HEAT TRANSFER GROUP
FINNED-TUBE PRODUCT

APPLICATIONS HANDBOOK

Table of Contents

Armstrong®

Armstrong Heat Transfer Group – 648 Moeller Street, Granby, Quebec, J2G 8N1, Canada Phone: 450-378-2655 Fax: 450-375-3787

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Table of Contents

Introduction

Scope

The Armstrong-Hunt Application Handbook is a tool to be used by sales and management personnel for determining markets and sales potential in any given territory.

This Applications Handbook should be used to determine account priorities in a territory. Each territory is unique and will provide different sales potential.

Use this Applications Handbook as an aid in understanding where Heating Coils, Cooling Coils, Unit

Heaters and Tank Heaters can be found in various industries.

Industry specific terminology and equipment names are referenced wherever possible.

If you have information on coil applications in industries in which you are familiar and wish to share them, please forward them to the Armstrong International Inc. Marketing Department, Three Rivers, Michigan.

Primary and Secondary Markets (defined)

Armstrong's primary sales effort is to upgrade and refit finned tube heat transfer equipment in order to reduce the customer's maintenance, extend coil life and improve the efficiency of their heat transfer equipment. Our secondary effort is the replacement of original finned tube heat transfer equipment which has fulfilled its useful service life cycle.

By doing the above, we assist our customers in saving time and money.

Primary Markets
Heavy-duty industrial finned tube heat transfer equipment for process applications and large volume heating and cooling requirements (e.g. process drying). The Replacement or Upgrading of Industrial Face and Bypass (F&BP) Air Preheating Systems with improved materials and design features. The potential primary customers utilizing this equipment include Pulp & Paper, Primary Metals, Process Chemical, Pharmaceutical, Power/Utility and similar industries. May include Custom Process Cooling/Heating Systems using Standard Construction features.

Secondary Markets
Standard construction finned tube heat transfer equipment for heating and cooling of filtered air and non severe industrial process applications (e.g. HVAC heating).

Identifying Market Potential

Location
Look at your geographic sales territory for:

1. Temperature extremes: To determine local potential heating and cooling problems.
2. Plants with 100+ employees and 10,000+ sq. ft. of plant area with large air handlers and possible process requirements.
3. Plants with severe atmospheric/environmental conditions in and around their plant locations that would indicate a need for special coil materials or cleaning requirements.

Industry
Check the Application Handbook for the name of industry or Standard Industrial Code (SIC) and classify the industries in your area by Primary or Secondary potential.

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Identifying Applications

Application Checklist
Once you have identified a customer as having some general coil potential you should use this

Applications Checklist as a guide to potential applications that require coils.

1. **Make-up Air Heating/Cooling** (especially unfiltered air)
2. **Space Heating/Cooling** (Unit Heaters)
3. **Boiler Air Preheating** (especially fossil fuel and multi-boiler installations)
4. Process Drying/Cooling (products in motion)
5. Product Storage Heating/Cooling (Batch process or storage/curing areas) (tank/vessel heating)
6. Production Equipment Heating/Cooling
7. Heat Reclaim/Heat Recovery

Heavy Duty and Light Duty

Heavy Duty vs. Light Duty Applications
Choosing a Heavy Duty Series 6000 Coil versus a Dura-Lite Plate Fin Coil or a Heavy Duty Unit Heater versus a Light Duty Unit Heater will be dependent on the actual application observed or described.

Since materials of construction often determine the product choice, the following factors should be considered:

- Environmental Conditions
- Maintenance History
- Equipment Budget
- Delivery Requirements
- Pressure/Temperature Information
- Process vs. Comfort Application
- Customer Preference
- Competition

Heavy duty coils usually come into play in design upgrades, problem solving, performance improvements, and extended coil life. All these reasons normally require an increase in equipment cost which must be understood and confirmed with the customer. Detailed specifications are critical.

Light duty coils usually are direct replacement business. Specifications are normally the same as originally supplied, or the application will emphasize Dimensional Fit and Rapid Delivery along with Maximum Specification Detail.

The Armstrong-Hunt Applications Handbook is your general guide for targeting your efforts to give the maximum return on time/effort.

Any improvements, additions or corrections you can provide will go toward making this a better tool for all who will use it.

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Make-Up Air Heating

Applications
Make-up air heating & cooling (ceiling or roof mount, large capacity and walk-in units) (fan coil units)

Principal
Heating outside air (usually sub-freezing in Northern Latitudes) to a minimum of 50-60°F (preheating).

Determine the final temperature range depending on building requirements. Final temperatures usually range from 50-100°F.

Some re-circulated air from the building may be blended with incoming air for the preheating stage.

Cooling coils are often found in combination with heating coil installations for cooling outside, humid air down to approximately 50-55°F.

Heating Medium
Each plant varies. Preheat coils, usually utilize constant pressure steam, high temperature hot water or glycol. Face and Bypass (F&BP) systems usually run on constant pressure steam, or high temperature hot water. Reheat Coils normally utilize modulated steam or high temperature hot water. Newer installed systems will primarily utilize Hot Wate or the entire Preheat/Reheat system is gas fired. Reheat heating medium is normally modulated, adjusting for the constant final temperature.

Cooling medium: Chilled water, glycol or refrigerants (Normally coils 4 to 8 rows deep).

Potential Problems
Leaking or freezing coils on preheat. Mechanical problems with Face & Bypass damper linkages.

Possible fin damage on unfiltered air installations. Poor temperature control/piping and drainage errors.

Tube/Header joint failure. Return bend leakage. Multi-row short circuiting (back-feeding).

Cooling coils may have fouled tubes, dirt clogged fins in the middle rows and return bend damage.

Construction
Mostly light-weight fins and tubes, e.g. 1/2” or 5/8” o.d. tube, .020 – .035” wall, .006 - .010” thick fin, Cu/Al or Cu/Cu. Mostly coils are OEM supplied. On Face & Bypass, look for 3/8” – ½” OD tubes and heavy-weight dampers with light weight or carbon-steel linkage designs.

Recommendations
A Tandem coil can be substituted for Preheat/Reheat or Face & Bypass (if 2 or more rows are required).

An entire specification can usually be upgraded if high maintenance and downtime is noted. Face & Bypass Coil Sections can be replaced with Dura-Mix F&BP Sections with Improved/Upgrade Construction features. Eliminate return bends on steam coils and supply Freeze Resistant (Centifeed, Tube within Tube, Distribution Tube Type Coils) where possible and recommend heavier fin designs on unfiltered air installations for easier fin cleaning.

Cooling Coils: Add intermediate drain headers for reduced freeze prevention and add clean-out/inspection plugs on all headers if frequent fluid side cleaning is required. Check the circuitry and pressure drops for possible row reduction. Add St. Steel Frames on Replacement Coils and St.Stl. Drain Pans where budgets allow.

Check to see if the size of coils can be reduced or increased to facilitate handling or to improve performance.

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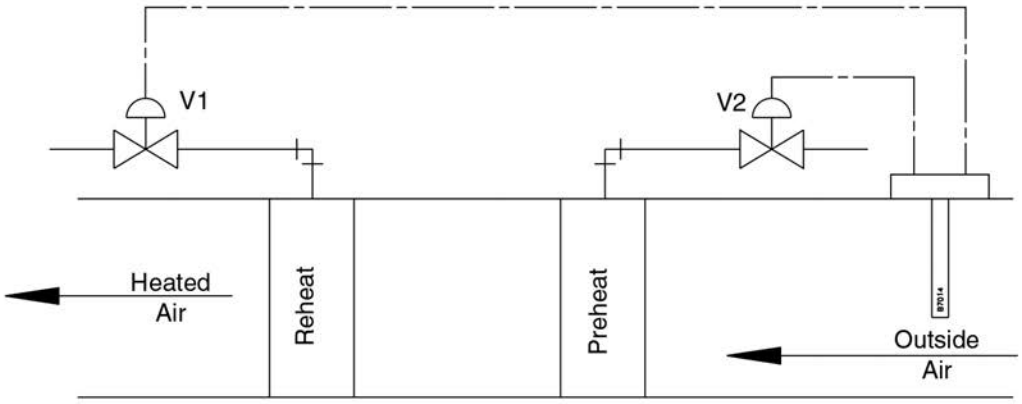
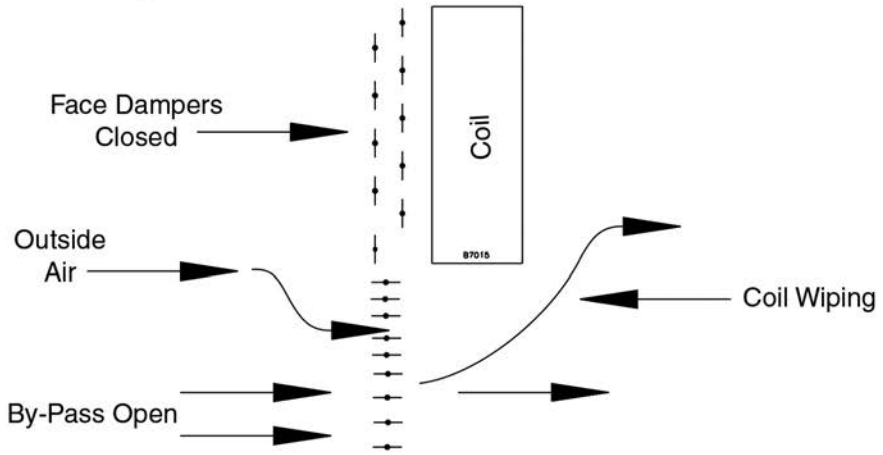
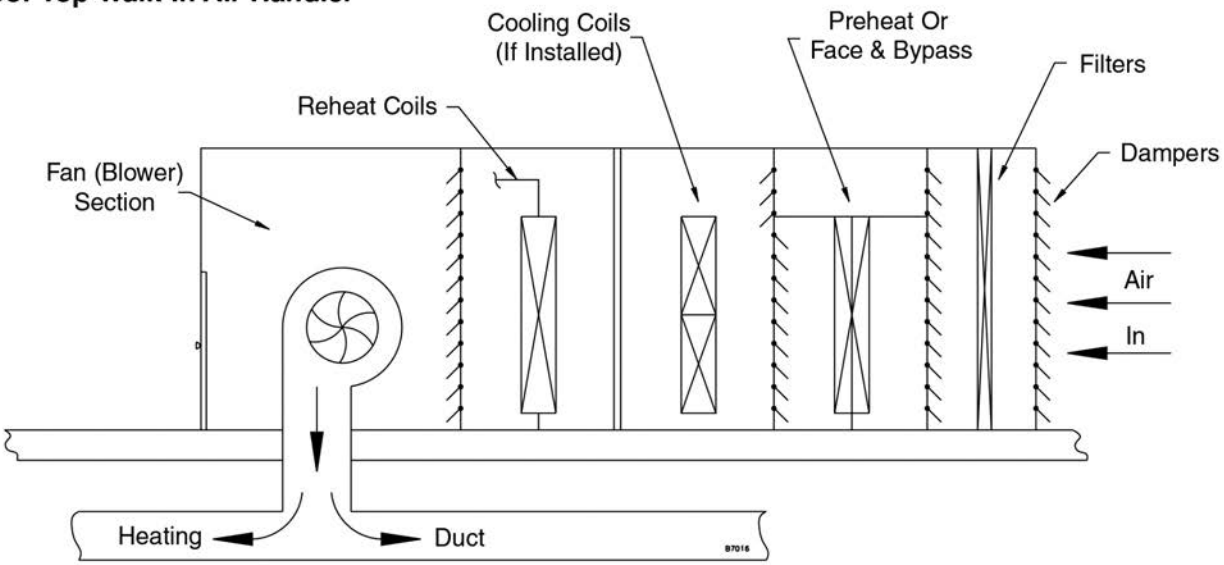
Preheat - Reheat Concept



Conventional Face and Bypass



Roof Top Walk-In Air Handler



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General Applications

Space Heating

Applications
Space Heating (cooling). Unit heaters and forced draft blowers (no outside air) and door heaters.

Principal
Heating/Cooling re-circulated air to maintain comfortable ambient temperatures in work or storage areas.

Typical entering air temperature heating 40 – 70°F; cooling 80 – 100°F. Typical outlet coil temperatures heating 90 – 120°F, cooling 50 – 55°F. Door heaters may or should use high velocity discharge nozzles to force air against inflowing cold air and act as hot air curtains.

Medium
Heating – Primarily steam and hot water.
Cooling – Refrigerants, chilled water.

Potential Problems
Motor failure (overheating), fan wear/damage, belt loosening (fan/coil units), core leakage due to light weight construction (OEM), damage or plugged fins (usually closely spaced very close 12 – 14 FPI). (May be result of missing or damaged filter system not suitable for area environment.)

On unit heaters problems with actually “feeling heat” at floor level can be attributed to unit heater under rated capacity, too high of a steam pressure, fan/motor problems, dirty fins, mounting height error, or excessive temperature difference between ambient and discharge air. (Coil outlet air from unit should normally be approx. 98-115°F. Higher Temperatures often have trouble getting air to floor. Lower temperatures feel cool to the skin.)

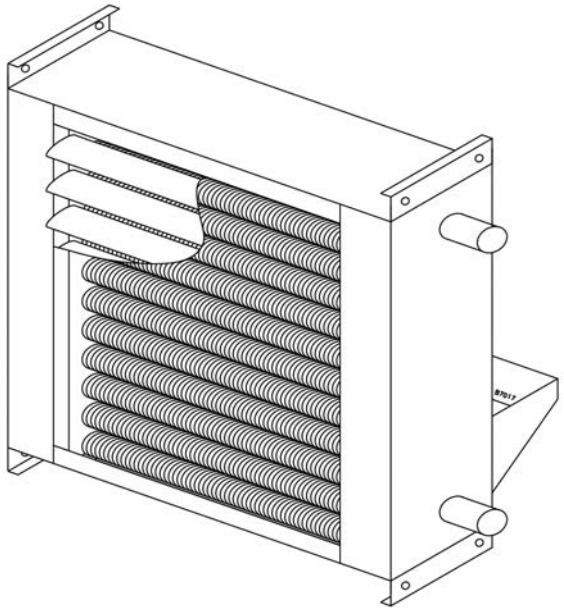
On space/unit coolers refrigerant pressure may be too low.

Construction
Normally supplied with lightweight construction on core, 1/2” or 5/8” o.d. thin wall tubes, thin fins (mostly plate fin) and 10 – 14 FPI. Most motors are totally enclosed with thermal overload protection. Some motors/mountings are custom and only available from the source manufacturer. OSHA fan guards are standard. Tubes are usually copper with fins being aluminum.

Upgrade, Heavier Duty Construction is found in dirtier, or smoke/fume filled air where corrosive atmospheres are present. Material changes to tubes of stainless steel or carbon steel and fins to heavier aluminum, carbon steel or stainless steel. Motors change to standard frame mount TEFC-Ball Bearing type, with permanently sealed lubrication and higher temperature insulation. Special coatings may also be needed (Heresite, Electro-Fin, Epoxy, Galvanized Steel...).

Recommendations
Upgrade to stronger, heavy duty designs where conditions warrant. Reduce the number of units required by substituting larger individual sizes with greater throws.

Supply different discharge nozzles, cones, louvers to balance the spread of heat and reduce “cool” spots.



Boiler Air Preheating

Applications
Boiler Air Preheating (refer to drawings on page 10)

Principal
Utility/Power Boilers – Fossil Fuels

Preheated air is for combustion and pulverized fuel conveyance by drawing outside air over finned coils.

Preheated air maintains high cold end temperatures of regenerative (rotating) or recuperative (stationary) air/gas combustion air heaters to reduce corrosion and fouling (oil, coal, lignite – occasionally gas). Coils are found in primary and secondary fan ducts upstream of Ljungstrom heaters and along building walls.

Recovery Boilers (kraft pulp/paper mills)
Preheats air for combustion of black/liquor sprayed into the boiler. Coils are normally found in ducts.

Municipal Solid Waste Boilers (Mass Burn of Refuse)
Preheats air taken from refuse pit for controlling grate temperatures and uniformity of refuse temperature as it enters and moves down the traveling grate or through the combustion kiln. Coils are in the ducts. Dirty air.

Hog Fuel Boilers (Wood Burners)
Preheats air for semi-solid fuel (chips, bark, etc.) to ensure fuel dryness and optimum firing temperature. Coils are in the ducts supplying combustion air to the burners/grates/stocker.

Gas/Oil Fired Packaged Fire Tube Boilers
(Steam or Hot Water) (Commercial Type found in most facilities) These Boilers require 10-15 CFM/HP (rated) for combustion. Most often Combustion air enters boiler room through louvers (normal) or unfortunately through open doors, windows, or even plant areas (dangerous). Draw from the combustion burner results in negative air pressure in boiler room. Add steam coils using flash (waste) steam, hot water coils using returning condensate, or waste blowdown water to preheat air coming into boiler room.

All combustion preheating can improve boiler efficiency.

Medium
Majority are steam heated in utility or large industrial facilities. Often superheated steam taken from turbine bleed points. High-temperature water (condensate) is used in some installations. Many newer i utility installations use glycol in wall mounted heater designs. Through-wall heaters raise the outside air to 90 - 120°F typically. Final outlet air temperatures for duct mounted units are approximately:

Commercial Packaged Boilers: 80-120°F

Utility/Power Boilers .....180 - 250°F
Recovery Boilers .....350 - 450°F
Municipal Solid Waste.....Stoker 250 - 300°F
Municipal Solid Waste.....Rotary Kiln 400+°F
Hog Fuel Boilers.....300 - 400°F

Potential Problems
Most problems fall into three areas: drainage, original design/materials and performance. Often units are master trapped or use level control and single common receiver. Joint, return bend and fin-bond failure can be expected on the original equipment installed. These coils often see 24 hour service and thus show problems earlier than HVAC installations. Installations are often not filtered so coils see much dust, dirt, etc. which reduces fin life and performance. Most problems are found on high pressure and superheated steam, not liquids.

Construction
Original equipment is primarily copper tube with aluminum or copper (solder coated) fins. First upgrades are normally in tube materials, changing to thin wall stainless steel or carbon steel. Glycol/water installations are normally of lightweight construction but tend to last.

Recommendations
Visit the site! Obtain all available drawings and measure/observe all coils. Talk upgraded specifications Heavy Duty 6000 Series wherever possible and write a detailed new design specification.

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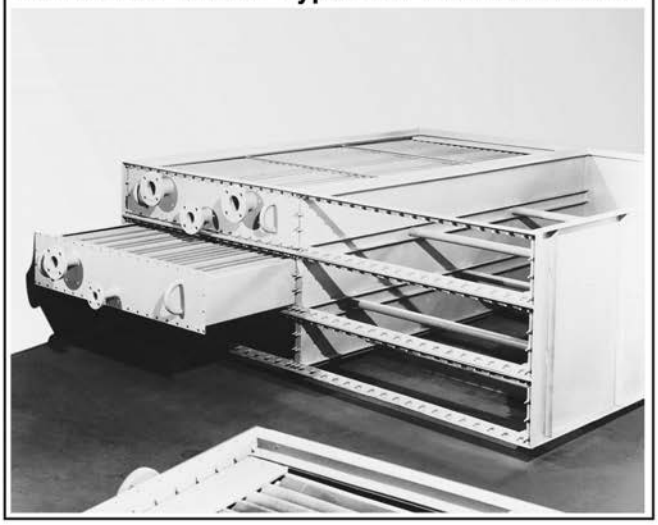
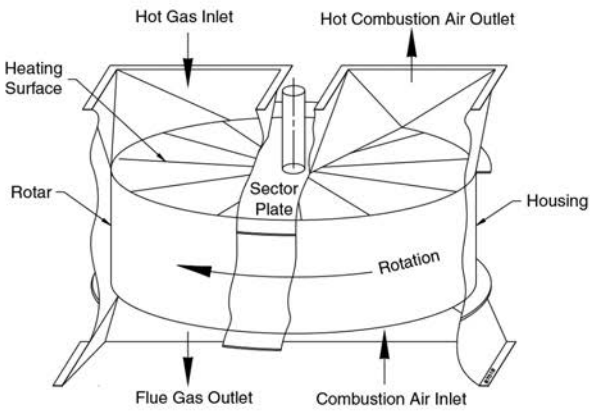
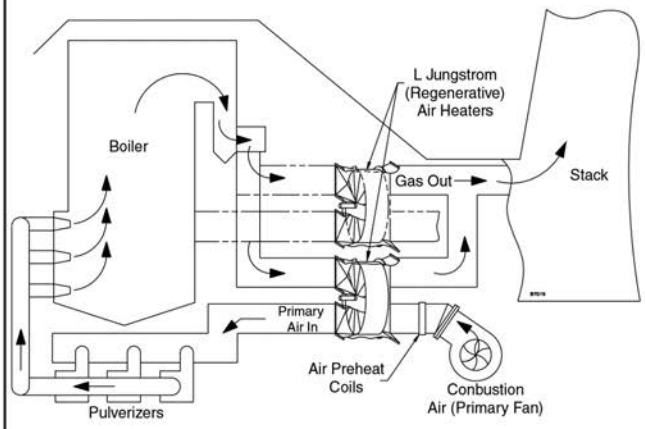
Removable Drawer Type - Air Preheater Coils



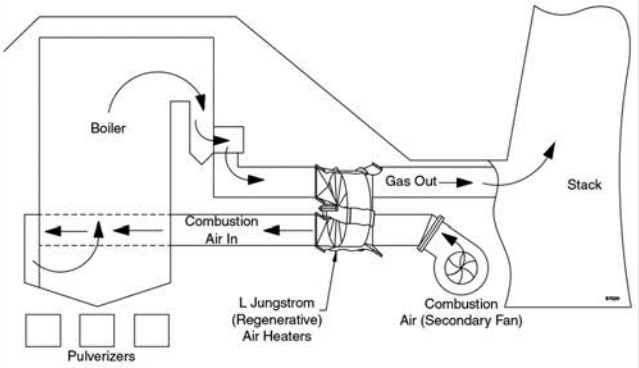
Ljungstrom Air Heater



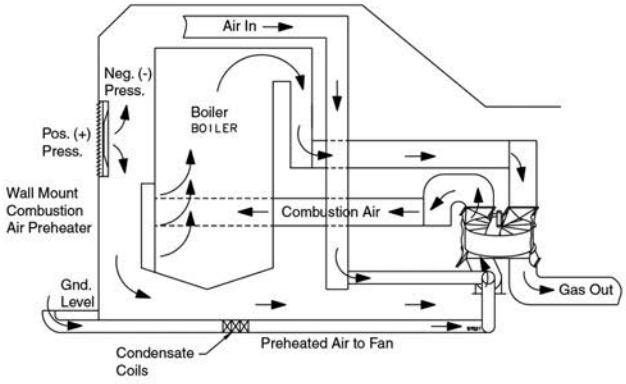
Primary Air System



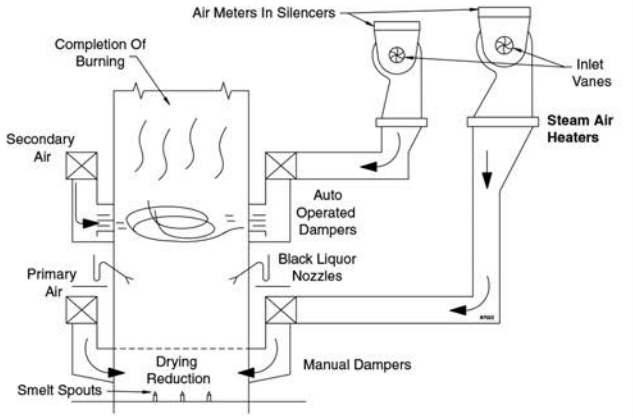
Combustion Air (Secondary) System



Alternate Preheat Systems



Chemical Recovery (Black Liquor) Boiler



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit **armstrong**international.com for up-to-date information.

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Process Drying

Applications
Process Drying/Cooling. Product Drying/Cooling.

Principal
Product passing along conveyor, felt, belt or held aloft by hot air. Coils supply heat for drying and cooling. Final air temperatures 100°F or higher. Also, coils are used in preheating the duct supplied air to process.

Heating/Cooling Medium
High pressure steam, high temperature hot oil, and medium pressure steam preheating air to be heated to final drying temperature with gas.

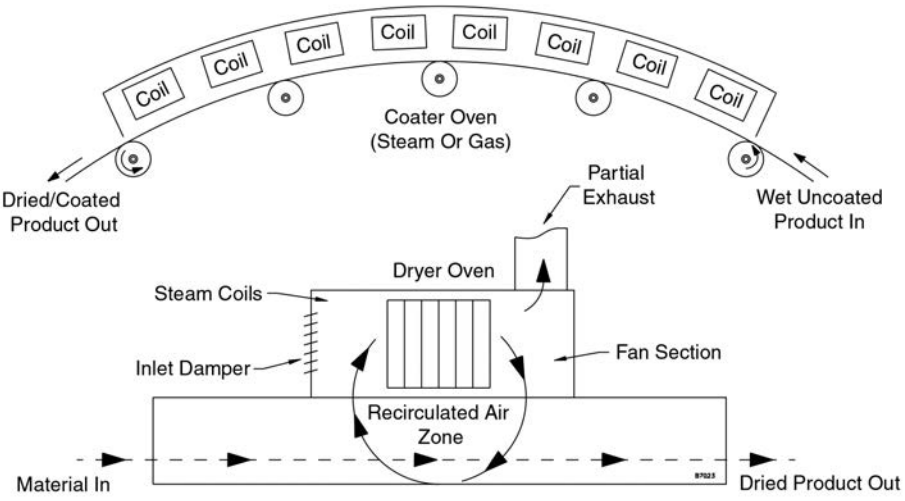
Look for
Performance (temperature) problems. Coil failures due to high pressure. Cleaning and removal problems.

Construction
Typically cupro-nickel or thin wall steel tubes, stainless steel fins, copper or aluminum plate fin or wrapped. Some medium wall steel (.065" NY Blower).

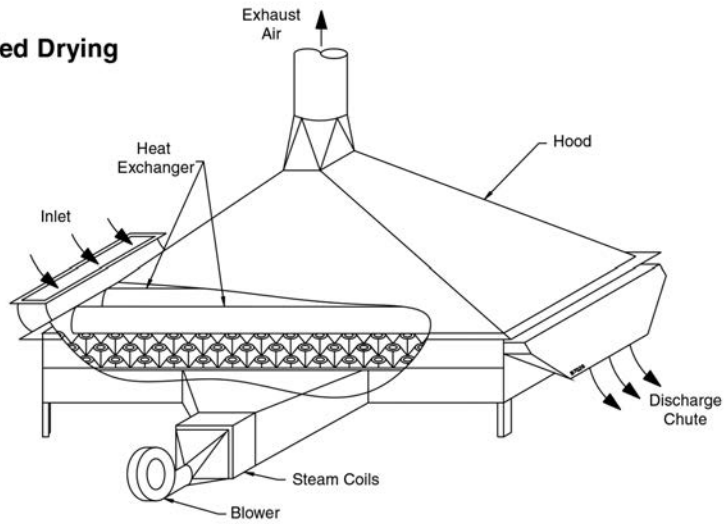
Recommend
Heavy Wall Tube Construction with welded/monometallic tube to header joints. Schedule 40/80 pipes, 12/10 gauge tubes, schedule 40 or Extra Heavy headers, .020" aluminum or copper KEYFIN (embedded), .024" steel, .036" steel fins.

Follow-up on new installations within 1-3 years for initial failures on OEM equipment.

Note
Ovens can be classified in this area. Ovens will be used for very high temperatures (300°F +) drying, baking, finishing, etc. They are used in any industry where these requirements exist. Examples are: paper coaters, plywood and veneer drying ovens, metal paint finishing, etc. Steam or gas is the heating normal medium. Some ovens need wide fin spacing due to dusty, particulate-laden environments. Most common are steel fin, steel tube welded joint options.



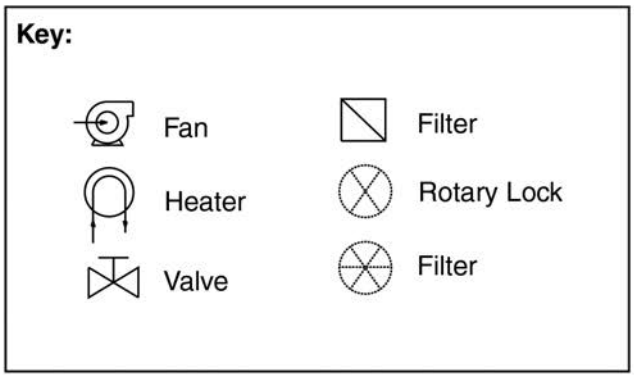
Fluid Bed Drying

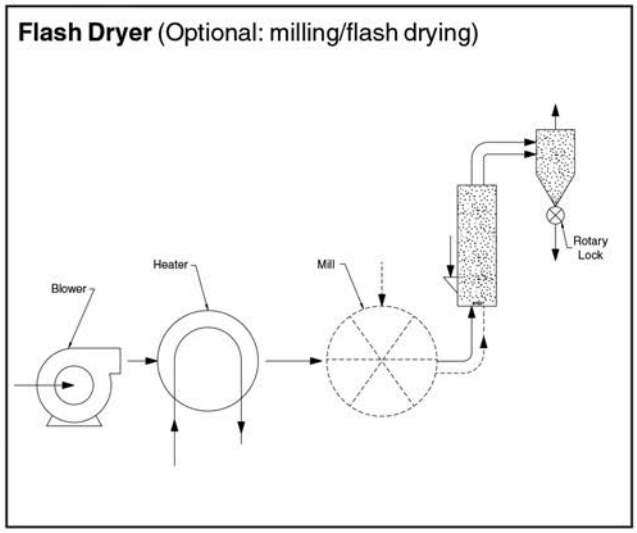


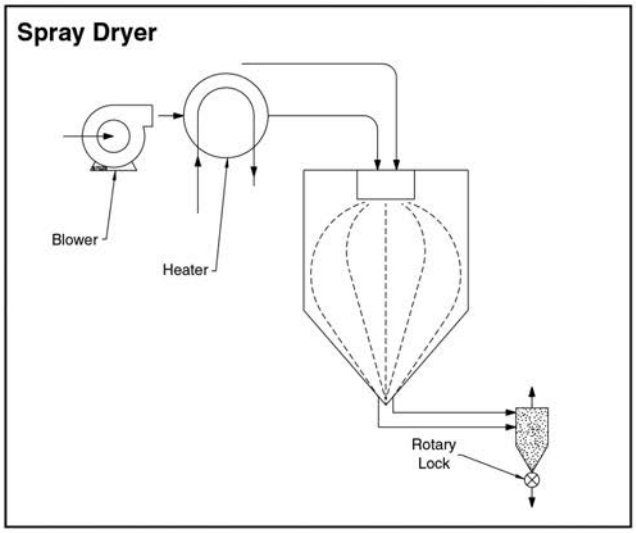
Application
Process Drying / Heating / Cooling Industrial Process Ovens.

Fluidized Bed Drying
Hot air supports product while drying.

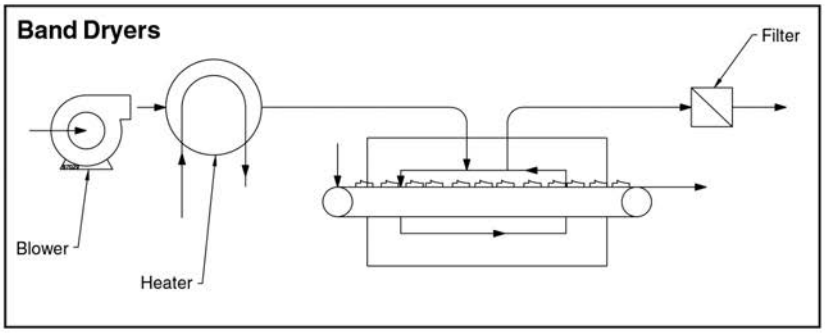
General Applications



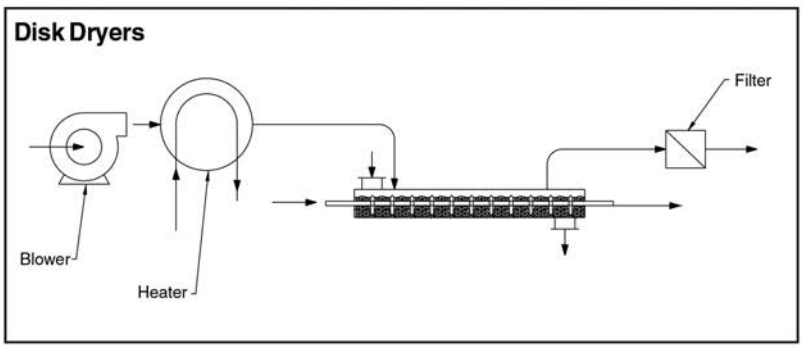




Flash Dryers and Spray Dryers
Dairy, whey, milk, powdering and drying. Slurries, wetcakes, process minerals, organic and inorganic salts, coal, polyolefins and other heat sensitive polymers, stearates.



Band Dryers
Cereals, food snacks, potatoes and meal.



Disk Dryers
Slurries, gels, filter cakes, wetcakes, ABS, acetates, organic acids, chemical oxides, and hydroxides, herbicides, pesticides, coal fines, pharmaceuticals, polycarbonates, polyesters, polyolefins, pigments, polyethylene, polypropylene, polyvinylacetates, organic and inorganic salts.

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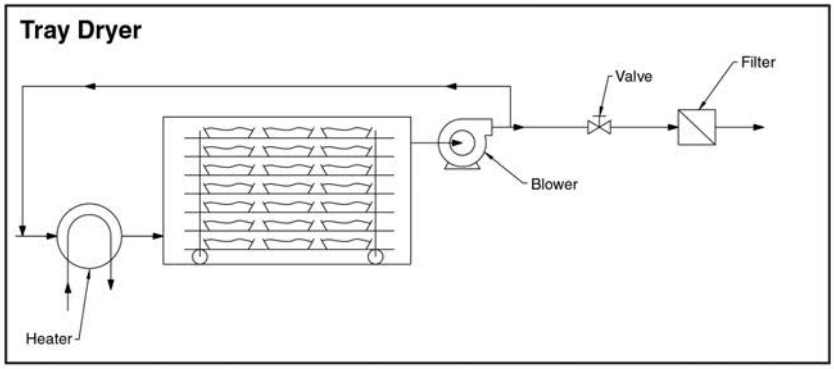
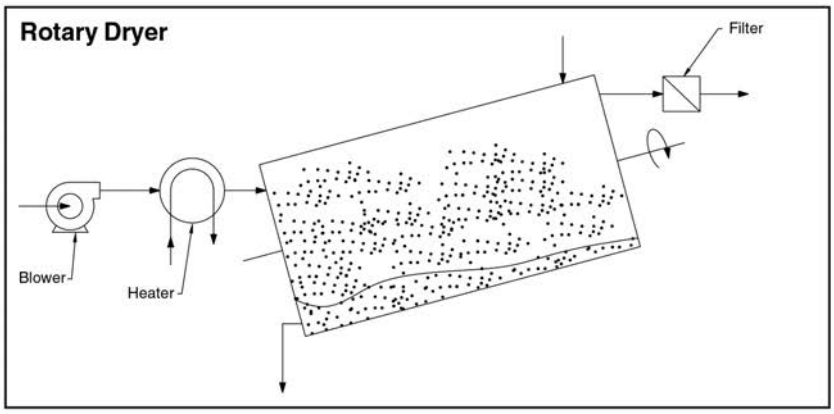
General Applications



Tray Dryers
Powders, batches, cakes, non-mixing food processes. Proof boxes (baking goods).



Rotary Dryers
Granulator, lime kiln, chip drying, heavy cakes, batches, solids.

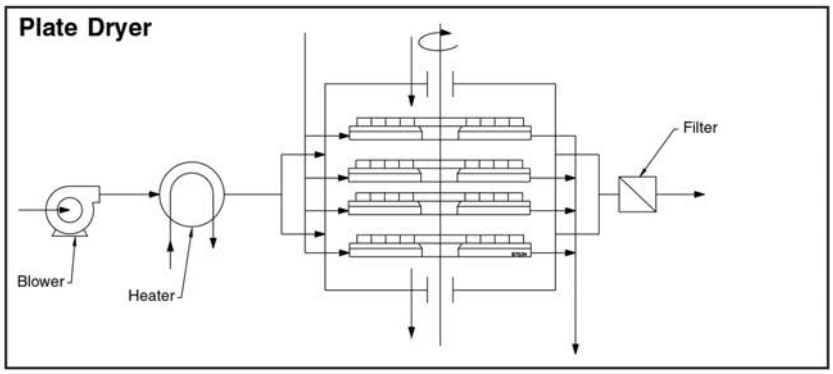
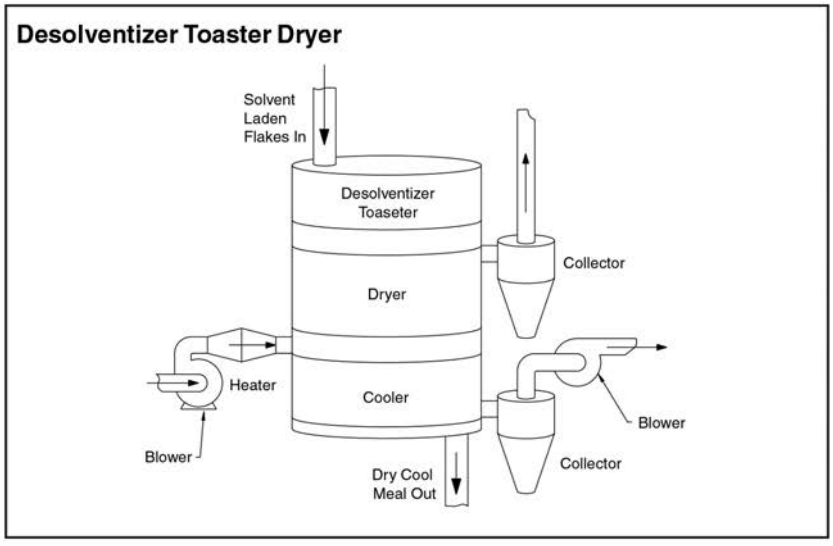


Plate Dryers
Granules, beads, powders, crystals, extrusions, chips, pellets, pastes, centrifuge and filter cakes, sludges, slurries. Sometimes with solvent recovery.



Desolventizer Dryer
Bean, meal and grain.

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General Applications

"Kathabar" Dehumidifying Coils

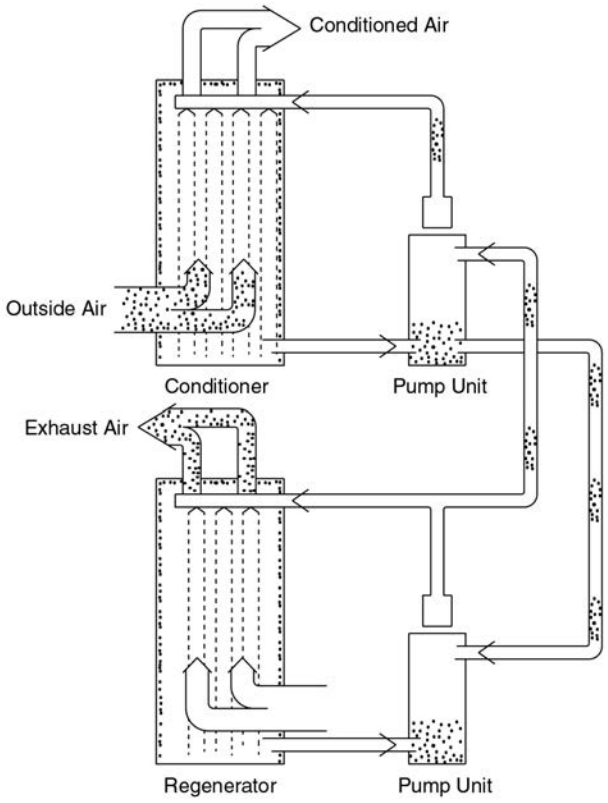
Applications
Kathabar Dehumidification System (Ross Air Systems or Somerset Tech.). Found in breweries, hospitals and factory areas where special dehumidified and non-contaminated air is required. Gradually removed to other dehumidifying systems in 80's-90's, but still found occasionally.

Principal
Conditioner Unit takes filtered outside air and sprays Kathene (lithium chloride) solution into the air over the coils to absorb moisture. Ammonia, glycol or chilled water in coils reduces temperature and condenses moisture in the air. Cooled air is then passed into the airspace.

Regenerator unit sprays Kathene solution over heating coils (steam or hot water) which gives up moisture (vaporizes), then concentrates and heats the Kathene. A pump circulates the Kathene back to the conditioner unit.

Potential Problems
Ammonia coil conditioner units built between 1970-1980 tend to have leakage problems where return bends and joints of cupro/nickel meet galvanized casings and therefore causing maintenance problems.

Recommend
Return header design on the conditioner with hot dip galvanized coils and no return bends. Obtain photos and drawings of our construction from Armstrong-Hunt along with references on successes in the brewing industry (Anheuser-Busch). Avoid getting involved with Regenerators as the Kathene at high temperatures is very corrosive and requires designs of unique materials. Trapping may also be a problem on Regenerators.



"Kathabar" Dehumidifying Coils

Applications

Food Processing
Baking – For product cooling and storage

Beverage – Coffee drying, freeze drying, instant tea packaging

Cereals – Cereal coating, cooling, packaging, storage

Dairy – Spray drying, cheese forming, packaging

Sugar – Pulverizing, conveying and bin storage

Confections – Candy forming, panning operations, gun coating, cooling tunnels, packaging and storage

Snack Foods – Same as confections

Meat – Cutting and slicing areas, dry sausage processing, frost-free coolers

Vegetables – Dryers, packaging, dehydration prevention of moisture regain.

Hospitals
To control humidity in spaces cooled by radiant ceilings. To control humidity and bacteria in critical areas.

Pharmaceuticals
Provide dry air for processing hygroscopic pharmaceutical products. Hard and soft capsule forming.

Drying and filling. Tablet compression. Ultra clean areas. Powder drying.

Chemical
Hygroscopic powders and chemicals used in fertilizers, explosives and rocket fuel.

Electronic
Humidity control in areas manufacturing semiconductors, chips and printed circuit boards.

Steel
De-humidify blast furnace air to stabilize furnace operation and improve efficiency.

Glass and Plastics
Laminating glass and vinyl for windshields. Storage facilities. Dry air for grinding and conveying.

Films and Emulsions
Provide conditioned air for film manufacture.

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Tank (Vessel) Heating

Application
Storage Tank Heating

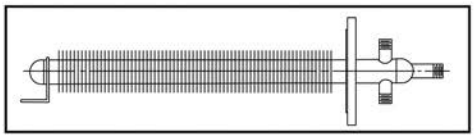
Principle
A finned tube coil bank is inserted into a tank, vessel or large drum for the purpose of heating the contents. Heating ensures contents will pump or mix easier. Coils can be installed on the tank bottom through manways or from the top. They can also be bolted on to mating flanges on the sides of tanks and supported internally.

Medium
Usually steam and occasionally hot oils or other thermal fluids (Mobiltherm, Dowtherm, Therminol, etc).

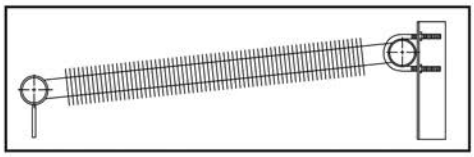
Potential Problems
Bent pipe, bare tube coils formed in spiral rings are often original equipment. Wall thinning through bending can cause erosion leaks. Poor drainage can lead to internal corrosion in tubes. Longitudinal fin design by BASTEX, or Brown Fin Tube can clog with sediment if installed on the bottom of tanks lying flat.

Construction
Tubes should be seamless to avoid leaks. Fins are either tension wound or welded. Materials are all stainless steel or all carbon steel. Wall thickness and fins should be thicker than normally found on most air heater applications.

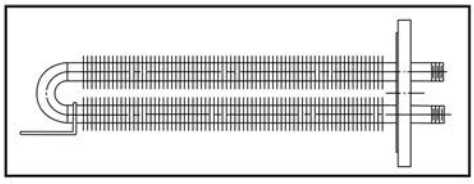
Recommend
Suggest finned coils (Fin Pitch 3-4-5 fpi maximum) to reduce size and overall length of bare pipe coils. Replace clogging longitudinal finned designs (Brown/Bastex) with tension/spiral wound design to reduce clogging and to let sediment fall through. Add agitators to improve heat transfer.



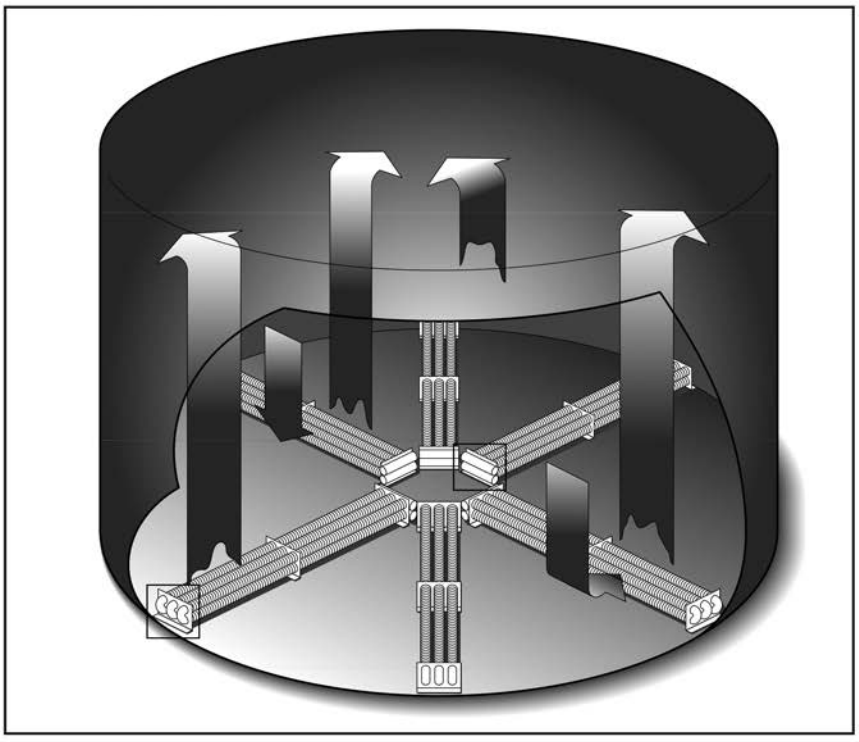
Flange Mounted Direct Type “BD”



Flange Mounted Bayonet Type “FB”



Flange Mounted Hairpin Type “FH”



Base Mounted Hairpin Type “BH” Shown

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Primary Market Applications

Finned Tube Products

Primary Markets

The following pages outline applications in the markets/ industries proven to most likely use Armstrong-Hunt Heavy Duty 6000 Series Coils and our Heavy Duty Industrial Unit Heaters.

Applications for other products such as Duralite Plate Fin Coils, Duramix F&BP and Tank Heaters may than Heavy Duty 6000 Series Coils will also be found in these industries.

Your best return on time/effort for 6000 Series and Heavy Duty products will be in the markets listed below. If you have none of these industries in your area, then refer to the Secondary Markets section or seek out other in-kind replacement business on HVAC applications.

The top ten (10) Markets/Industries are shown with their appropriate Standard Industrial Code (SIC) number. Refer to the following pages for details on specific applications in each industry.

Market	**SIC**
Paper	26
Food	20
Public Utilities	4911
Chemicals	28
Transportation Equipment Manufacturing	37
Petrochemical Refining/Coal Products	29
Primary Metals (Steel/Aluminum)	33
Textile Mill Products	22
Lumber/Wood Products	24
Furniture	25

Industry: Pulp and Paper SIC 26

Paper Mills	SIC 2621
Paperboard Mills	SIC 2631
Building Paper & Building Board Mills	SIC 2666

Applications

Make-Up Air Units

These fan/coil units generally found around the periphery of the paper machine building. Their purpose is to supply heated outside air to the building for comfort and paper drying. Final air temperatures range to 100°F. Steam is the primary heat transfer medium but hot water and glycol are also used.

Roof Ventilation Units

These are also fan/coil units supplying heated outside air to the roof area of the mill. The purpose is to heat the inside of the cold roof to prevent condensation from taking place, subsequently dripping on the paper machine below. Other than their specific use, they are similar to makeup air units.

Pocket Ventilation Units

On a hooded paper machine, effective drying may not be accomplished with make-up air units alone. When this is the case (as it is most of the time) heated outside air is injected into the paper machine at strategic points to ensure uniform and complete drying of the paper. This is called pocket ventilation. Final air temperatures can be higher here than in other heating units so more coils may be required to do the job. Steam is still the most widely used medium for these coils but many of the newer installations are using hot water or glycol from heat recovery units.

Heat Recovery Units

The air that comes off of a paper machine is still hot and wet. More and more mills are installing heat recovery units at these exhaust points to recover much of this heat and to use it to preheat incoming air to some other part of the ventilation system or to heat glycol or water. This results in two things, savings in energy costs and less use of steam coils. A reduction of 50 to 12 coils on an average machine is possible using this principle.

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Boiler Air Preheating

Power Boilers
Coils are used to preheat combustion (make-up) air in ducts to the boiler to a minimum level for protecting heat recovery air heaters from corrosion. Also, building air is preheated through wall heaters which allows air to be drawn over coils by negative air pressure in the boiler house. Applies to coal, oil, wood and bark boilers.

Chemical Recovery Boilers
Preheated combustion air for burning black liquor that is sprayed inside furnaces (Kraft Mills). 300 – 400°F air temperature is required.

Building Space Heating
Chip storage, pulp processing, bleach plants and coal handling.

Tank Heating:
Storage tanks for liquors.

Pulp Mills - SIC 2611

Applications

Pulp Dryers
Machines for drying wet pulp into long sheets for ease in shipment to paper mills. Air is blown over and across which sometimes supports pulp sheets while drying. Flakt dryers are most common. Some dryers use bedframe type coils, some with no fins. These coils may have special oval tubes and lie flat. The WEB passes over/around them. Newer Flakt dryers use cupro-nickel tubes and plate fins and light weight flexible casings which can be twisted to fit. Suggest Keyfin Fin construction.

See Also under Paper Mills – SIC 2621, General Applications:

1. Boiler Air Preheating
2. Make-up Air Heating
3. Roof Ventilation Units
4. Building Space Heating
5. Tank Heating

Paper Coating and Glazing - SIC 2641

Applications

Coating Machines
Application of films, coating, adhesives, etc. by high temperature drying and high velocity air flow on paper or other materials. Accompanied by using steam drying rolls and heating hoods. Hoods can be all steam, all gas or begin with steam and finish with gas. Final temperatures range from 200°F (all steam) to 400+°F (gas).

Films, coatings, glues, resins, sheets, wallpaper dryers, layered and laminated products.

Environments are usually laden with materials which can clog coils. Frequent cleaning is needed. Use maximum 8 FPI.

Sanitary Paper Products - SIC 2647

Applications

High Temperature Paper Product & Fiber Dryers
High pressure steam and gas drying of absorbent fibers for pads, napkins, tissues, diapers, etc.

Yankee dryers and hoods which direct very high temperature air to dry fine fibers products on rotating drums or rolls. Also, oven type environments where fluffed or finishing fibers pass through a drying chamber for final finishing.

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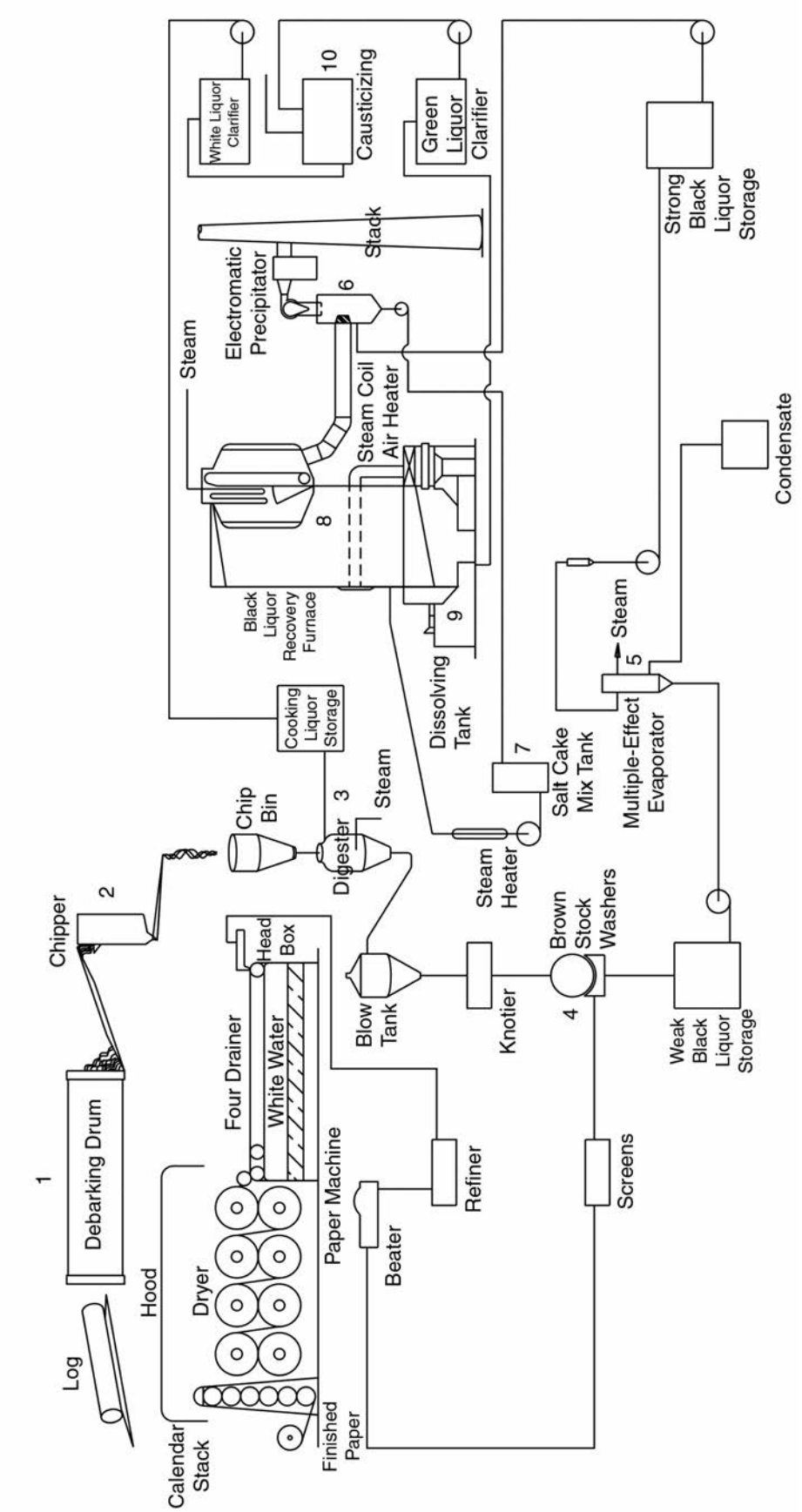
Primary Market Applications

Applications

Pulp and Paper Mills



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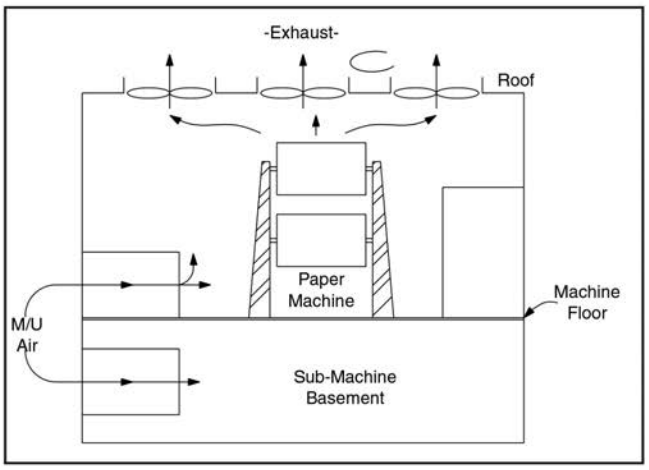
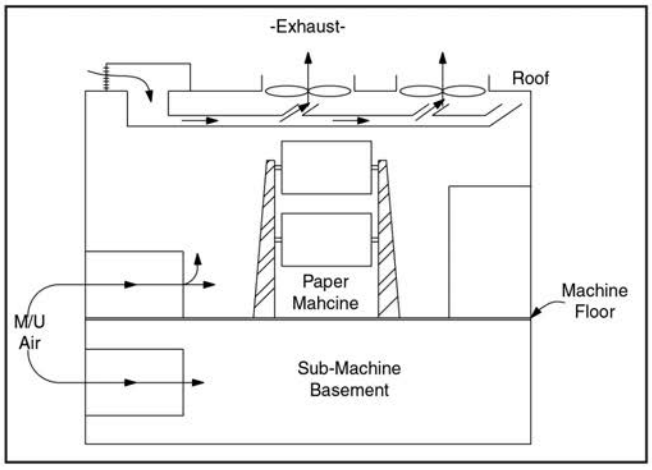
Applications

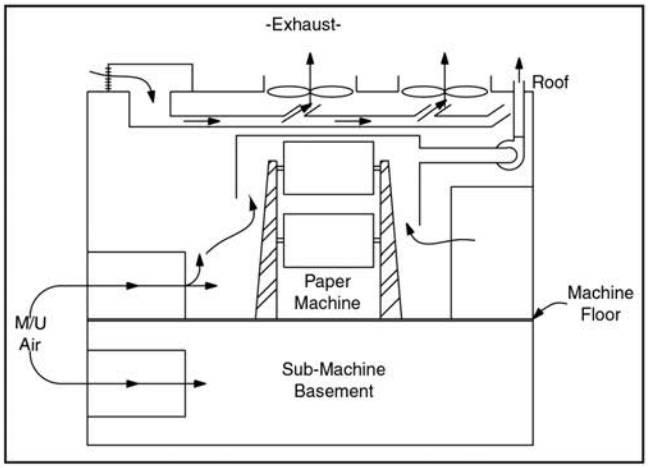
Pulp and Paper Mills



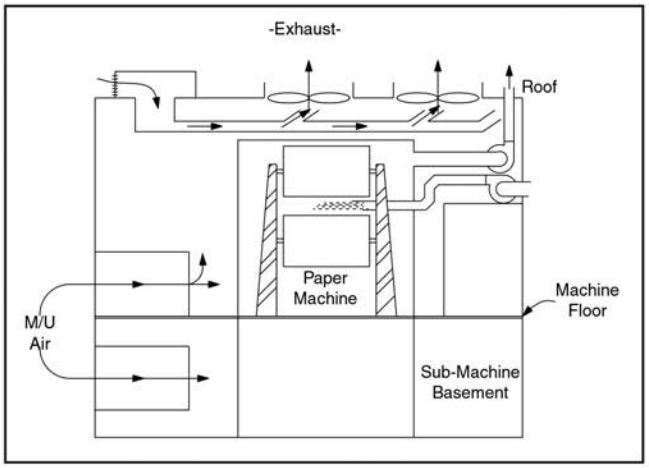
1. Basic System: Paper machine exhaust 100 tons of air per tons of paper, exhaust air plus.



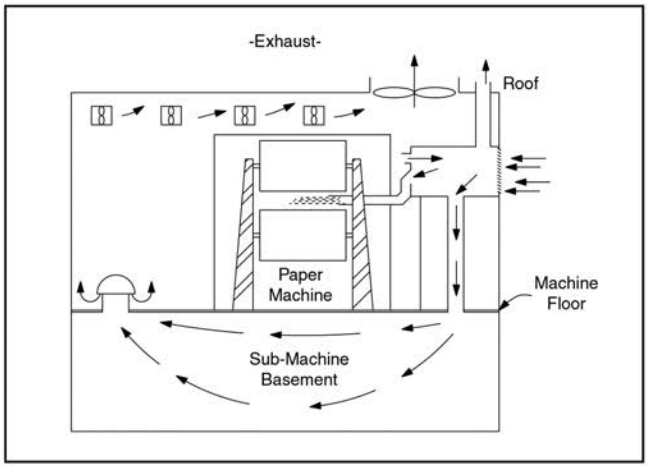
2. Roofline Ventilation: Reduces condensing on structure, prevents "rain", adds to air balance.



3. Open Hood: 35-40 tons of air per ton of paper, controlled flow over paper.



4. Pocket Ventilation
5. Fully Enclosed Hood: 15-20 tons of air per ton of paper.



6. Economizer: (Air to Air) Total make-up control, 10-15 tons of air per ton of paper. Under roof heating (unit heaters).

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Public Utilities (SIC 49)

Electric Service – Power Plants SIC 4911

Primarily Fossil Fuel Plants Burning, Coal, Oil Lignite, Petroleum Coke, Natural Gas or Combinations. (Not Gas/ Turbine Generator Topping Stations.)

Applications

Boiler Air Preheating: See General Applications Sheet. Wall Heaters and In-Duct preheaters for Cold End Protection of Ljungstrom (rotary regenerative) air heaters.

Hydro Electric Plants

Valve and switchgear and generator cooling systems. Large volume WATER COOLED SYSTEMS. Often SPECIAL CONSTRUCTION. May require ROLLED TUBE Joints. (Special). Rugged materials.

Space Heating

Unit Heaters and Building Ventilation. Heating throughout the power plants. Look for applications in coal handling areas for Heavy Duty Construction. Also turbine room heating, maintenance shops and storage areas. Office area HVAC. Locker Room Heating and Cooling.

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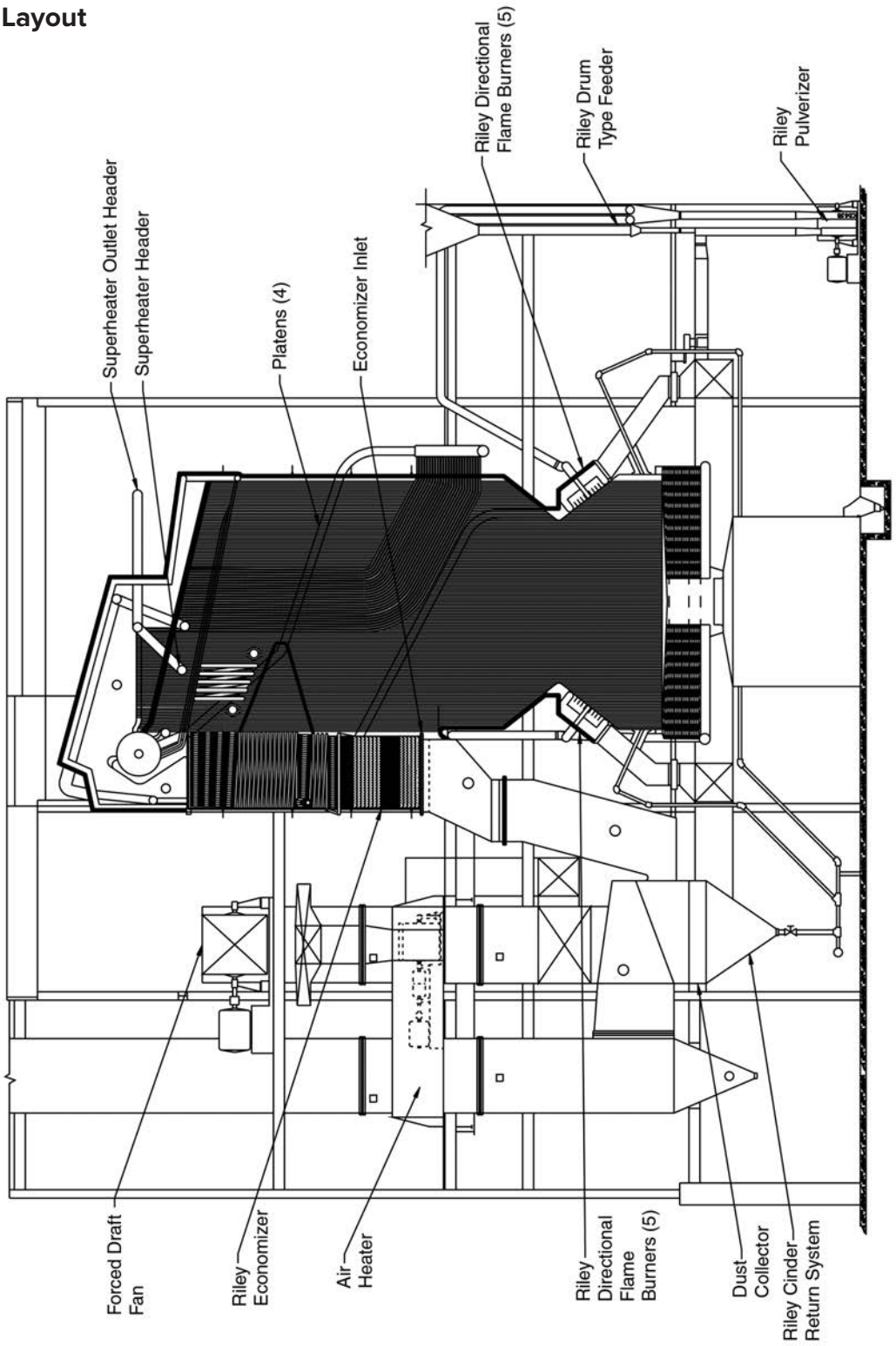
Typical Boiler Layout



Coil Construction

Replacement coils can easily be upgraded to various dmbedded fin designs, especially copper, keyfin in stainless steel tube. Watch for applications where Ljungstrom Air Heaters are located above the coils, resulting in acidic media washing down on coils during the cleaning processes. Use only 304-L or 316-L stainless steel fins and tubes.

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Primary Market Applications

Public Utilities (SIC 49)

Application

Cogeneration (Special Category)

Cogeneration involves the production of steam for electrical production and distribution/resale. Turbine exhaust steam is often used for nearby process needs and should offer other opportunities.

The production of the steam is a result of burning various products in specially designed boilers (incinerators, furnaces, kilns, etc.)

The Cogeneration facility is not normally owned and operated by a utility but rather by a joint venture with manufacturers, municipalities and utilities. The electricity generated is normally sold to a local utility. This helps pay for the facility.

Fuel types range from tires and scrap wood to municipal solid waste (MSW) and inedible foodstuffs. Almost anything that can be dried, burned and not produce noxious emissions is a target for cogeneration.

Equipment

Combustion Air Preheat Coils are often found in these installations. They normally serve the purpose of drying out the fuel to be burned. Boilers will be either traveling or reciprocating stoker type of fluidized bed designs. Unit Heaters can also be found in these facilities.

Construction

For dirty, unfiltered applications such as MSW plant air preheating, steel tubes and steel fins are basic specifications. Steam is often high pressure and may be superheated. If air is filtered, other materials such as Keyfin aluminum/steel fins may be suitable.

Industry

Foods (SIC 20)

Meat Packing Plants - SIC 2011

Applications

Ammonia coils in large refrigeration coolers, stainless steel coils or hot dip galvanized for keeping meats at controlled low temperatures. Often packaged fan coil units.

Sausage/Prepared Meats - SIC 2013

Applications

Smokehouses for smoking/curing sausage, pork, ham, etc. Re-circulates high temperatures. Smoke filled environment through hanging or trayed meat products. High steam pressures and air temperatures. Heavy caustic cleaning required. Usually copper/copper heavy duty with stainless steel casings or all stainless steel material. Some steel tube/copper fin. (Names – Alkar, Julienne, K.S.I. Smokehouses).

Poultry Processing - SIC 2016-17

Applications

Fin tubed for perimeter heating. Steel on steel. Incubators.

Dairy Products - SIC 2021-26

Applications

Creameries and cheese processing plants. Drying and processing of milk by-products. See tower and spray dryers and flash dryers under process drying. Whey processing and drying for use as feedstock supplement and food additive. Milk drying, cheese flaking, powdering. Most applications using 150°F and higher temperatures with product in liquid form. Stainless steel coils and glycol heating/cooling is common. Freezing of milk products, ice cream, etc. Ammonia coils, hot dip galvanized, stainless steel. (Names – Niro-Atomizer, Damrow, DEC).

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Grain Mills - SIC 2041

Wet Corn Mills - SIC 2046

Soy Bean Mills - SIC 2075

Applications

Drying, toasting and desolventizing meal. (Crown Iron Works, French Oil Mill, dryers). Starch dryers (from grain processing). See General Application Sheet for Process Dryers). Large overhead plant areas needing door heaters for truck and rail car loading and handling. Alcohol recovery and processing. Storage tank heating, edible oils, fructose recovery. Dryers for sweeteners (flash/tower/spray dryers). low temperatures. Often packaged fan coil units.

Potato Processing - SIC 204-

Applications

French fry cookers, potato dryers, potato flake dryers, (Proctor and Schwartz, National Dryer) band dryers. See General Application Sheet on Process Dryers. Several large coils per dryer. High temperature 200°F air.

Cereal and Breakfast Foods - SIC 2043

Applications

Drying of cereal, rice and grain products. Toasting band dryers (see General Application Sheet). Names: Proctor & Schwartz, Food Engineering Co. Dryers are high pressure steam or gas. High pressure steam on unit heaters for fumigation and pest control. Plants are evacuated and pesticides at high plant air temperature destroy pests in the plant environment.

Pet Foods - SIC 2047

Prepared Feeds - SIC 2048

Applications

Occasional animal feed dryers combining whey and other products. Some toasting, coating and cereal type drying. See Breakfast Foods.

Breads, Cakes, Cookies, Crackers - SIC 2051-23

Applications

Baking ovens, proof boxes (Name – Fred Pfenning) dryers, toasters. High exhaust in building requires 100% make-up air heating.

Cane and Beet Sugar Refining - SIC 2062-3

Applications

Granulator heating (Names – B.M.A.>, Stearns), boiler air preheating (coal or oil fire). See General Application Sheet. Moisture problems in pulp press areas with moderate temperature and high local humidity. Needs local Hi-bay unit heaters. (Poor line heating prevents condensation). Sugar storage heating and space heating. Problems with ammonia in steam and the environment. No copper should be used, use stainless steel or steel on steel.

Confectionary Products - SIC 2065-67

Candies
Chocolates
Chewing Gum, etc.

Applications

Kathabar systems, spray dryers (see General Application Sheet).

Edible Oil Mills - SIC 2074-79

Soybean
Vegetables, etc.

Applications

Drying, toasting and desolventizing. (Names – Crown Iron Works, French Oil Mill). Tank Heating (oil storage).

Malt Beverages - SIC 2082

Beer Producers

Applications

Kathabar systems, ammonia and glycol (see General Application Sheet). Yeast processing, spray dryers and atomizers. (Nitro-Atomizer, Damrow) Bottle washers, pasteurizing. (Stainless Steel Coils)

Malt Production - SIC 2083

Applications

Large make-up air systems face and by-pass. Malt growing areas dusty, powdery and moist. Unit heaters (cleanable).

Wines, Liquors, Soft Drinks - SIC 2084-87

Flavoring, Extracts

Applications

Tank heaters, bottle washers (dryers). Stainless steel heating coil and equipment.

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Primary Market Applications

Salt Processing - SIC 20

Applications

Caustic problems. Medium to high pressure steam on salt dryers, cleaning problems. Keyfin vs. copper/copper. If steam is left on during coil cleaning, aluminum fins can be used. (e.g. Hardy Salt – Michigan).

Roasted Coffee - SIC 2095

Applications

Toasters, preheaters, boilers burning coffee grounds.

Manufactured Ice - SIC 2097

Applications

Ammonia coils in stainless steel or hot dip galvanized in (ice production) refrigeration machinery.

Chemicals - SIC 28

General Note

Since chemical industry plants are often like large scale chemical laboratories, many special processes may be going on in different plant areas. You must probe into processes to find applications.

Look for areas or processes involved with chemical reactions requiring hot air to initiate process (catalyst). Hot air drying of slurries, batches, pellets, powders, pills, acids, salts, chemical bases and components of finished products. Flaking, atomizing, heating and cooling of products in process.

Space heating in corrosive environments and those contaminated with product dust, powder, particles and gases (fumes). Chlorine areas, ammonia in process (no copper). Acidic areas, nitric, sulfuric, etc. Compressor area cooling (summer).

Applications

100% outside make-up air heaters: Often required due to corrosive or harmful vapors, fumes being exhausted. Watch for freezing problems.

Process Dryers

See General Application Sheet.

Space Heating

Unit heaters requiring stainless steel materials on pipe, fins and casings. Epoxy coatings, special motors (e.g. explosion proof). Compressor room heating (winter).

Product Cooling

Acid gas condensers. This is where process steam comes in contact with process gas. The steam/gas mix condenses in finned coolers. Use single unit heater designs or multiple fan, multi-row duplex, triplex condenser/sub coolers. Look for blast air coolers, condensate coolers, freon condensers, heptane coolers, hydrogen coolers, hevasite coolers, molten salt coolers, methane gas coolers, solvent recovery units (condensers) sulphur coolers, slurry coolers and vapor condensers. Size of coolers we can handle is usually limited to under 20 feet total overall length.

Tank Heating

Finished product and chemicals heating using finned coils inserted into tanks of (often corrosive) liquids. Materials should be carbon steel or all stainless steel to replace internal bare coils, longitudinal fin coils (Bastex, Brown Fin Tube) or external embossed coils; insert through manways into tank.

The following is a grouping of specific chemical industry markets where heavy duty and specialty finned tube product applications will be found.

Alkalies and Chlorine – SIC 2812
Corrosive Environments

Plastic Material and Synthetic Resins – SIC 2821
PVC Product Dryers (pipe, etc.)

Synthetic Rubber – SIC 2822
Product Storage Heating (solvent recovery)

Cellulosic and Non-Cellulosic Man-Made and Organic Fibers – SIC 2823-24
Fiber Stran Dryers

Biological, Medical Pharmaceutical Detergents – SIC 2831-34
Powder Dryers, Fluid Bed Dryers, Kathabar Systems

Surface Active Agents, Toilet Preparation – SIC 2843
Hot Process Dryers for Chemical Reactions

Paints and Allied Products – SIC 2851
Pigment Drying Ovens

Industrial/Organic Chemicals – SIC 2869

Applications

Sulphuric acid coolers 316-L stainless steel. Combustion air heaters for sulphur burners. 304/316-L stainless steel space heaters. Nitric acid production, tail gas evaporation. N2 or CO2 flash vaporizers for storage tanks and trucks, mounted on the outside of tanks to cause liquid to vaporize (become gas) (stainless steel or all aluminum). Tube replacements in hydrocarbon coolers. Space heating in finished product areas.

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Nitrogenous and Phosphate Fertilizers – SIC 2873

Applications

Ammonia or acidic atmospheres (corrosives). No copper in ammonia atmospheres. Ammonia reformer furnace or fired heater air pre-heater coils.).

Agricultural Chemicals – SIC 2879

Applications

Pesticide Manufacturing – Granulators and tower dryers, chemical tank storage. Acidic and corrosive vapors (nitric acid or ammonia in atmospheres) in process building. Special coils and heaters. Much steel on steel and stainless steel.

Adhesives and Sealants – SIC 2891

Applications

Tank storage heating and corrosive atmospheres. 100% outside make-up air. Vapor (solvent recovery).

Explosives (Powders) – SIC 2892

Applications

Explosion proof motors required on unit heaters. Use the 3 year limited warranty as a sales tool for uninterrupted service in critical process areas. Large, 100% outside air requirements. Chemical storage tank heating and powder drying.

Printing Ink and Carbon Black – SIC 2893-2895

Applications

Dirty plant environment. Wide fin space heaters and make-up air coils. Large process building areas.

Transportation Equipment (SIC 37)

General Note

Look for the largest plant areas using massive make-up air units. For example, air houses, roof top air handlers (fan-coil units), etc. Check for history of maintenance problems.

Paint Spray and Finishing Areas

Small objects will be on a conveyor system, large objects (locomotives) are painted and finished in large stationary booths. Typical temperatures needed 150 – 300°F.

Parts Washing

Drying Lines either belt or conveyor carries objects past a drying station. Either room air or preheated air is no higher than 200°F.

Welding Shops and Lines

High fume and dust areas. Space heating usually has fins that would foul up. Recommend wide fin spacing and cleanable unit heaters.

Power House

Look for (Boiler) Coal and oil fired units requiring or missing air preheating. Suggest wall mounted air heater using negative pressure in boiler building to draw air over coils. Also, use better unit heaters.

Plating Areas and Metal Treating

Corrosive fumes and chemicals. Require make-up air and cleanable or corrosion resistant space heating. Possible tank heating applications.

Dock Areas

Rail and truck, door heaters which can withstand some abuse (fork lift damage). Also, high velocity units for higher mounting locations and greater heating coverage.

Unit Heaters

Look for history of motor problems with special motors and frames and poor deliveries. Armstrong uses standard motors and frames.

Specific Manufacturing Applications

Motor Vehicles – SIC 371
(All above applications)

Aircraft – SIC 372
Hangers and high test/maintenance facilities. High velocity door heaters. Paint finishing and parts washing, plating areas. Use 3-year warantee on unit heaters. No one wants drippage on their aircraft.

Railroad Equipment – SIC 3743
Locomotive service shops and rework facilities. High bay buildings with large door heater and high velocity unit heater applications. Dirty, smokey environment from welding, diesel, oils, etc. Locomotive manufacturing. See all General Applications.

Railroads – SIC 4011

(See SIC 3743 above)

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Primary Market Applications

Primary Metals (SIC 33)

General Note

Large areas requiring massive space heating and door heating for ventilation. Electric generation and furnace cooling require water for cooling. This hot water (condensate) often is sub-cooled in large air cooled condenser units using multiple rows and multiple (unit heater) type fans. Higher steam pressures available.

Steel Mills – SIC 331

Applications

Hot and cold rolled steel/strip mill warehousing. Large size unit heater usage, 24-36", 42-48" versus Wing and N.Y. Blower. Large and high bay plant areas. Little maintenance is done on these units. Often dirty and in disrepair. Poor performing. Corrosive space heating above picking lines and in annealing areas. USE Phenolic Resin Coatings or Epoxy in these areas. "Solidaire" dryers in iron alloy production. Hoffman metal strip dryers, keeps conveyor rolls dry and frees belts. Special cooling coil applications after annealing, coating or galvanizing. Baghouse heating, electrical switchgear room air intake.

Look to POWERHOUSE where Utility Sized Boilers may be installed and Combustion Air Preheating is required. Heavy Duty Unit Heaters for possible superheated steam and dirty operating environments.

Foundries – SIC 332

Applications

High pressure steam for unit heaters and dirty environments.

Primary Non-Ferrous Metal Production – SIC 333

Applications

Oven exhaust heat recovery. Finished product heating. Dusty, large plant areas using large space heaters. Door heaters required due to exhausting smoke and fumes.

Metal Heat Treating – SIC 3398

Applications

Corrosive environment applications for space and tank heating (process and plating). Special materials 304, 316-L stainless steel. Atmospheric contamination. Door heaters needed and 100% outside air makeup due to high exhaust rate.

Fabricated Metal – SIC 34

Applications

Usually large plant areas needed. Unit heater space heating is common or large air handlers are found. Low maintenance is typical. Much gas heating is used. Look for metal dryers, plating and finishing equipment and tank cooling.

Textile Mill Products – SIC 22

Textile Printing and Finishing Plants – SIC 2231, 2258, 2261-69

Applications

Drying machines, drying and finishing applications. Hank dryer coils, tenter frames, carpet dryers (backings), wood dryers. Ventilation requirements. Lint and fiber build-up on coils. Cleanable, wide fin spacing. Mostly steam, but some hot oil now being used.

Textile Mill Products – SIC 2291-98

Applications

Felt goods, padding and fillings and coated fabrics. Drying machines (see above) and unit heaters. Fiber and lint environments. Low maintenance.

Lumber and Wood Products – SIC 24

General Note

This industry traditionally requires a heavy duty product, steel on steel or even all welded fins. Temperatures are usually quite high and environments are usually laden with fiber, wood dust, powder or wood bits.

Applications

Dry Kilns: Raw lumber stud and boards are dried in the kilns (giant warehouse type building) where trucks or railcars of wood (a charge) are heated until moisture is reduced to a significant level. Heating is done with finned coils on walls between cars and on the roof. Air is re-circulated and exhausted depending on humidity in kiln. Hardwoods give off tannic acids and require special materials or coatings. Sell finned tubes to end users. (Moore, Drying Systems, Hemco). Steam and some hot oils.

Dryers for Veneer & Particleboard

Use large number of wide space, wide fin pitch coils in hoods (superheaters) over product conveyors. Most air is re-circulated and contains fine bits of product. (Coe, Moore & Drying Systems) High pressure steam, high temperature air.

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Boiler Air Pre-heaters
On wood, chip, bark and sawdust boilers. Look for waste heat, flash steam which can be used here.

Space Heating
Chip, fiber and dust laden environment.

Baking/Finishing
If finishes are applied to wood surfaces, then hot air dryers may dry finish in conveyor type oven.

The following categories would use coils:

Hardwood Dimensions and Flooring SIC 2426

Wood Kitchen Cabinets SIC 2434

Hardwood/Softwood Veneer/Plywood SIC 2435-36

Wood Preserving SIC 2491

(Corrosive atmospheres and tank heating)

Particleboard SIC 2492

Furniture – SIC 25

Wood & Metal, Household & Office Furniture

Wood TV & Radio Cabinets

SIC's – 2511, 2514, 2517, 2521, 2522

Applications
Dusty Environments: Wood sanding dust. Dust collectors cause high negative pressure. Much air infiltration. Wood kilns and curing building. Paint, stain and varnish dryers (George Koch, Belkor, Thermal Engineering). Low to medium pressure steam in wood product drying. High pressure steam and gas on enamel finishing and metal furniture drying lines. Fins clog easily. Often little maintenance. On some gas systems pre-heaters are used. Unit heaters with wide fin spacing.

Petroleum Refining and Coal Product – SIC 29

Petroleum Refining – SIC 2911

Applications
Fired heater and power boiler preheating. Look for coal fired or sour gas (high sulphur) fuel burning. Coils will protect Ljungstrom air heaters and make more efficient firing. High temperature heat recovery applications on heaters using keyfin and hot oils.

If plant has sulphur recovery unit then gas will be sweet (low sulphur). Look for sulphur cooler applications.

Conveyor belt heating where products (coal, coke) stick to belt unless heated.

Many corrosive areas in enclosed buildings. Unit heater applications with special core materials and motors.

Tank farm storage heating – Tank heaters in large storage tanks for finished goods, oil, tars, etc. Replace bare pipe (bent into coils) or welded fin (Brown Fin or Bastex) tank materials.

Paving Mixtures, Blocks, Asphalt, Felt & Coatings – SIC 2951-52

Applications
Tank storage heating (viscous materials). Felt dryers. Dirty sticky environments, tough cleaning applications (solvents). Product heating.

Lubricating Oils and Grease – SIC 2992

Applications
Tank storage heating and oil environment space heating.

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Secondary Markets Applications

Overview

The following industrial market areas offer coil/unit heater/tank heater potential but often to a lesser degree than the primary markets. This has been determined by previous sales history.

Your specific market area and climate may call for more emphasis in these secondary areas.

The general applications still apply here: e.g. space heating, boiler air preheating, make-up air heating etc.

Look to these markets for secondary targets, but, you may be surprised how they can develop into substantial coil business when serviced well.

General Medical & Surgical Hospital – SIC 8062

College & Universities – SIC 8221

Applications

Make-up Air Units: Requiring 50 – 100% outside air. High maintenance, large volume units. Often Wing face and by-pass. Replace entire Face and By-pass unit with DURAMIX Face and Bypass System, Centifeed Coils with Posi-Pressure Controllers or Tandem Coils and modulating control or preheating/reheat coil combination. Wing units or original coils may have to be cut out. If so replace with smaller sized, more easily handled coils which fit through doorweays. Usually low to medium pressure steam. Demonstrate how higher pressures can be used on our coils when available. Poor maintenance and lack of a large maintenance staff make for good opportunities with our coils.

Fabricated Rubber Products – SIC 3069

Applications

Latex surgical gloves, prophylactics. Drying ovens. Molded rubber products. Dusty, powdery environments clog coils and unit heaters. Usually bad infiltration of cold air due to exhaust of process area heat and dust. Toy balloon manufacturing.

Vinyl Sheet Products & Wallpaper Processing – SIC 4922

Applications

Main Transmission Plant, desulphurizing, gas stripping, acid condensing and thermal oxidizing. All may require area heating and process fin tube coils. Corrosive fumes and vapors. Large make-up air heating requirements in process buildings. Boiler air preheating in colder climates. Compressor cooler/condenser replacement cores. Many gaseous products are cooled through these coils. 100% Glycol used in some heaters, can be corrosive to joints.

Hard Surface Floor Coverings – SIC 3996

Applications

Vinyl film dryers.

Non-Electrical Machinery – SIC 35

Applications

Look for large plant areas and central steam system. Areas with inaccessible coils, dirty, dusty areas, weld shops and heat treating as key potential. Some parts washer/dryer applications. Paint finishing (dryers). Look for coal fired boiler installations.

Good Potentials In This Group (Usually large manufacturing plants)

Farm Machinery – SIC 352

Construction Machinery – SIC 353

Food Products Machinery – SIC 3551

(OEM Process Milk/Whey/Powder Dryers)

Paper Industry Machinery – SIC 3554

(Hoods, Coaters, Dryers)

Industrial Process Furnace & Ovens – SIC 3567 HP/HT Coils

Preheat Gas & Heat Recovery (much gas)

Commercial Laundry Equipment – SIC 3582

Applications

Tumblers, dryers, steam heating coils. Use wide fins. Coils easily clogged with lint. Not maintained.

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Secondary Markets Applications

Carbon and Graphite Products – SIC 3624

Applications

Cleaning problems. Dusty, dirty environment.

Storage Batteries – SIC 3691

Applications

Drying of finished products, labels covers.

Laminated Metallic Electronic Components – SIC 36

Applications

Multi-layered, sheets, strips or boards. Dried in laminated sheet dryer.

Leather Tanning and Finishing – SIC 3111

Applications

Critical temperature and environmental control. Make-up air heating. Tank heating. Corrosive chemicals in atmosphere. Cleaning problems on coils.

Stone, Clay, Glass and Concrete – SIC 32

Applications

Mostly gas as key heating/process medium. Space heating, usually unit heaters. Heat recovery potential from glass annealing oven exhausts. Some steam drying on cement product dryers or brick kilns. Dusty, dirty environments.

Printing and Publishing – SIC 27

Periodicals – SIC 2721

Gravure Commercial Printing – SIC 2754

Applications

Usually German/Italian machines with multiple coils on oil and water based inks. Rotogravure print hoods. Advertising materials, catalogs, Christmas wrapping. Low to medium steam pressure. Small size coils, often 10-20 per press. Can improve heat transfer, production and finish quality with upgrade design and reduced maintenance. Solvent recovery condensers and some tank heating. Bigger plants may have space heating needs. Poor drainage arrangements.

Newspapers – SIC 2711

Applications

Primary light duty coil area and liquid heating/cooling. Where poor maintenance exists, there is opportunity. Solvent recovery condensers. See Commercial Applications.

Tobacco – SIC 21 (2111-2141)

Cigarette

Cigar

Smoking Tobacco

Applications

Dryers of shredded tobacco. High fire hazard. Dusty environment from tobacco shavings.

Resources Mining – SIC 10

Applications

Metallic ores, potash, iron ore, copper, gold, coal, nickel, etc. Shaft heating in shallow mines, shaft cooling in deep mines, conveyor belt heating from shaft (keeps ores from sticking). Large make-up air systems. Ethylene glycol and Dowtherm. Mostly all Carbon Steel Construction. Unfiltered air, rugged environment. Service building space heating. Glycol/steam/high temperature hot water.

Oil and Gas Recovery – SIC 13 (1311, 1382)

Applications

Offshore and well head oil field heating. (Generally with unit heaters). Glycol, thermal oils, steam and high temperature hot water. Low maintenance and rugged construction required. Use the 3-year warranty.

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Specific Unit Heater Applications

The applications referred to in the previous sections have included:

1. Space Heating
2. Product Gas Condensing
3. Subcooling of Liquids
4. Door, Dock and High Bay Heating

Some variations of the above include:

1. Preheating outside air using freeze resistant cores in the unit heaters (Centifeed/Tandem).
2. Portable units made with pads/skids or rollers and quick connect couplings.
3. Special connections on face for mounting to temporary ducts for heating rail cars, tanks on outside applications.

The list goes on with your imagination.

The bottom line is that if you are only thinking of unit heaters for heating a large open space in a factory or warehouse, then you are severely limiting the products potential.

Liquid Coil Applications

– Specific Commercial and Light Industrial

Duralite Heating And Cooling Coils

Liquid coil applications range from simple air conditioning applications using chilled water or refrigerants pumped through a circuit of tubes or condensing coils with stainless steel casings; to special fluids in the tubes like Dowtherm glycol, Mobiltherm for heat recovery and special process applications.

Equipment manufacturers normally select the lowest cost, minimum duty materials to achieve initial design requirements and give adequate service life (2-4 years - although in some instances the fluid service environment and demand may give 10-20 yrs of adequate service life.)

Higher temperature and pressure fluids lead to heavy duty designs as described in previous sections. (Series 6000 Heavy Duty Coils - Heavy Wall C.Stl., Welded Joints, Heavy Fins, etc..)

Replacement in-kind with similar equipment as supplied by the manufacturer is the standard practice.

Liquid Coil Commercial Applications

Hospitals, colleges, universities, large and high rise office buildings and government facilities. Quite simply, look for large, walk-in type or built up packaged air handling arrangements using hot water for heating and chilled water or glycol for cooling. Detailed measurements of coils and identification of numbers of tubes, circuiting, orientation and connection locations is often enough for quoting.

Address drainage of liquid coils with care. Many light duty coils fail due to poor drainage during the off season. Ask if this has been a problem and recommend additional drain connections or blow out connections where practical.

Most of this air is filtered so dirt and cleaning should not be a problem.

Light Industrial Applications

Look for manufacturing and service facilities with medium to large air handling requirements in large packaged or walk-in units. These are generally cleaner environments where steam is not used or available. Possible Hot Water Heating Coil replacements or Large Cooling Coils using Chilled Water.

See Commercial Applications above with the following exceptions

1. Opportunity to upgrade designs where maintenance is lax or non-existent.
2. Quote DURALITE designs to meet existing material specs and upgrade where needed.
3. Follow-up with contractors who have exclusive service contracts with companies or institutions and will not shop openly for bids.

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Summary

The applications for all types of finned tube coils and heater/coolers is as endless as the imagination.

Heavy duty and light duty coils have their place but often the misapplication of light duty products or the lack of maintenance and cleaning will lead to a less that desirable service life and unnecessary failures. Always keep your eyes open for visible needs for finned tube coils or heater replacements, and listen to customer's previous problems as opportunities for improved product introduction, problem solution and life extension for his finned tube heat transfer applications. Look for opportunities to blend all your product offerings into the resolution of any coil or heater problem.

This Applications Handbook is not meant to cover every possible application, and is ever-expanding.

Therefore, as you develop new applications for end users, oem's, engineers, and process plants, please contact Armstrong-Hunt, Inc. or Armstrong Intl. Inc. to add new input for sharing with future technical applications and sales personnel.

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