



Harris Environmental Cold Rooms

- Protein Purification
- Column Chromatography
- Cell Biology Research
- Critical Product Storage

Harris designs for *your* realities

Since 1960, Harris Environmental Systems has worked with laboratory scientists and production engineers to develop cold rooms that deliver stable environments 24 hours a day, 7 days a week.

Standard features include:

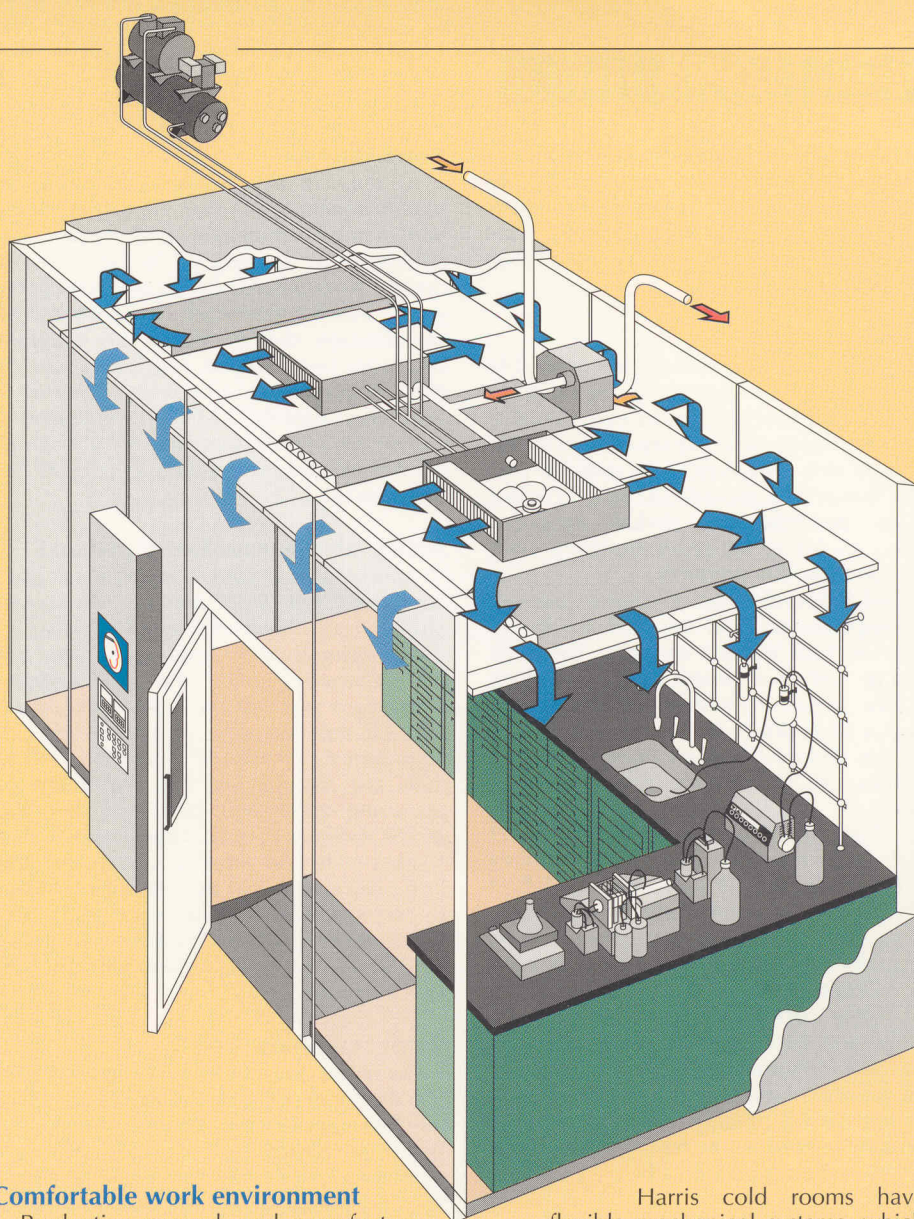
- Temperature uniformity $\pm 0.5^{\circ}\text{C}$
- Temperature gradient of 1.0°C Max.
- Meets FDA validation requirements
- 20 cfm ventilation per person
- 70 to 100 foot candle illumination
- No-waste, custom-cut wall panels
- Average 70dBA maximum noise level
- Digital temperature controls
- Narrow-range chart recorder, accurate to $\pm 0.5\%$ of the -5 to 55°C span
- Intelligent, active high/low alarms
- 3"-thick, insulated panels with .032" white aluminum skins

Optional features include:

- Desiccant dehumidification
- Low-cost conversion to warm room
- Stainless steel wall finish
- 4"-thick wall panels
- Insulated floors with internal ramp
- Remote mounted condensing units
- Coated cooling coils
- HEPA-filtered supply air
- Powered doors
- Card-key access
- Containment curb for liquid hazard
- Laboratory cabinets & benches
- Plenum walls for low air return
- Filtered return air grills
- Explosion-proof construction to Class I, Div. I and Div. II, Groups C and D
- 24-hour, multi-point strip chart testing for performance validation

Eliminate product stability problems

Temperature deviations at the working height can make compounds unstable and research results unpredictable. Harris cold rooms meet and surpass uniformity requirements of $\pm 0.5^{\circ}\text{C}$ and maximum temperature gradients of 1.0°C . The temperature is constant even when transient heat loads occur from process equipment and door openings. Also, Harris provides an air distribution system that features a perimeter slot diffuser rather than the less-effective "egg-crate" ceiling. High-velocity air from slot diffusers provides even air circulation throughout the space, eliminating thermal stratification.



Comfortable work environment

Productive research and manufacturing requires exceptional illumination and a quiet environment. Harris cold rooms are equipped with recessed fluorescent lighting fixtures which deliver a full 70 to 100 foot candle illumination at the working surface. Air handling systems are designed with components sized to limit noise to an average maximum of 70 dBA—the level of normal human conversation.

Intelligent, active alarms

Unlike passive systems, Harris alarm circuits take action to mitigate an out-of-spec condition. For example, if temperature is too low, all cooling is automatically shut down, while the system provides visual and audible warning of the problem. Such intelligent alarms ensure that basic corrective measures are taken immediately.

Full FDA compliance

Harris rooms meet stringent requirements for FDA CGMP compliance, which means your projects can move to full production with a minimum of process modification. Rooms can also include features for higher volume operations such as power doors, card key access, monitoring connections to central computers and concrete containment curbs for hazardous liquids.

Harris cold rooms have flexible mechanical systems, which allow your cold room to be converted to warm-room operations at minimal additional cost. Such features allow valuable planning flexibility and full utilization of your plant investment as products move from laboratory to production.

Complete utilization of costly space

Unlike vendors which provide a limited number of standard-size rooms, Harris insulated panels can be made to fit each installation exactly. This means your limited space will be fully utilized for productive activity. In some cases, particularly where structural columns must be surrounded by the room enclosure, Harris custom-cut panels can increase floor space by more than 15% over rooms built with restrictive, standard size panels.

Reliable, trouble-free operation

Harris cold rooms are equipped with extra equipment capacity for unusual peaks in cooling and heating loads. Also, all Harris refrigeration systems have safety features such as automatic compressor restarts. Such robust design features help ensure continuous reliability of Harris mechanical systems.

Specifying Cold Rooms

Cold rooms can be designed to maintain virtually any temperature required for life science applications. To ensure the room meets your particular requirements, consider these issues as you develop your specification:

Humidity control

In most cold rooms, humidity control is not essential. In those cases, the designer should avoid specifying a defined humidity level in order to minimize equipment costs.

There are, however, two reasons end users sometimes include humidity control in the specification: to reduce excessive defrost cycles or to avoid problems with humidity-sensitive products.

Cold room refrigeration systems operate at temperatures cold enough to freeze water on heat transfer surfaces. This frost must be melted off when it begins to block air flow. When the system defrosts, the air handler shuts down, and room temperature can rise slightly above set point for 5 to 12 minutes. This occurs about four times in 24 hours.

A desiccant dehumidifier removes water vapor from the air, allowing the cooling system to run much longer between defrost cycles—days or weeks rather than hours. When 24-hour temperature uniformity is essential, specifying a desiccant dehumidifier will reduce the frequency of defrost.

In other circumstances, sensitive materials demand a uniform humidity. In this case desiccant dehumidifiers create and maintain specified humidity levels. Refrigeration systems are not reliable for close tolerance humidity control at low temperatures, since they must defrost periodically.

Ventilation air

In cold rooms, excess ventilation air leads to high costs. This air carries moisture, which condenses and freezes on cooling coils, leading to frequent defrost cycles. As explained in the previous paragraph, room temperature is slightly out of specification during defrost, so frequent cycles are best avoided. Harris provides 20 cfm ventilation as a standard feature. If ventilation beyond 20 cfm is necessary, it should be clearly specified so additional equipment can be installed to remove the moisture load.

Active alarms = no loss of product

Alarms advise room operators of fault conditions, but when specified, these circuits can provide other useful functions.

For example, if the room goes above the high alarm set point, the door heaters, lights, fans and hot gas valves should be shut off automatically. Active alarms can help prevent "runaway" conditions rather than just announcing that a problem is occurring, and should be clearly specified by the designer in critical applications.

Harris also provides, as a standard feature, dry contacts in the control enclosure to connect alarm circuits to central monitoring systems. When this feature is useful, it should also be identified in the specification.

Refrigeration controls

To avoid any confusion among suppliers, the room designer should clearly specify PID temperature controls when the uniformity requirement is $\pm 0.5^\circ\text{C}$. This will alert the vendor that controls suited only for cold storage rooms are not acceptable.

Likewise, if there is no uniformity requirement, the designer should avoid specifying uniformity. Rooms without a uniformity specification, such as storage coolers, are much less costly than environmental rooms.

Air filtration

As an option, Harris can adapt the mechanical system to provide Class 100,000 or Class 10,000 clean room conditions in a cold room. This typically requires more air flow, larger air handlers and HEPA filters. Alternately, the designer can specify "HEPA-filtered air" delivered to a particular part of the room to protect a sensitive operation. If the specification already requires close-tolerance temperature control, adding high-quality particle control is not especially costly. The basic structures and construction details needed for clean rooms are already in place with Harris cold rooms. Specifying Class 10,000 conditions adds less than 30% to room costs.

Surface finish

Standard surface finishes for cold rooms include baked white enamel on 0.032" aluminum, with anodized aluminum extrusions to join panels. For exceptionally corrosive environments, stainless steel or FRP (fiber-reinforced plastic) panels are available as an option. These options are usually avoided except in extreme cases. Stainless steel presents a visually uncomfortable working environment, and can increase room cost by about 15%. FRP panels add less than 5% to room costs, but must sometimes be checked for compliance with local building codes.

Specification Variables

Ideally, the facility planner should discuss these possible alternatives with the end user at an early stage in the project. A clear understanding on these points can avoid discrepancies between bid and budget.

Activity in the room

Outside dimensions

_____ W x _____ L x _____ H

Lighting

_____ Foot candles

Temperature

_____ °C

Temperature uniformity

$\pm 0.5^\circ\text{C}$
 \pm _____ °C

Temperature gradient

1°C
 _____ °C

Heat loads

_____ Cfm ventilation
 _____ Watts/equipment load
 _____ Number of people
 _____ Other loads

Recorder span

-5 to 55°C - 10" chart diameter
 0 to 100 temperature & humidity
 _____ to _____ °C

Noise reduction measures

Adjustable speed fans
 Remote condensing units
 Acoustical ceiling plenum

Particulate reduction measures

Filtered air
 HEPA-filtered air
 Other (Class _____)

Humidity

No specified level
 _____ % rh \pm 5% max. annual variation
 _____ % rh \pm 2% max. annual variation
 Allowed to vary between _____ % and _____ %

Temperature controls

Time-proportioning PID control
 On-off air temperature control

Refrigeration equipment

Use central chilled water or glycol system
 Air-cooled condensing units
 Water-cooled condensing units
 Remote condensing unit _____ ft. from room
 Suction line accumulators
 Multiple independent sensors

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