

## CHAPTER 8

# JUSTICE FACILITIES

<a href="#">Terminology</a> .....	8.1	<a href="#">Heating and Cooling Plants</a> .....	8.2
<a href="#">System Requirements</a> .....	8.1	<a href="#">Controls</a> .....	8.2
<a href="#">Indoor Air Quality</a> .....	8.2	<a href="#">Fire/Smoke Management Systems</a> .....	8.3
<a href="#">Energy Considerations</a> .....	8.2	<a href="#">Health Issues</a> .....	8.3

**T**ECHNICAL and environmental factors and considerations for engineers designing HVAC systems that serve justice facilities are presented in this chapter. Most of the information presented is for facilities in the United States. Regulations for justice facilities in other parts of the world differ significantly and the authorities governing these facilities should be consulted directly. Refer to the 2000 *ASHRAE Handbook—HVAC Systems and Equipment* for further information on HVAC systems and equipment mentioned herein and to other chapters of this volume for various space applications and design considerations.

### TERMINOLOGY

The following terms will be used throughout this chapter:

**Justice Facility.** Any building designated for purposes of detention, law enforcement, or rendering a legal judgment.

**Cell.** A room for confining one or more persons; it may contain a bed for each occupant and a toilet and wash basin.

**Holding Cell.** A room designed to confine a person for a short period of time; it may or may not contain a bed.

**Small Jails.** A facility consisting of up to 100 rooms and ancillary areas, designed for confining people.

**Large Jails.** A facility consisting of more than 100 rooms and ancillary areas, designed for confining people.

**Prison.** A facility consisting of several buildings and ancillary area surrounded by high walls and/or fences, designed to confine a minimum of 500 people.

**Minimum Security.** A facility or area within a jail or prison that allows confined people to mix together with little supervision for periods of time during the day.

**Medium Security.** A facility or area within a jail or prison that allows confined people to mix together with some or total supervision for periods of time during the day.

**Maximum Security.** A facility or an area within a jail or prison that confines people to their cells with total supervision.

**Work Release.** A program that allows minimum security occupants freedom during the day to work outside the facility but requires them to return for the night.

**Courthouse.** A facility consisting of courtrooms, judges chambers/offices, jury rooms, jury assembly rooms, attorney interview rooms, libraries, holding cells, and other support areas.

**Police Stations.** Facilities housing the various functions of local police departments. These facilities may contain holding cells, evidence storage rooms, weapons storage, locker rooms, offices, conference rooms, and parking garages.

**Juvenile Facilities.** Also known as **Family Court** facilities, these facilities are for young offenders. Usually kept separate from adult facilities, they house their own court or hearing rooms, judges chambers, offices for social workers and parole officers, conference rooms, waiting areas, classrooms, sleeping rooms, intake areas, libraries, exercise rooms/areas, kitchens, dining areas, and laundry.

**Inmate.** A person confined to a cell, jail, prison, or juvenile facility.

**Correctional Officer.** A trained law officer who supervises inmates.

**Correctional Officer Facilities.** Areas designated for use only by the correctional officers, including control rooms, break rooms, locker rooms, and storage rooms.

**Inmate Areas.** Areas that inmates have access to, with or without supervision, including cells, day rooms, exercise areas, outside areas, and certain ancillary areas.

**Day Rooms.** A room where confined people can congregate for periods of time outside of their cells during the day under supervision. The room usually contains chairs, tables, TVs, and reading and game materials.

**Exercise Areas.** Areas designated for use by inmates where they can mix and exercise for short periods of time during the day. This area is usually outdoors or has at least one wall or the roof exposed to the outdoors.

**Ancillary Areas.** Areas used for support of the justice facility, including offices, kitchens, laundry, mechanical rooms/plants, electrical rooms/plants, libraries, classrooms, and rooms for exercise, health care, visitation, interviews, records, evidence, storage, fingerprinting, lineups, inmate intake, etc.

**Control Room.** A room that allows viewing or monitoring of various areas of the facility and/or houses electronic or pneumatic controls for door locks, lights, and other functions.

### SYSTEM REQUIREMENTS

**Outside Air.** All areas require outside air for ventilation to provide good air quality, makeup air for exhaust systems, and to control pressures within facilities. Minimum outside air requirements for cells, dining halls, and guard stations as well as other ancillary areas can be found in publications of the American Correctional Association and in *ASHRAE Standard 62*. Minimum outside air for most areas is about 15 cfm per occupant. Courtrooms are not included in *ASHRAE Standard 62*, but most courtrooms are designed to supply approximately 6 air changes per hour, with 15 cfm per person outside air as a minimum.

**Equipment Locations.** Access to mechanical equipment and controls must be kept secure from inmates at all times. Equipment rooms should be located where inmates do not have access to them. In areas where inmates do have access, security ceilings with lockable access panels should be used when mechanical equipment and components must be located within ceiling plenums. Equipment serving areas not accessible to inmates can be located as in other facilities unless the owner has other specific requirements. Equipment locations within courthouses should consider noise within courtrooms, jury rooms, and attorney interview rooms.

**Barrier Bars.** In locations where ducts or openings pass into or out of inmate areas, barrier bars are usually installed in ducts or openings that exceed 6 to 8 in. in any direction. Barrier bars are solid steel bars on 4 to 6 in. centers mounted in a solid steel frame to match the duct or opening size. They must be installed as a welded assembly within a structural wall compartment, much like a fire

The preparation of this chapter is assigned to TC 9.8, Large Building Air-Conditioning Applications.

damper, whenever possible. Barrier locations should be coordinated with the owner of the facility. Include the bars in static pressure calculations of airflow systems.

**Air Devices.** Grilles and registers serving areas accessible to inmates are usually security-type devices, designed to reduce entry of obstacles into the grilles, that are constructed of heavy gage steel and welded in place within the walls or ceilings. Locations of these devices should be coordinated with the owner of the facility. Air devices serving areas not accessible to inmates can be standard grilles, registers, and diffusers. Standard diffusers can also be installed in inmate areas with high ceilings.

**Outside Air Intakes and Exhausts.** Louvers and grilles associated with intake and exhaust air should be located (1) where inmates do not have access to them and (2) where substances cannot be discharged into them to cause harm or disruption to services and personnel within the facility. Barrier bars are usually installed.

### INDOOR AIR QUALITY

[Table 1](#) lists indoor occupied conditions for common types of areas within justice facilities in the United States. When areas are unoccupied, the temperatures may be adjusted from those listed in [Table 1](#) by a minimum of 3°F. Spaces that are heated only will have higher summer temperatures than those noted in [Table 1](#) depending on program requirements of the facility governing body. The indoor environmental criteria for each space need to be coordinated with the owner of the facility; some facility programs do not allow air conditioning of cells, day rooms, and other areas.

### ENERGY CONSIDERATIONS

Jails and prisons are occupied twenty-four hours a day year-round and require a large amount of outside air that is subsequently exhausted. There are several methods available to recover exhausted energy and reduce the energy needed to cool and heat the outside air. Such as the following:

- Sensible and enthalpy *heat recovery wheels or heat exchangers* are used most often.
- *Runaround heat recovery coil loops* may be used when exhaust and supply airstreams must be separated.
- *Thermal storage* is available for heating and cooling.
- *Variable-speed drives* can be used on cooling towers fans, pumps, supply and exhaust fans, and chillers.
- *Variable air volume* systems can be used in office spaces and other areas not requiring constant airflows.
- *Supply temperature reset* based on outside air temperatures can be used on heating and cooling systems.
- *Economizer* cycles can be used when outside air meets indoor condition requirements
- *Heat capture* from boiler stacks can preheat combustion air or makeup water.
- *Free cooling heat exchangers* provide cooling water by using the cooling towers in lieu of the chiller when outside air conditions allow.

- Where reheat is required, water from mechanical cooling or *recaptured heat sources* may offer economical paybacks.

Whatever form of energy recovery is used, all systems should be examined for the rates of return on the cost of implementing and operating the systems.

### HEATING AND COOLING PLANTS

Most larger correctional facilities have central heating and cooling plants; smaller facilities generally use local systems. For small plants, rooftop units or split systems and fuel-fired, electric heating, steam, or hot-water boilers can be used. For larger plants, water-chillers with cooling towers and steam or hot-water boilers are normally used to serve air-handling units, fan-coil units, reheat coils, and other equipment throughout the complex. Primary-secondary pumping of hydronic systems should also be considered.

The heating and cooling requirements are for continuous operation while there are occupants. Essential equipment should be backed up with standby units for use during maintenance or equipment failure. In addition, major components may need to be braced for seismic and/or wind restraint to ensure continuous service.

Plants should be located in areas not accessible to inmates. For central plants serving very large facilities, the plant may be located away from the complex (outside the fences or walls). Some of these plants use distribution tunnels from the plant to the various buildings in lieu of direct burial of the piping. Access to these tunnels must be kept secure from inmates. Vertical duct and pipe chases within facilities are usually located adjacent to cell areas, incorporated within plumbing chases, and stacked to connect to the heating and cooling equipment.

The capabilities of maintenance personnel and the training to be provided them should be considered in selecting the types of systems and equipment to be used in the design. The owner and/or maintenance personnel should be consulted to determine the best combination of components, systems, and location for the facility.

### CONTROLS

Controls serving HVAC systems for small facilities can be local and consist of electric, electronic, pneumatic, or a combination of all of these. Controls for larger facilities are usually electronic and are connected to a central, computerized system so that operators can manage the systems more efficiently. Thermostats and other sensors in or near inmate areas should be inaccessible to inmates (e.g., in return or exhaust ducts). Control panels should be located within secure areas. All interconnecting wiring and pneumatic tubing should be concealed from inmates and kept secure.

### FIRE/SMOKE MANAGEMENT SYSTEMS

All confined occupants of justice facilities need to be kept safe from fire and smoke. Early detection of fires should be considered in all facilities. Installation of fire and smoke detectors should be discussed with the owner. These detectors need to be installed in secure areas or within the units and not be accessible to inmates.

**Table 1 Indoor Environment**

Space	Occupied Temperature, °F	Humidity, %	Pressure	Minimum Air Changes	Minimum Filtration MERV*
Jail cells	72 to 78	30 to 50	Negative	6	8
Isolation cells	72 to 78	30 to 50	Negative	12	11
Day rooms	72 to 78	30 to 50	Positive	6	8
Kitchen	65 to 85	30 to 60	Negative	6	8
Laundry	65 to 85	30 to 60	Negative	12	8
Jail ancillary	72 to 85	30 to 50	Positive	6	8
Courtrooms	72 to 78	30 to 50	Positive	6	8
Courts ancillary	72 to 85	30 to 50	Positive	6	8

\*MERV = Minimum Efficiency Reporting Value per ASHRAE Standard 52.2. Also see Chapter 24 of the 2000 ASHRAE Handbook—HVAC Systems and Equipment for more information.

Smoke control systems should also be considered to facilitate evacuation of inmates to safe areas during an emergency, especially if the facility has no other means to evacuate the inmates to secure areas outside the buildings. The owner should be aware of the costs and complexity of smoke management before implementation.

### HEALTH ISSUES

Certain areas within large facilities (certain cells within small facilities) should be designed to provide negative pressures within them to provide isolation from other spaces for inmates with communicable diseases such as HIV and TB. These spaces should have separate, dedicated exhaust systems, alarms, and controls. Application and component requirements should be discussed with the owner. See [Chapter 7](#) for discussions of health care systems and applications.

### BIBLIOGRAPHY

- ACA. 2002. *Standards for adult correctional institutions*, 4th ed. Adult Correctional Association, Lanham, MD.
- ACA. 1991. *Standards for adult local detention facilities*, 3rd ed. Adult Correctional Association, Lanham, MD.
- ACA. 1991. *Standards for juvenile detention facilities*, 3rd ed. Adult Correctional Association, Lanham, MD.
- ACA. 1991. *Standards for small juvenile detention facilities*, 1st ed. Adult Correctional Association, Lanham, MD.
- ACA. 1991. *Standards for juvenile training schools*, 3rd ed. Adult Correctional Association, Lanham, MD.
- ASHRAE. 2001. Ventilation for acceptable indoor air quality. ANSI/ASHRAE *Standard* 62-1989.
- Gill, K.E. 1994. Design for jails. *Heating/Piping/Air Conditioning Engineering*(July).
- Gill, K.E. and C.W. Hyman 1995. Environmental control of courthouses—The next generation. *Heating/Piping/Air Conditioning Engineering* (January).
- Linde, J.L. and B.C. Davenport. 1995. HVAC design for minimum-, low-, and medium-security federal correctional facilities. *ASHRAE Transactions* 101(1):919-927.
- Tseng, P.C., R. Krout, and D. Stanton-Hoyle. 1995. Energy program of requirements for a new detention center—Energy design criteria for prisons. *ASHRAE Transactions* 101(1):928-943.