −10 Deg.F freezer with a −20 Deg.F saturated suction (10 Deg.TD) will have a BTUH rating of 6,350 × 10 = 63,500 when applied in a recirculated refrigerant system.

50 Hertz results in a fan motor RPM decrease of 17%. Fan pitch will be increased to compensate. Derating for 50 Hertz is not necessary.

Low temperature capacity multipliers with thermostatic expansion valve feed for halocarbon refrigerants:
−20 Deg.F. Suction—1.0
−30 Deg.F. Suction—0.9
−40 Deg.F. Suction—0.8

Relative sound level is in decibels on the "A" scale, measured 6 feet in front of the unit. Actual sound level is dependent upon unit location, room size and height, and surface "hardness" of walls, ceiling and product.

Fan motor nameplate amps are total for the unit. Motors have internal overheat protection and may be wired in parallel and cycled with one contactor. NEC limits total parallel motor ampacity to 15 amps at 600 volts and 20 amps at 125 volts or less. Higher capacity models for 115 or 208-230/1/60 service can be provided when more than one parallel motor circuit is used. Ampacity will increase as room temperature is lowered (8% at 32 Deg.F; 18% at −10 Deg.F) due to denser air. As the air temperature lowers TEAO motor capability increases at a faster rate than the imposed fan load.

Three phase motors are ⅓ or ½ HP. ⅓ HP will be provided where ¼ HP single phase are shown.

Ammonia Connections are adequate for the following design TD:

Saturated Suction Deg.F	−40	−30	−20	10	20
3 to 1 Recirculated	10	13	16	18	18
Direct Expansion	—	—	—	15	18
Flooded	10	13	16	18	18

Consult factory for recirculated and direct expansion halocarbon; brine and heat reclaim inlet and outlet connections.

DXF distributors will be brass with copper leads. TEV must be externally equalized.

TEV for DXA must be externally equalized without discharge tube except for DT1 and DTX1 models using a single circuit coil requiring TEV with discharge tube.

Please specify:
- Quantity and complete model number
- Saturated suction temperature
- Room temperature
- Electrical characteristics
- Coil connection hand when facing air discharge—right or left hand
- Options—see Features
- Accessories—control voltage

Model Key

DTX - 3 - S - 760 - RTA - A - LH

DT-DTX DRAW THRU
BT-BTX BLOW THRU

NO FANS

GALV STEEL COIL

CAPACITY

REFRIGERANT FEED
DX—Direct Expansion
RT—Recirculated Top
RB—Recirculated Bottom
FL—Flooded
B —Brine

REFRIGERANT
A—Ammonia
F—Halocarbon R-12, 22 or 502

TYPE OF DEFROST
A —Air or Off Cycle (Room above 36°F.)
HGC—Hot gas coil only (Room above 32°F.)
HGU—Hot gas coil and drain pan
WD — Water Defrost

COIL CONNECTION HAND—facing fan discharge
RH—Right Hand
LH—Left hand

SPECIFICATIONS

DT/BT UNIT COOLERS

DT BT MODEL	CAPACITY BTUH/1°TD WET DX	WET REC	FROSTED DX	FROSTED REC	COIL DATA FINS INCH	FACE SQ. FT.	SURFACE SQ. FT.	INT. VOL. CU. FT.	AIR DATA CFM	FACE FPM	FAN MOTOR NAMEPLATE AMPS FANS NO. HP	115/1	208/1 230/1	208/3 230/3	460/3	SOUND LEVEL db (A)	APPROX. WEIGHT LBS
1S-185	1680	1930	1590	1850	3	5.8	377	0.7	3490	600	1-¼	5.0	2.5	1.7	0.9	67	530
1S-200	1820	2190	1720	2000	4	5.8	482	0.7	3375	581	1-¼	5.0	2.5	1.7	0.9	67	560
1S-205	—	—	1765	2050	3	5.8	377	0.7	4420	762	1-½	7.8	3.9	2.0	1.0	71	530
1S-210	—	—	1810	2100	4	5.8	482	0.7	3965	683	1-½	7.8	3.9	2.0	1.0	71	560
1S-215	1970	2370	—	—	6	5.8	693	0.7	3270	563	1-⅓	5.4	2.7	1.7	0.9	69	640
2S-370	3365	4035	3055	3700	3	11.6	754	1.2	6980	600	2-¼	10.0	5.0	3.4	1.8	70	910
2S-395	3640	4370	3305	3950	4	11.6	964	1.2	6750	581	2-¼	10.0	5.0	3.4	1.8	69	970
2S-415	—	—	3435	4150	3	11.6	754	1.2	8840	762	2-½	15.6	7.8	4.0	2.0	73	910
2S-425	—	—	3545	4250	4	11.6	964	1.2	7930	683	2-½	15.6	7.8	4.0	2.0	73	970
2S-430	3940	4730	—	—	6	11.6	1386	1.2	6540	563	2-⅓	10.8	5.4	3.4	1.8	71	1130
3S-550	5045	6050	4585	5500	3	17.3	1131	1.8	10450	600	3-¼	15.0	7.5	5.1	2.7	71	1290
3S-595	5460	6550	4960	5950	4	17.3	1446	1.8	10100	581	3-¼	15.0	7.5	5.1	2.7	70	1380
3S-615	—	—	5145	6155	3	17.3	1131	1.8	13250	762	3-½	—	11.7	6.0	3.0	74	1290
3S-635	—	—	5320	6350	4	17.3	1446	1.8	11890	683	3-½	—	11.7	6.0	3.0	74	1380
3S-645	5910	7100	—	—	6	17.3	2079	1.8	9800	563	3-⅓	16.2	8.1	5.1	2.7	72	1620
4S-735	6760	8115	6145	7350	3	23.1	1508	2.3	13950	600	4-¼	20.0	10.0	6.8	3.6	72	1670
4S-795	7305	8750	6640	7950	4	23.1	1928	2.3	13500	581	4-¼	20.0	10.0	6.8	3.6	71	1790
4S-825	—	—	6850	8250	3	23.1	1508	2.3	17700	762	4-½	—	—	8.0	4.0	75	1670
4S-850	—	—	7100	8500	4	23.1	1928	2.3	15850	683	4-½	—	—	8.0	4.0	75	1790
4S-860	7900	9480	—	—	6	23.1	2772	2.3	13050	563	4-⅓	—	10.8	6.8	3.6	73	2110
5S-915	8405	10100	7630	9150	3	28.9	1885	2.8	17450	600	5-¼	—	12.5	8.5	4.5	73	2050
5S-990	9090	10910	8255	9905	4	28.9	2410	2.8	16850	581	5-¼	—	12.5	8.5	4.5	72	2200
5S-1030	—	—	8580	10300	3	28.9	1885	2.8	22100	762	5-½	—	—	10.0	5.0	76	2050
5S-1060	—	—	8870	10600	4	28.9	2410	2.8	19800	683	5-½	—	—	10.0	5.0	76	2200
5S-1070	9820	11785	—	—	6	28.9	3465	2.8	16350	563	5-⅓	—	13.5	8.5	4.5	74	2600
6S-1100	10080	12100	9150	11000	3	34.7	2262	3.4	20900	600	6-¼	—	15.0	10.2	5.4	74	2430
6S-1190	10920	13100	9915	11900	4	34.7	2892	3.4	20250	581	6-¼	—	15.0	10.2	5.4	73	2610
6S-1235	—	—	10290	12350	3	34.7	2262	3.4	26500	762	6-½	—	—	12.0	6.0	77	2430
6S-1275	—	—	10630	12750	4	34.7	2892	3.4	23750	683	6-½	—	—	12.0	6.0	77	2610
6S-1290	11820	14200	—	—	6	34.7	4158	3.4	19600	563	6-⅓	—	—	10.2	5.4	75	3090

AMMONIA CONNECTIONS—MPT

MODEL	RECIRC LIQ	RECIRC SUCT	RECIRC HG	DIRECT EXPANSION LIQ	DIRECT EXPANSION SUCT	DIRECT EXPANSION HG HEADER	FLOODED LIQ	FLOODED SUCT	FLOODED HG	DRAIN PAN (FPT) STD	DRAIN PAN (FPT) WATER	DRAIN PAN (FPT) HOT GAS
DT/BT1	¾	1½	¾	½	¾	¾	1½	1½	¾	1	2	2—1
DT/BT2	¾	2	¾	½	1	¾	1½	2	¾	1	2	2—1
DT/BT3	¾	2	¾	½	1¼	¾	1½	2	¾	1	2	2—1
DT/BT4	¾	2½	1	½	1¼	1	2	2½	1	1¼	2½	2—1½
DT/BT5	¾	2½	1	½	1½	1	2	2½	1	1¼	2½	2—1½
DT/BT6	¾	2½	1	½	1½	1	2½	3	1	1¼	2½	2—1½

SPECIFICATIONS

DTX/BTX UNIT COOLERS

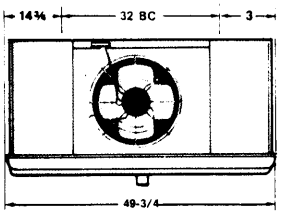
DTX BTX MODEL	CAPACITY BTUH/1°TD WET DX	WET REC	FROSTED DX	FROSTED REC	COIL DATA FINS INCH	FACE SQ. FT.	SURFACE SQ. FT.	INT. VOL. CU. FT.	AIR DATA FLOW CFM	FACE FPM	FAN MOTOR NAMEPLATE AMPS FANS NO. HP	115/1	208/1 230/1	208/3 230/3	460/3	SOUND LEVEL db (A)	APPROX. WEIGHT LBS
1S-240	2190	2640	2000	2400	3	7.4	485	0.9	4600	620	1-⅓	5.4	2.7	1.7	0.9	69	660
1S-250	2330	2800	2120	2550	4	7.4	620	0.9	4500	600	1-⅓	5.4	2.7	1.7	0.9	69	700
1S-260	—	—	2160	2600	3	7.4	485	0.9	5500	740	1-½	7.8	3.9	2.0	1.0	71	660
1S-270	—	—	2240	2700	4	7.4	620	0.9	5000	670	1-½	7.8	3.9	2.0	1.0	71	700
1S-280	2560	3080	—	—	6	7.4	890	0.9	4300	580	1-½	7.8	3.9	2.0	1.0	71	800
2S-470	4380	5280	3980	4800	3	14.9	970	1.5	9200	620	2-⅓	10.8	5.4	3.4	1.8	71	1140
2S-510	4650	5650	4230	5100	4	14.9	1240	1.5	9000	600	2-⅓	10.8	5.4	3.4	1.8	71	1210
2S-520	—	—	4320	5200	3	14.9	970	1.5	11000	740	2-½	15.6	7.8	4.0	2.0	73	1140
2S-540	—	—	4480	5400	4	14.9	1240	1.5	10000	670	2-½	15.6	7.8	4.0	2.0	73	1210
2S-560	5110	6160	—	—	6	14.9	1780	1.5	8600	580	2-½	15.6	7.8	4.0	2.0	73	1410
3S-720	6570	7920	5980	7200	3	22.3	1455	2.3	13800	620	3-⅓	16.2	8.1	5.1	2.7	72	1610
3S-760	6980	8410	6350	7650	4	22.3	1860	2.3	13500	600	3-⅓	16.2	8.1	5.1	2.7	72	1720
3S-780	—	—	6470	7800	3	22.3	1455	2.3	16500	740	3-½	—	11.7	6.0	3.0	74	1610
3S-810	—	—	6720	8100	4	22.3	1860	2.3	15000	670	3-½	—	11.7	6.0	3.0	74	1720
3S-840	7670	9240	—	—	6	22.3	2670	2.3	12900	580	3-½	—	11.7	6.0	3.0	74	2030
4S-960	8760	10560	7970	9600	3	29.7	1940	3.0	18400	620	4-⅓	—	10.8	6.8	3.6	73	2090
4S-1020	9310	11220	8470	10200	4	29.7	2480	3.0	18000	600	4-⅓	—	10.8	6.8	3.6	73	2240
4S-1040	—	—	8630	10400	3	29.7	1940	3.0	22000	740	4-½	—	—	8.0	4.0	75	2090
4S-1080	—	—	8960	10800	4	29.7	2480	3.0	20000	670	4-½	—	—	8.0	4.0	75	2240
4S-1120	10230	12320	—	—	6	29.7	3560	3.0	17200	580	4-½	—	—	8.0	4.0	75	2640
5S-1200	10960	13200	9960	12000	3	37.2	2425	3.6	23000	620	5-⅓	—	13.5	8.5	4.5	74	2560
5S-1270	11640	14020	10580	12750	4	37.2	3100	3.6	22500	600	5-⅓	—	13.5	8.5	4.5	74	2750
5S-1300	—	—	10790	13000	3	37.2	2425	3.6	27500	740	5-½	—	—	10.0	5.0	76	2560
5S-1350	—	—	11200	13500	4	37.2	3100	3.6	25000	670	5-½	—	—	10.0	5.0	76	2750
5S-1400	12780	15400	—	—	6	37.2	4450	3.6	21500	580	5-½	—	—	10.0	5.0	76	3250
6S-1440	13150	15840	11950	14400	3	44.6	2910	4.4	27600	620	6-⅓	—	—	10.2	5.4	75	3040
6S-1530	13970	16830	12700	15300	4	44.6	3720	4.4	27000	600	6-⅓	—	—	10.2	5.4	75	3260
6S-1560	—	—	12950	15600	3	44.6	2910	4.4	33000	740	6-½	—	—	12.0	6.0	77	3040
6S-1620	—	—	13450	16200	4	44.6	3720	4.4	30000	670	6-½	—	—	12.0	6.0	77	3260
6S-1680	15340	18480	—	—	6	44.6	5340	4.4	25800	580	6-½	—	—	12.0	6.0	77	3860

AMMONIA CONNECTIONS—MPT

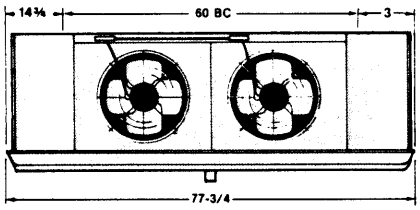
MODEL	RECIRC LIQ	RECIRC SUCT	RECIRC HG	DIRECT EXPANSION LIQ	DIRECT EXPANSION SUCT	DIRECT EXPANSION HG HEADER	FLOODED LIQ	FLOODED SUCT	FLOODED HG	DRAIN PAN (FPT) STD	DRAIN PAN (FPT) WATER	DRAIN PAN (FPT) HOT GAS
DTX/BTX1	¾	1½	1	½	¾	¾	1½	1½	1	1	2	2—1
DTX/BTX2	¾	2	1	½	1¼	1	1½	2	1	1	2	2—1
DTX/BTX3	¾	2½	1	½	1½	1	2	2½	1	1	2	2—1
DTX/BTX4	¾	2½	1½	½	1½	1¼	2	2½	1½	1¼	2½	2—1½
DTX/BTX5	¾	2½	1½	½	2	1¼	2	3	1½	1¼	2½	2—1½
DTX/BTX6	1	3	1½	½	2	1¼	2½	3	1½	1¼	2½	2—1½

PHYSICAL DATA

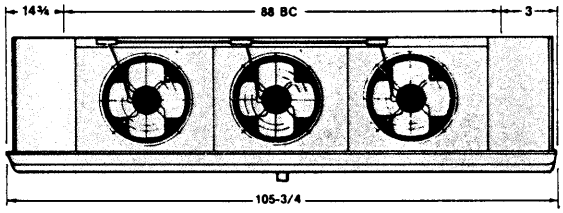
DT/BT 1
DTX/BTX 1



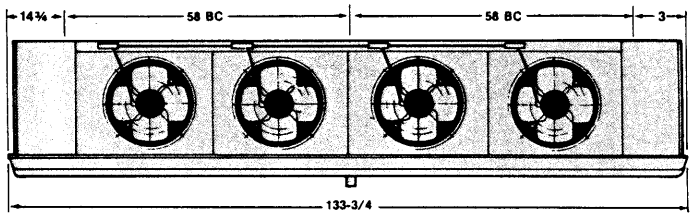
DT/BT 2
DTX/BTX 2



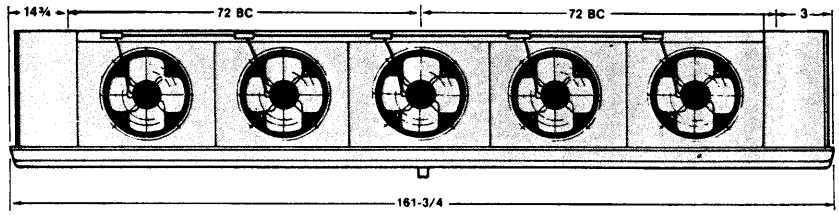
DT/BT 3
DTX/BTX 3



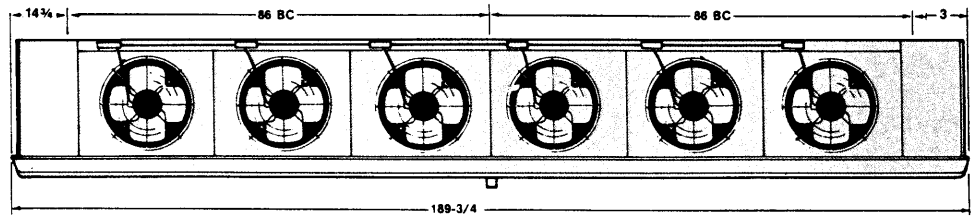
DT/BT 4
DTX/BTX 4



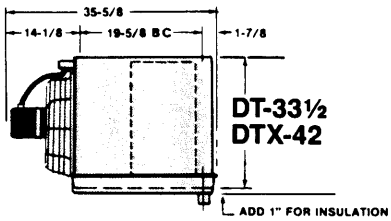
DT/BT 5
DTX/BTX 5



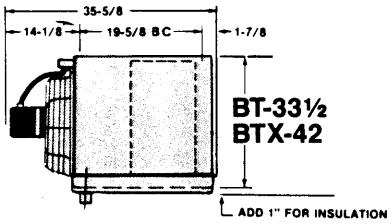
DT/BT 6
DTX/BTX 6



DRAW THRU AIR



BLOW THRU AIR



ADD 5" TO HEIGHT
FOR ALL WATER DEFROST UNITS

Hanger holes are 1/2" diameter threaded rods.

DT left hand refrigerant connections shown.

BT right hand refrigerant connections shown.

For general reference—do not use for construction purposes.

APPLICATION

Draw-thru unit coolers can be used in medium and low temperature holding coolers, freezers, shipping docks, carcass chill, assembly and process areas.

Blow-thru unit coolers should be used in rooms above +20°F only. BT units are not recommended for carcass chill applications.

All models have relatively low noise levels when compared with units with higher horsepower and larger diameter fans. These units should not be applied for blast chilling or freezing requiring external static pressure.

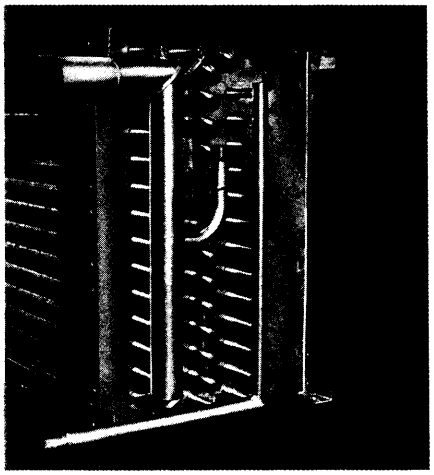
Air throw is 60-80 feet. Units should be located away from walls a distance equal to the unit height. Air discharge should be free of all obstructions. It is not necessary to locate units near walls of high palletized coolers or freezers. It is best to locate units so that an aisle is behind the unit to allow good return air circulation.

Fin spacing for freezer applications should be 3 or 4 to the inch to prevent coil frost blockage. 4 or 6 fins/inch are applicable for medium temperature areas.

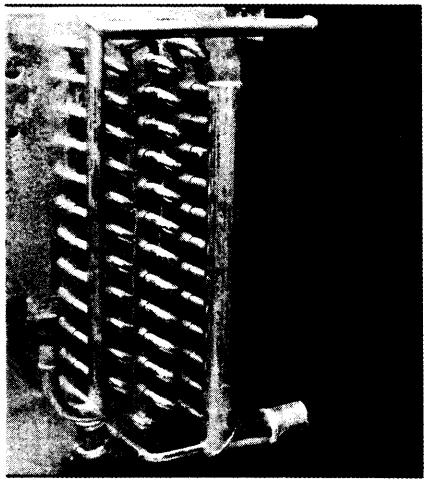
Coil defrost may be with air in rooms above 36 Deg. F. and with hot gas in areas below 36 Deg. F. Hot gas heated drain pans (HGU) are required in areas below 32 Deg. F., otherwise the coil only (HGC) can be defrosted with hot gas.

Ammonia recirculated liquid over feed systems must provide liquid at 5 psi above suction pressure and at a temperature not exceeding 30 Deg. F. above saturated suction temperature. Overfeed rate should be 3 or 4 to 1.

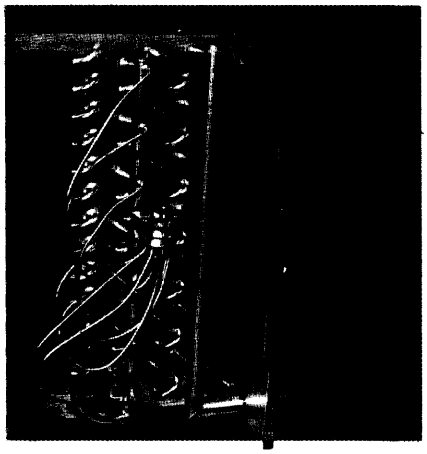
Recommended Coil Circuiting for Ammonia



RBA—Recirculated bottom feed is recommended for all hot gas defrost systems with heated drain pans—HGU. Hot gas, condensed liquid, and oil flow is downhill in each circuit back-flowing the liquid feed orifices required to balance the static head. Hot gas flows through the drain pan and then into the main coil suction through a pan to coil check valve. Defrost ammonia condensate and oil is externally relieved through the liquid line with a tee located between the hand balancing valve and the coil. The relief line should be trapped for best results.



RTA—Recirculated top feed is recommended for all air defrost, wet coil, or hot gas defrost systems without heated drain pans—HGC. Air defrost is faster when the suction pressure is raised to 70 psig during defrost. This eliminates evaporating all liquid in the coil. Hot gas is piped to an external tee located between the hand balancing valve and the coil in the liquid line. When hot gas defrosting multiple units with a common dual pressure regulator located in the suction line, it is recommended that each unit be provided with a hot gas check valve located at the unit. These check valves will prevent liquid flow into the hot gas header during cooling due to operating pressure differences between units.



DXA—Direct expansion feed using thermostatic expansion valves is not recommended with saturated suction conditions below 0 Deg. F. Coils are fed through an orificed distributor requiring externally equalized TEV without discharge tube except for DT1 and DTX1 models which are single circuited without distributor requiring use of discharge tubes with TEV. For best results, TEV application should be with TD's of 12 to 15 Deg. F. Hot gas defrost models are provided with a hot gas header which by-passes the capillaries for rapid defrost. HGU models require a pan to header check valve. Multiple HGC units defrosting with a common suction line dual pressure regulator require a check valve at each unit located in the hot gas feed to the hot gas header. For best results trap all suction lines with undersized traps and risers. Compressors must be protected for overfeed.

SPECIAL APPLICATIONS

Flooded surge drum feeds are provided with factory fitted surge drums shipped loose. Drums are sized for operating ammonia charges. Carry-over may occur with pull-down loads or excessively long hot gas defrost cycles when the defrost relief is piped to the drum. It is recommended that pump-out cycles (5–10 minutes) be used before hot gas defrosting. Surge drums include internal float (external optional) and ASME Stamp. Relief valves are not included. Hot gas defrost kits are available. Overall unit height will increase due to surge drum.

Halocarbon direct expansion TEV feeds are provided with a brass distributor and copper leads. Hot gas defrost models are provided with a hot gas by-pass header. All connections are for steel pipe except liquid.

Water defrost must be arranged so that all water pipes are free draining after a defrost cycle in rooms below +32°F. Water flow requirements using 60°F water for draw-thru or blow-thru are as follows:

NO. FANS	GPM	CONNECTIONS NO/SIZE (FPT)
1	8	1/1″
2	15	1/1″
3	20	1/1″
4	25	2/1″
5	30	2/1″
6	36	2/1″

Halocarbon recirculated liquid overfeed units are available top feed (RTF) or bottom feed (RBF) for hot gas defrost. Liquid overfeed rate should be 2 to 1 with liquid feed temperature not exceeding 20 Deg. F. above saturated suction. Connections are for steel pipe.

Non-expanding refrigerants such as calcium chloride brine can be used with steel coils. Contact factory for selection. Provide brine type, concentration, room and brine temperature and required unit capacity. Generally, GPM results in a 3 to 4 Deg. F. brine rise through the coil.

Hot gas heat reclaim circuiting is available for condenser application or for both heating and cooling applications. Unit coolers have approximately the same BTUH rating when condensing as when evaporating. When applied as heat reclaimers, the TD is normally 30 to 40 Deg. F.—the room being 60 Deg. F. and the saturated condensing temperature being 90 to 100 Deg. F.

Variable air volume can be economically achieved by cycling some of the fans in a flooded or recirculated liquid feed unit. Fans are compartmented preventing reverse rotation when de-energized. Factory mounted line voltage thermostats are available to cycle fans in medium temperature areas when the allowable temperature swing is 5 Deg. F. These allow units to be wired normally. Arrangement can provide low humidity in processing areas as the coils stay on-the-line.

KRACK

Krack Corporation

401 S. Rohlwing Road (Route 53) • Addison, Illinois 60101
Phone: (312) 629-7500 • Telex 72-1435 • Cable: KRACKOIL