Rear Door Heat eXchanger

Planning Guide

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Note: Before using this information and the product it supports, read the general information in Appendix B, “Notices,” on page 31.

Second Edition (July 2008)

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Planning for the installation of a Rear Door Heat eXchanger

This *Planning Guide* contains information about planning the installation of an IBM® Rear Door Heat eXchanger.

The heat exchanger is a water-cooled device that is mounted on the rear of an IBM NetBay42 Enterprise Rack to cool the air that is heated and exhausted by devices inside the rack. A supply hose delivers chilled, conditioned water to the heat exchanger. A return hose delivers warmed water back to the water pump or chiller. In this document, this is referred to as a secondary cooling loop. The primary cooling loop supplies the building chilled water to secondary cooling loops, air conditioning units, and so on. The hoses for the secondary cooling loop are not included with this product. The rack on which you install the heat exchanger can be on a raised floor or a non-raised floor.

For heat exchanger performance information, see “Heat exchanger performance” on page 5.

For information about hoses, water treatment, and cooling distribution units for supplying conditioned water, see “Secondary cooling loop parts and services information” on page 24.

If you want to procure IBM installation planning services regarding what is needed to plan for supplying conditioned water and installing the Rear Door Heat eXchangers, see “Installation and support from IBM Integrated Technology Services” on page 27.

This documentation might be updated occasionally to include information about new features, a translated version of the documentation might be available in your language, or technical updates might be available to provide additional information that is not included in the heat exchanger documentation. These updates are available from the IBM Web site. To check for updated documentation and technical updates, complete the following steps:

1. Go to http://www.ibm.com/systems/support/.
2. In the IBM Systems Support pane on the left, click **Hardware upgrades**.
3. On the “Support for IBM Upgrades” page, in the **Product Family** field, select **Rack Expansion**.
4. In the **Type** field, select **Heat eXchanger**.
5. In the **Part number** field, select **32R0712**.
6. Click **Go**.
7. On the "Support for Rack expansion" page, for documentation updates, click the **Documentation** tab.

Related documentation

The following documentation provides related information for the heat exchanger:

- *IBM Rear Door Heat eXchanger: Installation and Maintenance Guide*
- *IBM Rack Safety Information*

Notices and statements in this document

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might occur.

Rear Door Heat eXchanger option kit

The IBM Rear Door Heat eXchanger option kit consists of the following components shown in Figure 1 on page 3.

- Door assembly
- Hinge kit
- Air-purge tool
- Documentation package

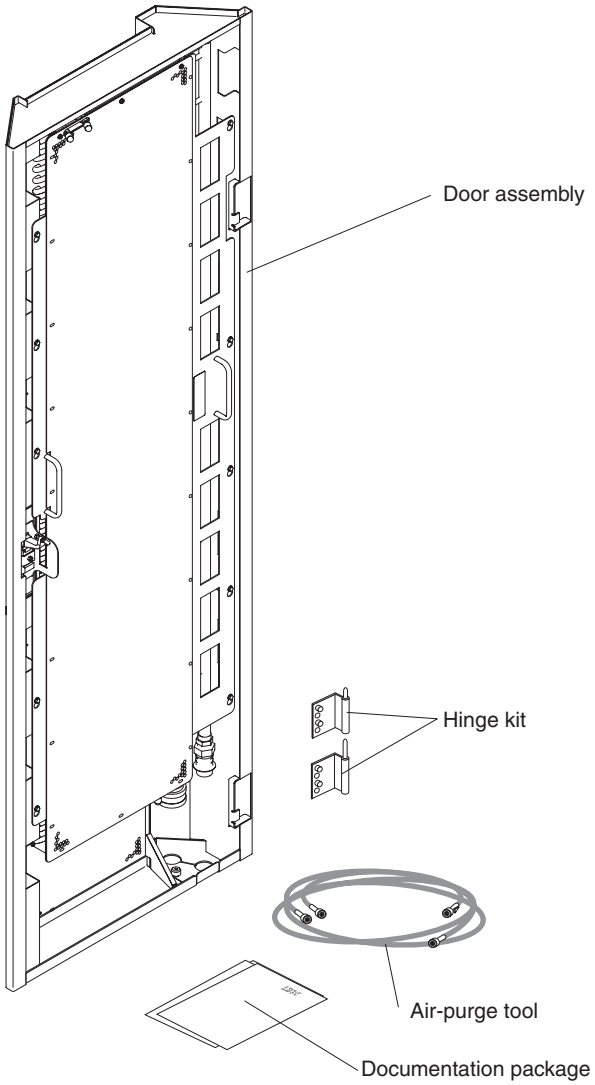


Figure 1. Components of the heat exchanger option kit

Heat exchanger specifications

The following information is a summary of the specifications of the Rear Door Heat eXchanger.

Table 1. Heat exchanger specifications

Door size • Depth: 142.6 mm (5.6 in.) • Height: 1945.4 mm (76.6 in.) 42U • Width: 639 mm (25.2 in.) **Exchanger size** • Depth: 67 mm (2.6 in.) • Height: 1791.3 mm (70.5 in.) • Width: 438.6 mm (17.3 in.) **Door assembly weight** • Empty: 29.9 kg (66 lb) • Filled: 35.6 kg (78.5 lb) **Door heat removal capacity** • For examples of door heat removal capacity, see the illustrations in "Heat exchanger performance" on page 5. • In general, the door heat removal capacity percentage increases if one or more of the following events occur: – The water temperature decreases. – The water flow increases. – The server heat loads decrease. • The door heat removal capacity varies with water temperature, water flow rate, air temperature and flow, and total heat load of the servers; however, a typical high-load cabinet (20 - 32 kW or approximately 70 000 to 105 000 Btu per hour) can achieve 55% - 85% heat removal.	**Air movement** • Provided by servers and other devices in the rack No additional air moving devices are required. **Air source for servers** • Room air for front of the rack. Air is exhausted from the servers, moves through the heat exchanger, and exits into the room (open loop). **Air temperature drop** • With high-heat-load devices, up to 25°C (45°F) between the air exiting the rack devices and the air exiting the heat exchanger. **Air impedance** • Air pressure drop across the heat exchanger is equivalent to that of the IBM acoustic rear door.	**Water source** • User-supplied, compliant with specifications in this document. • Couplings on door: 19 mm (0.75 in.) • ID hose required: 19 mm (0.75 in.) minimum **Water pressure** • Normal operation: <137.93 kPa (20 psi) • Maximum: 689.66 kPa (100 psi) • Pressure drop across heat exchanger: Approximately 48 kPa (7 psi) **Water volume** • Exchanger: Approximately 2.8 liters (0.75 gallons) • Exchanger plus supply and return hoses to the pump unit: Maximum of approximately 15.1 liters (4.0 gallons) excluding pump unit piping and reservoir **Water temperature** • If no dew point control: 18°C ±1°C (64.4°F ±1.8°F) • Lower temperature water is allowed, provided that the water supply can monitor and adjust the relative-to-room dew point. **Required water flow rate** (as measured at the supply entrance to the heat exchanger): • Minimum: 22.7 liters (6 gallons) per minute • Maximum: 37.9 liters (10 gallons) per minute

Heat exchanger performance

The expected performance of the heat exchanger is illustrated in Figure 2 for a typical inlet air temperature of 24°C (75.2°F), with a fully populated rack near uniform power dissipation, 32 kW heat load, and the node fans running near minimum fan speed (1530 cfm). By selecting the water inlet temperature and water flow rate, you can achieve the necessary heat removal. These levels can be achieved with normal cable exits from the rack and with the small amount of hot air bypass at the base of the door (small amounts of hot air escaping from the rack without being cooled by the door).

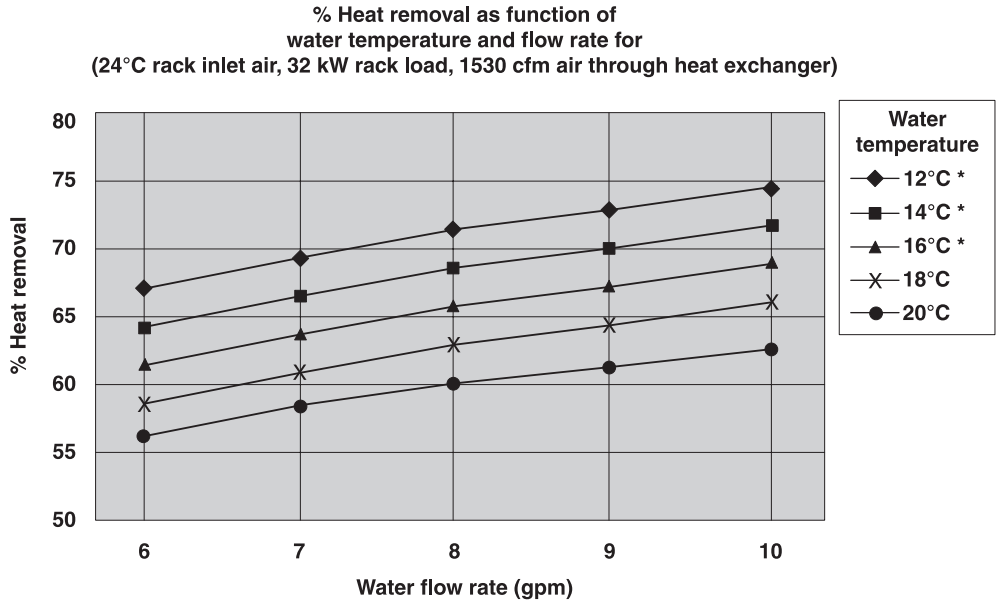


Figure 2. Typical performance of the heat exchanger, 32 kW heat load

* As described in “Heat exchanger specifications” on page 4, water temperatures below 18°C (64.4°F) can be used only if the system that is supplying the water is able to measure the room dew point conditions and automatically adjust the water temperature accordingly.

Another example of performance data is shown in Figure 3, which illustrates the same conditions as in Figure 2 on page 5, except that it reflects a 20 kW heat load. Because of the lower heat load, a specific level of cooling can be achieved with warmer water, a lower flow rate, or both.

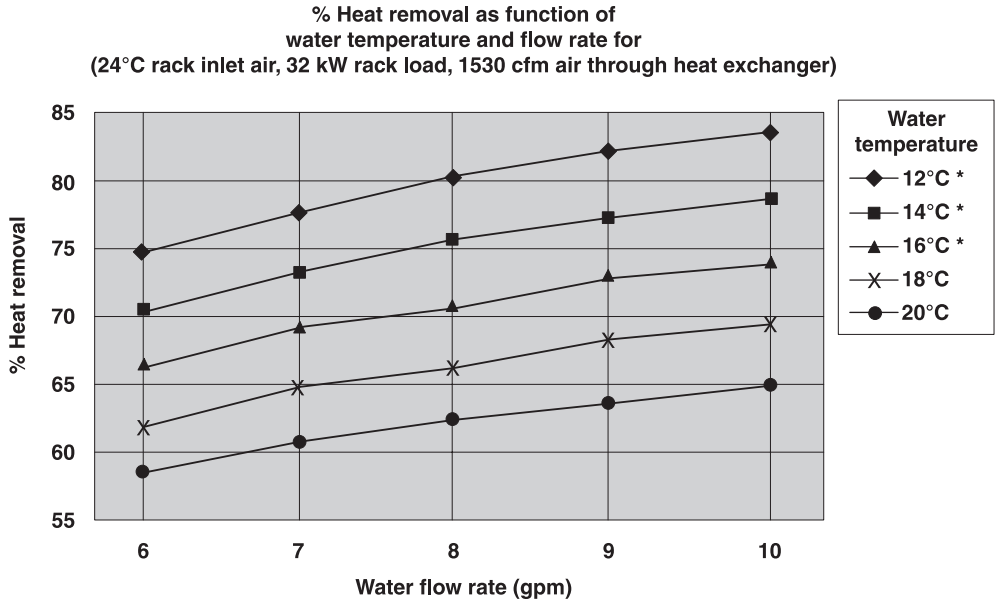


Figure 3. Typical performance of the heat exchanger, 20 kW heat load

* As described in "Heat exchanger specifications" on page 4, water temperatures below 18°C (64.4°F) can be used only if the system that is supplying the water is able to measure the room dew point conditions and automatically adjust the water temperature accordingly.

Planning considerations overview

As you plan the installation of the heat exchanger, include the following considerations:

- Providing chilled, conditioned water that meets the specifications that are outlined in "Water control and conditioning of the secondary cooling loop."
- Procuring and installing the water supply system that is suitable for your data center. Details are provided in "Water delivery specifications for secondary loops" on page 8.
- Providing redundant secondary cooling loop water supply, or enough room air conditioning to handle a tolerable heat load if the function of one or more of the heat exchangers is compromised. If the rear door is opened for rack maintenance, or conditioned water supply to the door is stopped, the rack heat load is sent out into the room and must be handled by room air conditioning, for example, until the conditioned water supply is restored.
- Providing floor or ceiling tile cutouts or protective coverings to avoid tripping hazards on non-raised floors as part of hose management.

Water control and conditioning of the secondary cooling loop

It is very important that the water that is being supplied to the heat exchanger meet the requirements that are described in this section. Otherwise, system failures might occur over time, as a result of any of the following problems:

- Leaks due to corrosion and pitting of the metal components of the heat exchanger or the water-supply system.
- Buildup of scale deposits inside the heat exchanger, which can cause the following problems:
  - A reduction of the ability of the heat exchanger to cool the air that is exhausted from the rack.
  - Failure of mechanical hardware, such as a hose quick-connect coupling.
- Organic contamination, such as bacteria, fungi, or algae. This contamination can cause the same problems as described for scale deposits.

The water that is used to fill, refill, and supply the heat exchanger must be particle-free deionized water or particle-free distilled water with appropriate controls for avoiding these issues:

- Metal corrosion
- Bacterial fouling
- Scaling

The water cannot originate from the primary chilled-water system for the building but must be supplied as part of a secondary, closed-loop system.

Important: Do not use glycol solutions because they can adversely affect the cooling performance of the heat exchanger.

Materials to use in secondary loops

You can use any of the following materials in supply lines, connectors, manifolds, pumps, and any other hardware that makes up the closed-loop water-supply system at your location:

- Copper
- Brass with less than 30% zinc content
- Stainless steel 303 or 316
- Peroxide cured ethylene propylene diene monomer (EPDM), non-metal-oxide material

Materials to avoid in secondary loops

Do not use any of the following materials in any part of your water-supply system:

- Oxidizing biocides, such as chlorine, bromine, and chlorine dioxide
- Aluminum
- Brass with greater than 30% zinc
- Irons (non-stainless steel)

Water-supply requirements for secondary loops

This section describes specific characteristics of the system that supplies the chilled conditioned water to the heat exchanger.

Temperature

The heat exchanger and its supply hose and return hoses are not insulated. Avoid any condition that might cause condensation. The temperature of the water inside the supply hose, return hose, and heat exchanger must be kept above the dew point of the location where the heat exchanger is being used.

Attention: Typical primary chilled water is too cold for use in this application because building chilled water can be as cold as 4°C - 6°C (39°F - 43°F).

Important: If the system that supplies the cooling water is not able to measure the room dew point and automatically adjust the water temperature accordingly, the minimum water temperature that must be maintained is 18°C ±1°C (64.4°F ±1.8°F). This is consistent with the ASHRAE Class 1 Environmental Specification that requires a maximum dew point of 17°C (62.6°F). See the ASHRAE document *Thermal Guidelines for Data Processing Environments*. Information about obtaining this document is at http://www.ashrae.org/publications/page/1279. Search on `Thermal Guidelines for Data Processing Environments`.

Pressure

The water pressure in the secondary loop must be less than 689.66 kPa (100 psi). Normal operating pressure at the heat exchanger must be 137.93 kPa (20 psi) or less.

Flow rate

The flow rate of the water in the system must be in the range of 23 - 38 liters (6 - 10 gallons) per minute.

Pressure drop versus flow rate for heat exchangers (including quick-connect couplings) is defined as approximately 48 kPa (7 psi) at 30 liters (8 gallons) per minute.

Water volume limits

The heat exchanger holds approximately 5.7 liters (1.5 gallons). Fifteen meters (50 ft) of 19 mm (0.75 in.) supply and return hoses hold approximately 9.4 liters (2.5 gallons). To minimize exposure to flooding in the event of leaks, the entire product cooling system (heat exchanger, supply hose, and return hose), excluding any reservoir tank, must have a maximum 15.1 liters (4 gallons) of water. This is a cautionary statement, not a functional requirement. Also consider using leak detection methods on the secondary loop that supplies water to the heat exchanger.

Air exposure

The secondary cooling loop is a closed loop, with no continuous exposure to room air. After you fill the loop, remove all air from the loop. Air bleed valves are provided at the top of each heat exchanger manifold for purging all air from the system.

Water delivery specifications for secondary loops

This section describes the various hardware components that make up the delivery system secondary loop that provides the chilled, conditioned water to the heat exchanger. The delivery system includes pipes, hoses, and the required connection hardware to connect to the heat exchanger. Hose management in raised floor or non-raised-floor environments is also described.

The primary cooling loop is considered to be the building chilled-water supply or a modular chiller unit. The primary loop must not be used as a direct source of coolant for the heat exchanger for the following reasons:

- If the supply water temperature is below the room dew point, condensation forms and causes dripping from the door components.
- If a leak develops in the door, supply hose, or return hose, a large amount of water is available.

Procurement and installation of the components that are needed to create the secondary cooling loop system are required for this design and are your responsibility. See “Secondary cooling loop parts and services information” on page 24 for information about suppliers of hoses and cooling distribution units. The main purpose of this section is to provide examples of typical methods of secondary loop setup and operating characteristics that are needed to provide an adequate, safe supply of water to the heat exchanger.

Attention: The overpressure safety device must meet the following requirements:

- Comply with *ISO 4126-1* (Information about obtaining this document is at http://webstore.ansi.org/default.aspx. Search on document number iso 4126–1.)
- Be installed so that it is easily accessed for inspection, maintenance, and repair
- Be connected as close as possible to the device that it is intended to protect
- Be adjustable only with the use of a tool
- Have a discharge opening that is directed so that discharged water or fluid will not create a hazard or be directed toward any person
- Be of adequate discharge capacity to ensure that the maximum working pressure is not exceeded
- Be installed without a shutoff valve between the overpressure safety device and the protected device.

Figure 4 shows a typical cooling solution and identifies the components of the primary cooling loop and the secondary cooling loop.

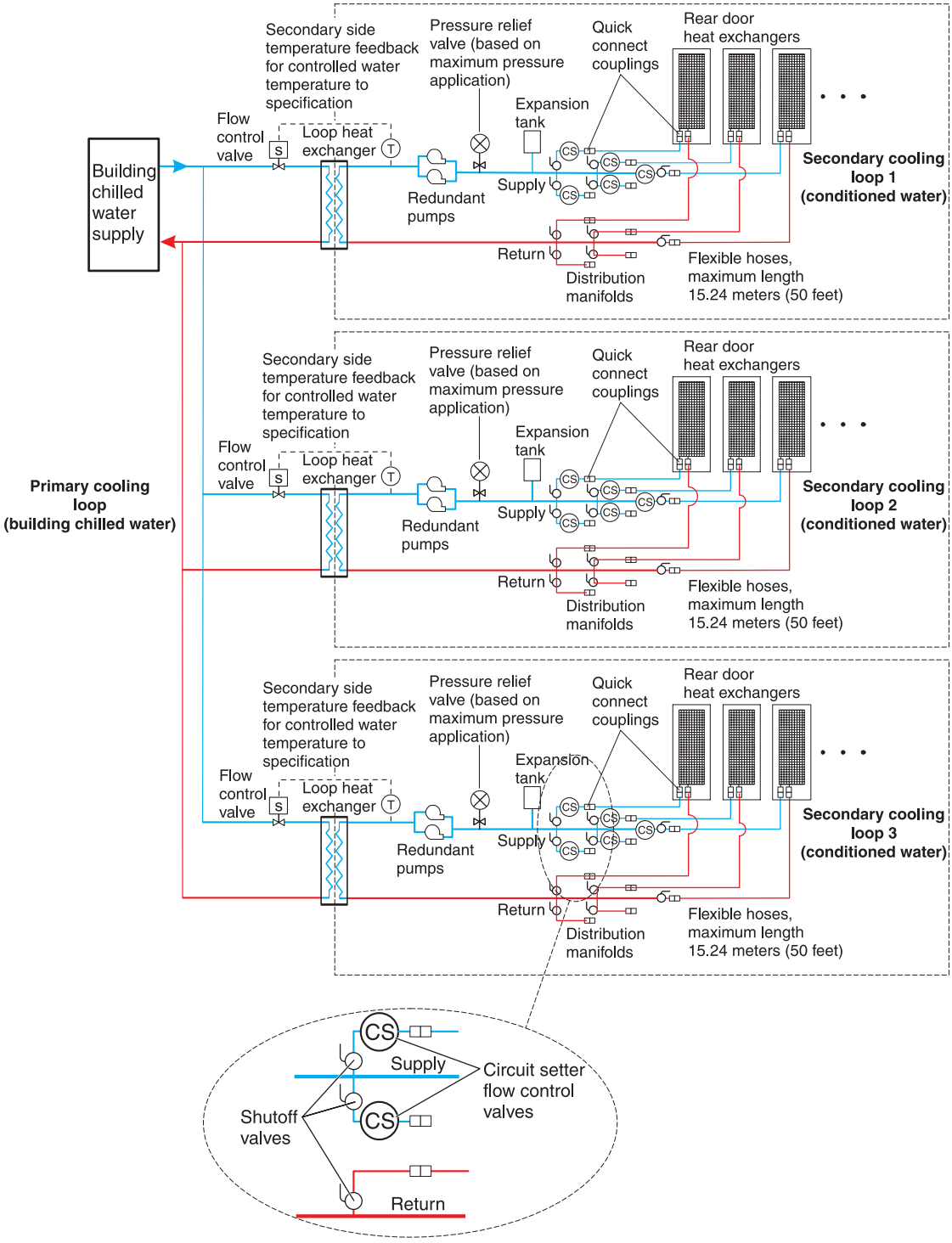


Figure 4. Primary and secondary cooling loops

Figure 5 shows an example of a fabricated facilities solution. The actual number of heat exchangers that are connected to a secondary loop depends on the capacity of the cooling distribution unit that is running the secondary loop.

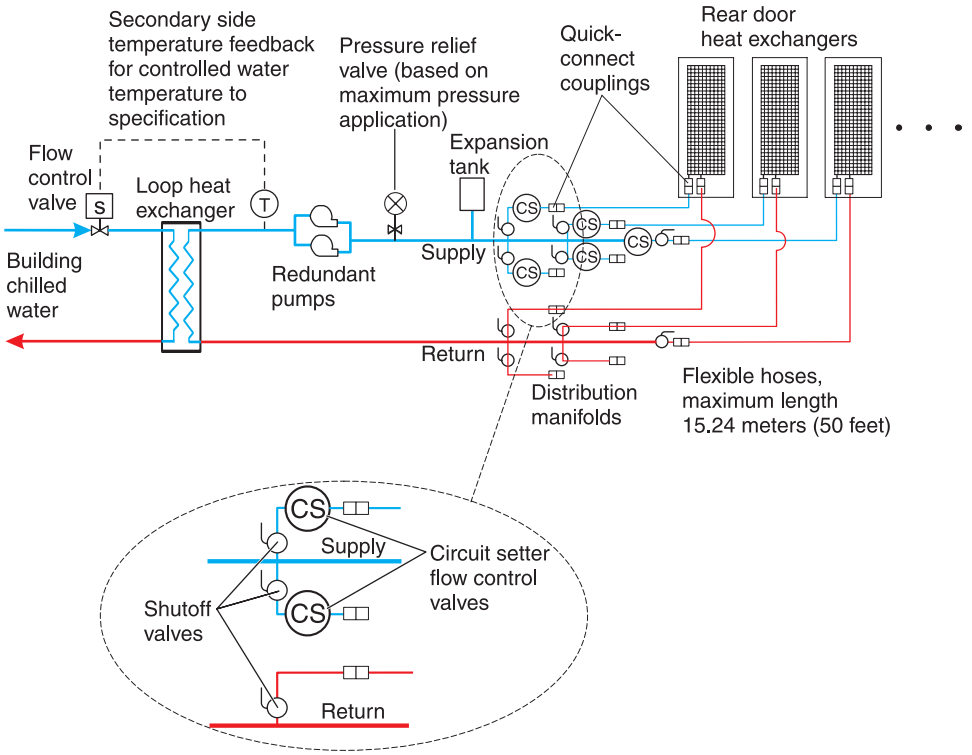


Figure 5. Cooling distribution unit that uses a fabricated facilities solution

Figure 6 shows an example of an off-the-shelf modular cooling distribution unit. The actual number of heat exchangers that are connected to a secondary loop depends on the capacity of the cooling distribution unit that is running the secondary loop.

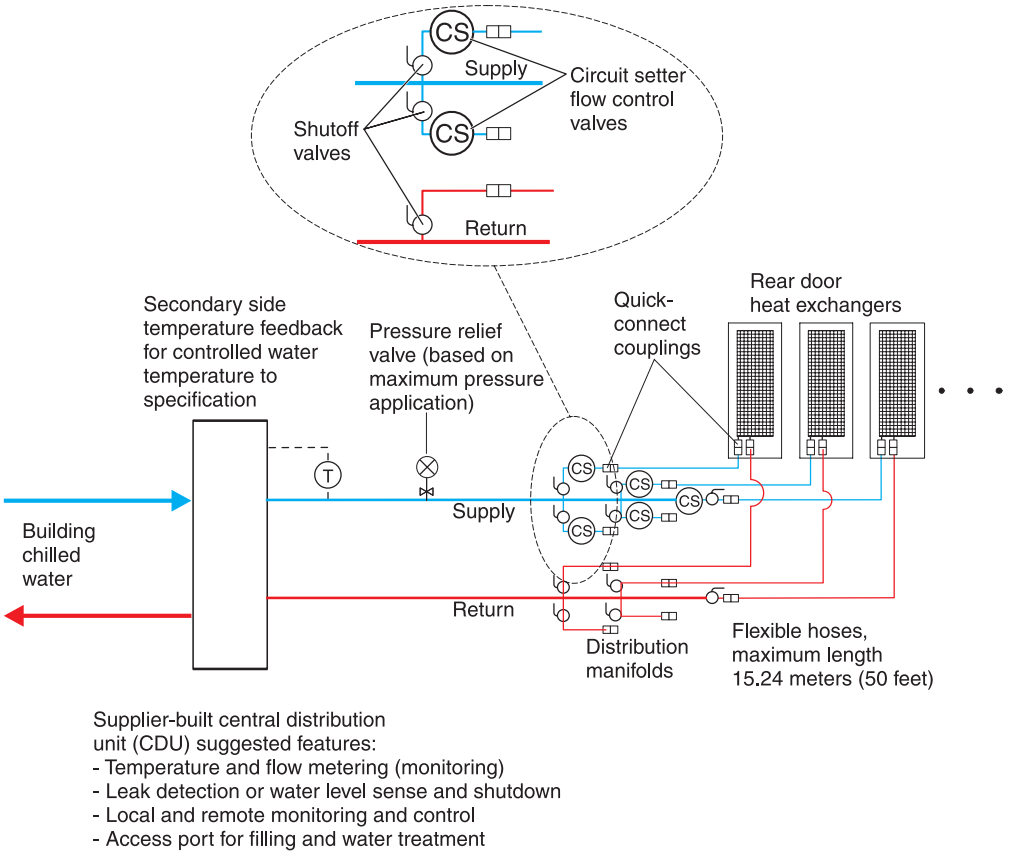
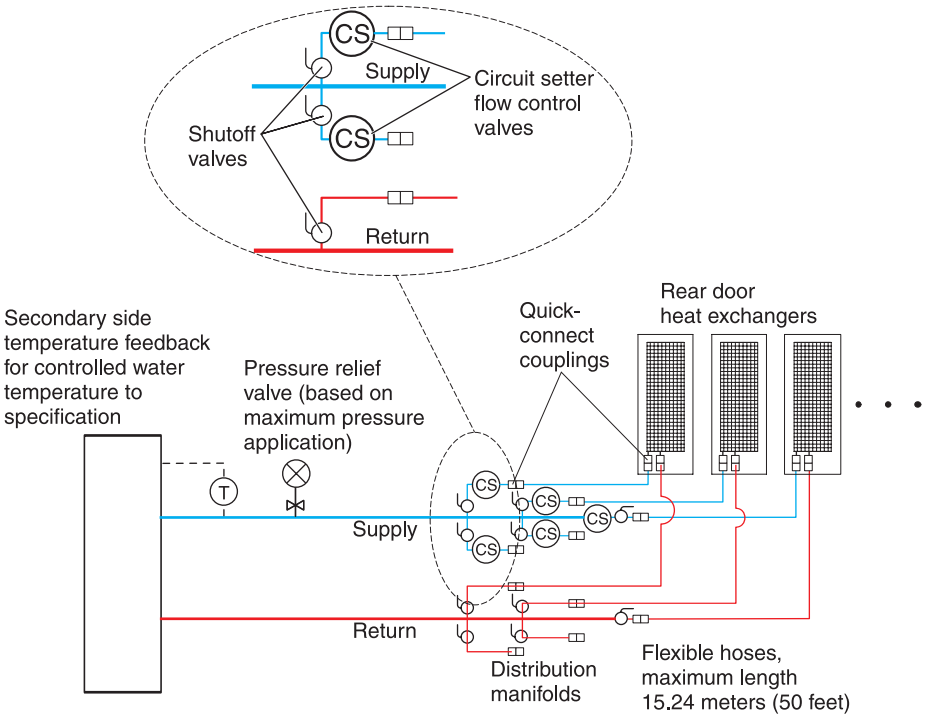


Figure 6. Cooling distribution unit that uses off-the-shelf supplier solutions

Figure 7 shows an example of a water chiller unit that supplies conditioned water to one or more heat exchangers. This must be a closed system (no exposure of the water to air) and meet all materials, water quality, water treatment, and temperature and flow specifications that are defined in this document. A water chiller unit is considered an acceptable alternative to use as a building chilled water source for removing heat from an IBM Rear Door Heat eXchanger.



Supplier-built water chiller
unit required features:
- Temperature and flow metering (monitoring)
- Leak detection or water level sense and shutdown
- Local and remote monitoring and control
- Access port for filling and water treatment

Figure 7. Cooling distribution unit that uses a water chiller unit to provide conditioned water

Manifolds and piping

Manifolds that accept large-diameter feed pipes from a pump unit are the preferred method for splitting the flow of water to smaller-diameter pipes or hoses that are routed to individual heat exchangers. Manifolds must be constructed of materials that are compatible with the pump unit and related piping. See “Materials to use in secondary loops” on page 7. The manifolds must provide enough connection points to allow a matching number of supply and return lines to be attached, and the manifolds must match the capacity rating of the pumps and the loop heat exchanger (between the secondary cooling loop and the building chilled-water source). Anchor or restrain all manifolds to provide the required support to avoid movement when quick-connect couplings are connected to the manifolds.

Example manifold supply pipe sizes

- Use a 50.8 mm (2 in.) supply pipe to provide the correct flow to six 19 mm (0.75 in.) supply hoses, with a 100 kW central distribution unit (CDU).
- Use a 63.5 mm (2.50 in.) supply pipe to provide the correct flow to eight 19 mm (0.75 in.) supply hoses, with a 120 kW CDU.
- Use an 88.9 mm (3.50 in.) supply pipe to provide the correct flow to twenty 19 mm (0.75 in.) supply hoses, with a 300 kW CDU.

Use shutoff valves for each supply line that exits the manifold to enable the flow of water to be stopped in individual legs of multiple circuit loops. This provides a way of servicing or replacing an individual heat exchanger without affecting the operation of other heat exchangers in the loop.

Use adjustable flow control valves, called *circuit setters*, on each supply line to enable control of the flow and compliance with specifications for each heat exchanger.

Use temperature and flow metering (monitoring) in secondary loops to provide assurance that water specifications are being met and that the optimum heat removal is taking place. Use circuit setters, placed as shown in Figure 4 on page 10, Figure 5 on page 11, and Figure 6 on page 12, to enable the adjustment of water flow to each water circuit off a main manifold system.

Anchor or restrain all manifolds and pipes to provide the required support and to avoid movement when quick-connect couplings are being attached to the manifolds.

Figure 8 shows another layout for multiple water circuits.

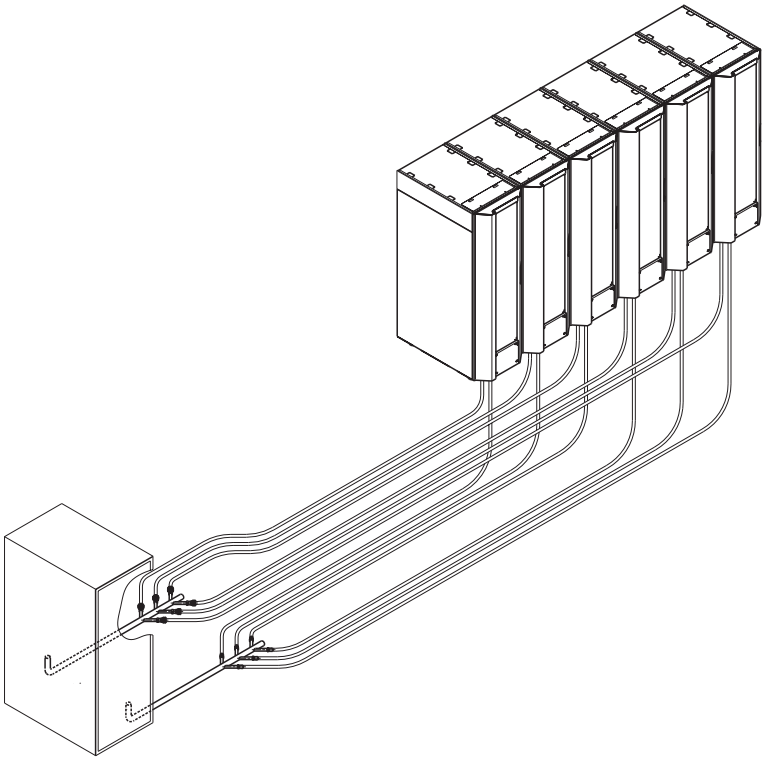


Figure 8. Typical central manifold (located at a central location for multiple water circuits)

Figure 9 shows an extended manifold layout.

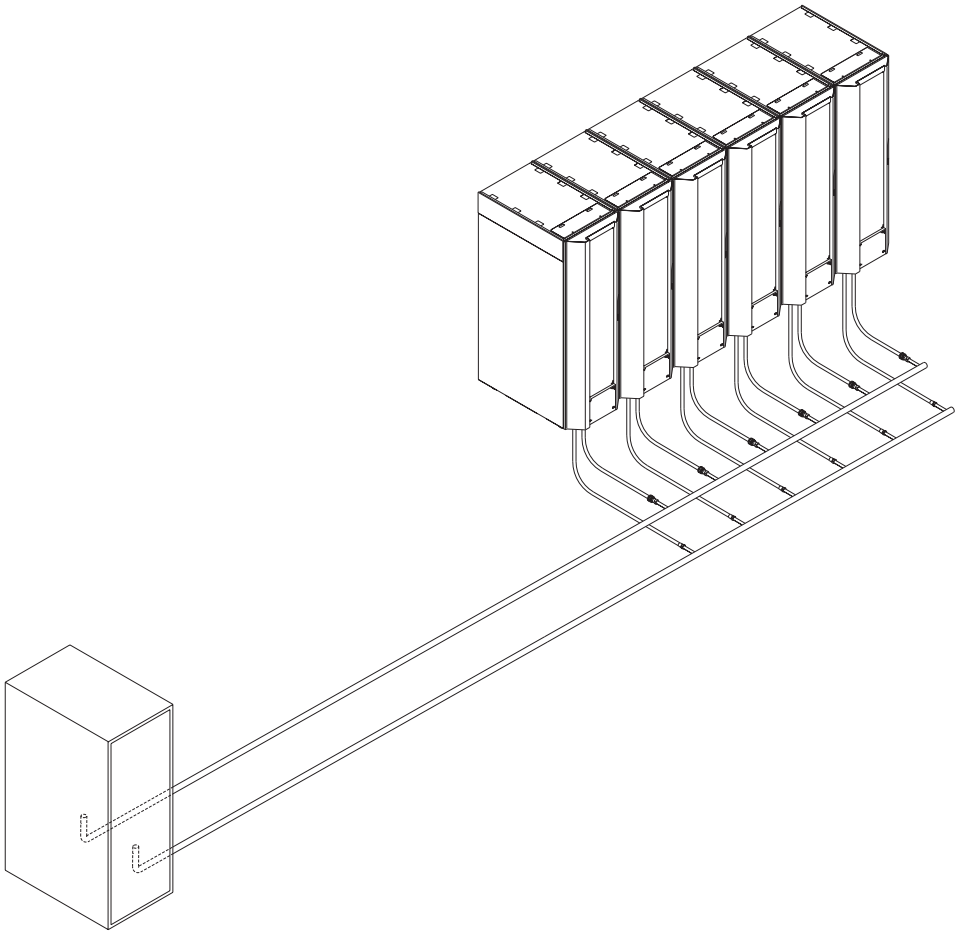


Figure 9. Typical extended manifold (located along aisles between racks)

Flexible hoses and connections to manifolds and heat exchangers

Pipe and hose configurations can vary. You can determine the best configuration for your installation by analyzing the needs of your facilities, or a site preparation representative can provide this analysis.

Flexible hoses are needed to supply and return water between your hard plumbing (manifolds and cooling distribution units) and the heat exchanger, allowing needed movement for opening and closing the rack rear door.

Hoses are available that provide water with acceptable pressure-drop characteristics and that help prevent depletion of some corrosion inhibitors. These hoses must be made of peroxide cured ethylene propylene diene monomer (EPDM), non-metal-oxide material and must have Parker Fluid Connectors quick-connect couplings at each end. These couplings are described in this section and are compatible with the heat exchanger couplings. Hose lengths from 3 to 15 meters (10 to 50 ft), in increments of 3 meters (10 ft), are available. Hoses that are longer than 15 meters (50 ft) might create unacceptable pressure loss in the secondary circuit and reduce the water flow, reducing the heat removal capabilities of the heat exchanger.

For information about a supplier of these hoses, see Table 2 on page 24. Use solid piping or tubing that has a minimum inner diameter of 19 mm (0.75 in.) and the fewest possible joints between a manifold and a heat exchanger in each secondary loop.

You can use quick-connect couplings to attach the hoses to the distribution manifolds. You must use quick-connect couplings to attach the hoses to the heat exchanger. Hose couplings that connect to the heat exchanger must have the following characteristics:

- The couplings must be constructed of passivated 300-L series stainless steel or brass with less than 30% zinc content. The coupling size is 19 mm (0.75 in.).
- The supply hose must have a Parker (male) quick-coupling nipple, part number SH6-63-W, or equivalent. The return hose must have a Parker (female) quick-conect coupling, part number SH6-62-W, or equivalent.
- At the opposite (manifold) end of the hoses, use similar quick-connect couplings. However, if you want to use other types of connectors, make sure that positive locking mechanisms are used to prevent loss of water when the hoses are disconnected. The connections must minimize water spill and air inclusion into the system when they are disconnected. You can also permanently attach hoses to the manifolds by using barbed fittings and clamps.

Layout and mechanical installation

This section provides an overview of the steps that are required to install a heat exchanger. For detailed information about installing a heat exchanger, see the *IBM Rear Door Heat eXchanger: Installation and Maintenance Guide*

The following topics are described in this section:

- Installing a heat exchanger
- Filling and draining the heat exchanger
- Raised-floor and non-raised-floor environments, including tile cuts
- Hose management
- Examples of typical layouts for water circuits

Door installation overview

The procedure for installing the heat exchanger include the following major tasks:

1. Preparing your facility to provide water to the rack per the specifications in this document.
2. Removing the existing rack rear door and installing new hinge assemblies.
3. Attaching the door assembly to the rack.
4. Routing flexible hoses, leaving enough length at the rack end to easily make connections to the heat exchanger.
5. Connecting the water-supply and water-return hose that runs from the cooling distribution unit or distribution manifold to the heat exchanger.
6. Filling the heat exchanger with water.
7. Adjusting the hoses to make sure that there are no kinks in the hoses and that the hoses are not lying against any sharp edges.
8. Adjusting the door latch assembly to make sure that the door fits flat against the rack and the gasket seals to the rack.

Heat exchanger filling and draining overview

The following steps describe the requirements for draining and filling a heat exchanger:

1. Filling a heat exchanger with water includes using the air purge tool that is supplied with the heat exchanger to purge any air from the heat exchanger manifolds. Containers must be available for capturing water. The container must hold a minimum of 2 liters (0.5 gal) capacity for purging air and a minimum 6 liter (1.6 gal) capacity for draining a heat exchanger.
2. You must drain a heat exchanger before the door that contains the heat exchanger is removed from the rack, or before you move a rack with a heat exchanger installed. The air purge tool can be connected to the drain port on the bottom of the heat exchanger to drain the water.
3. Use absorbent materials, such as cloth, under the work area to capture any water that might spill when you fill or drain a heat exchanger.

Raised-floor hose requirements and management

On a raised floor, hoses can be routed under the floor tiles and can be brought up from beneath the rack through special tile cutouts. The hoses are connected to the quick-connect couplings on the bottom of the heat exchanger.

In a typical example, each heat exchanger requires a special cut 0.6 m × 0.6 m (2 ft × 2 ft) floor tile below it with the opening outside of the rack footprint. A portion of the tile is cut away and correctly covered to protect against sharp edges. The corner opening is placed directly under the hinge side of the rack rear door. The opening size of the cut is 152.4 mm wide × 190.5 mm long ±12.7 mm (6.0 in. wide × 7.5 in. long ±0.5 in.) in the direction parallel to the door. See Figure 10 on page 19 and Figure 11 on page 20.

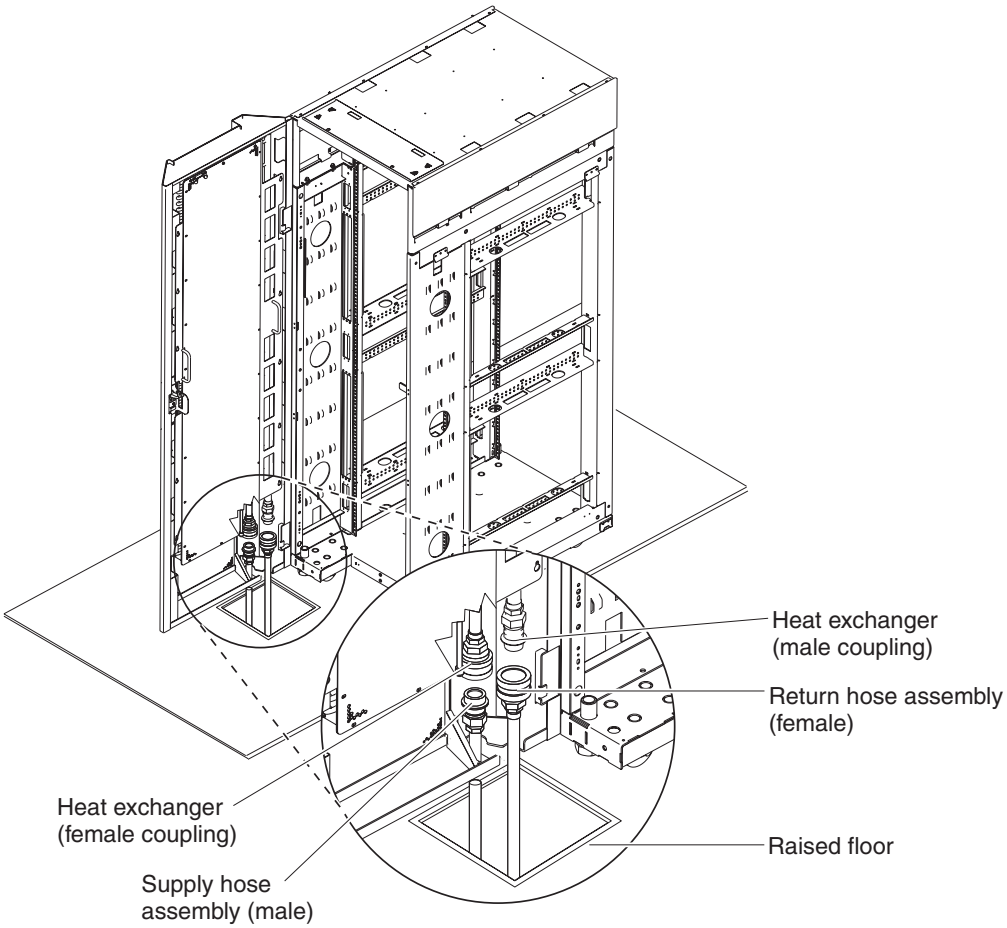


Figure 10. Raised-floor hose management example 1: hose exit through floor tile at the door hinge

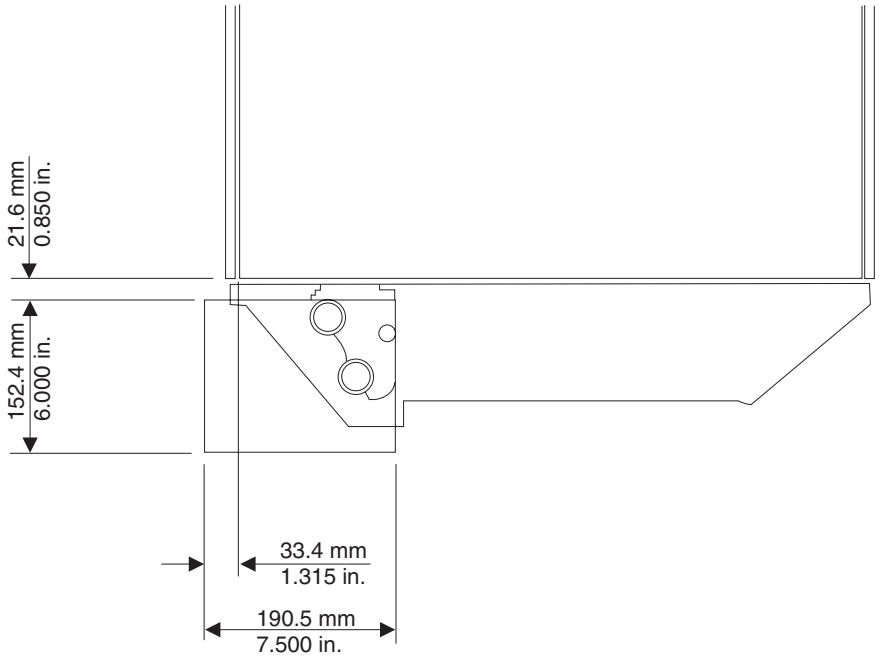


Figure 11. Raised-floor hose management example 1: tile cutout size and position

In another example, for a rack that is installed at the same time as a heat exchanger, or in cases where a rack is moved to install new floor tiles under it, each heat exchanger still requires a special cut 0.6 m × 0.6 m (2 ft × 2 ft) floor tile. However, the floor tile is positioned completely within the footprint of the rack. A modified cable opening or independent hose cutout is used. Flexible hoses that each contain a right-angle elbow are used to route the hoses under the rack in a large loop to allow hose movement when the door is opened and closed. Figure 12 and Figure 13 on page 22 show how to route hoses under the rack with enough hose length to allow the hose to move freely as the door is opened and closed.

Note: Existing tile cutouts for electrical or other cables can also be used for the hoses, if enough space is available.

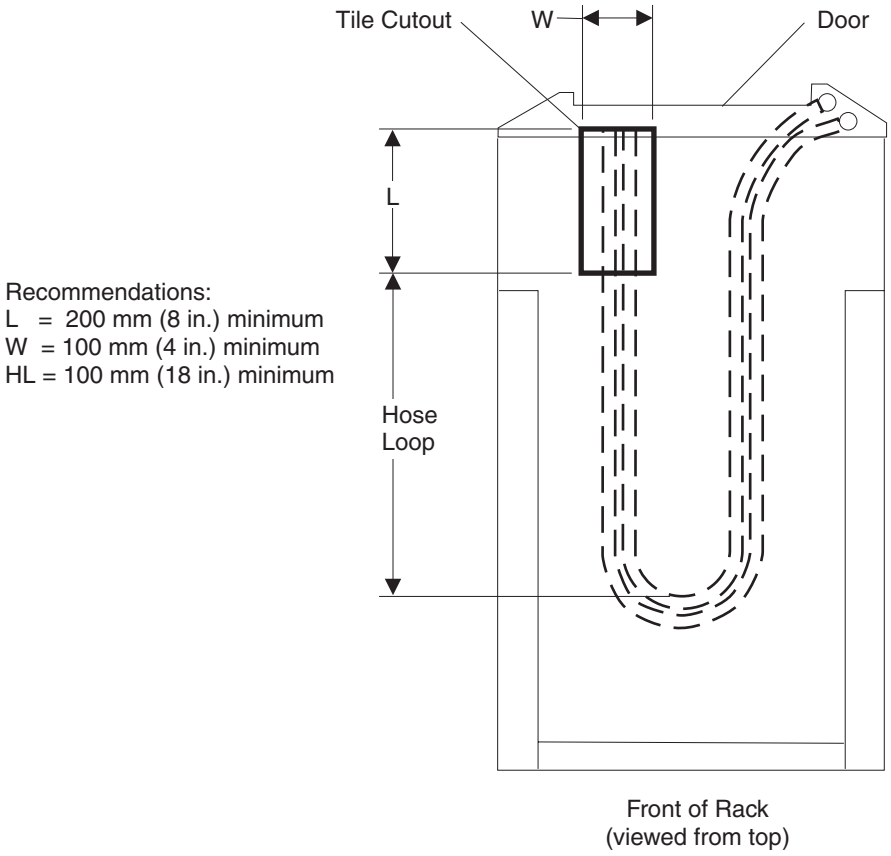


Figure 12. Raised-floor and non-raised-floor hose management example 2: loop under the rack with door closed

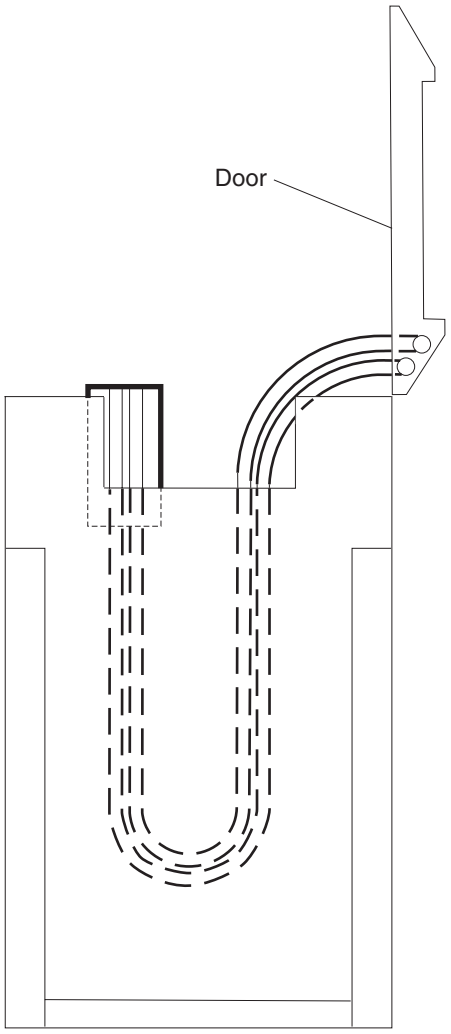


Figure 13. Raised floor and non-raised floor hose management example 2: loop under the rack with door open

Lay hoses side-by-side as they run between the heat exchanger and the pump unit manifold, and allow the hoses to freely move. Leave enough slack in the hoses below the rear door so that no pressure is exerted on the mated couplings when the hoses are connected and operating. When you route hoses, avoid sharp bends that cause hose kinks and avoid hose contact with sharp edges.

Non-raised floor hose requirements and management

In data centers without a raised floor, straight hose assemblies cannot make the sharp bend to exit between the floor and the rack door without kinking the hose.

Hose assemblies with right-angle metal elbows are needed. This allows you to route the hoses along the floor, make the 90° turn upwards within the gap between the bottom of the heat exchanger and the floor surface, and then connect to the heat exchanger couplings. This is shown in Figure 14 on page 23.

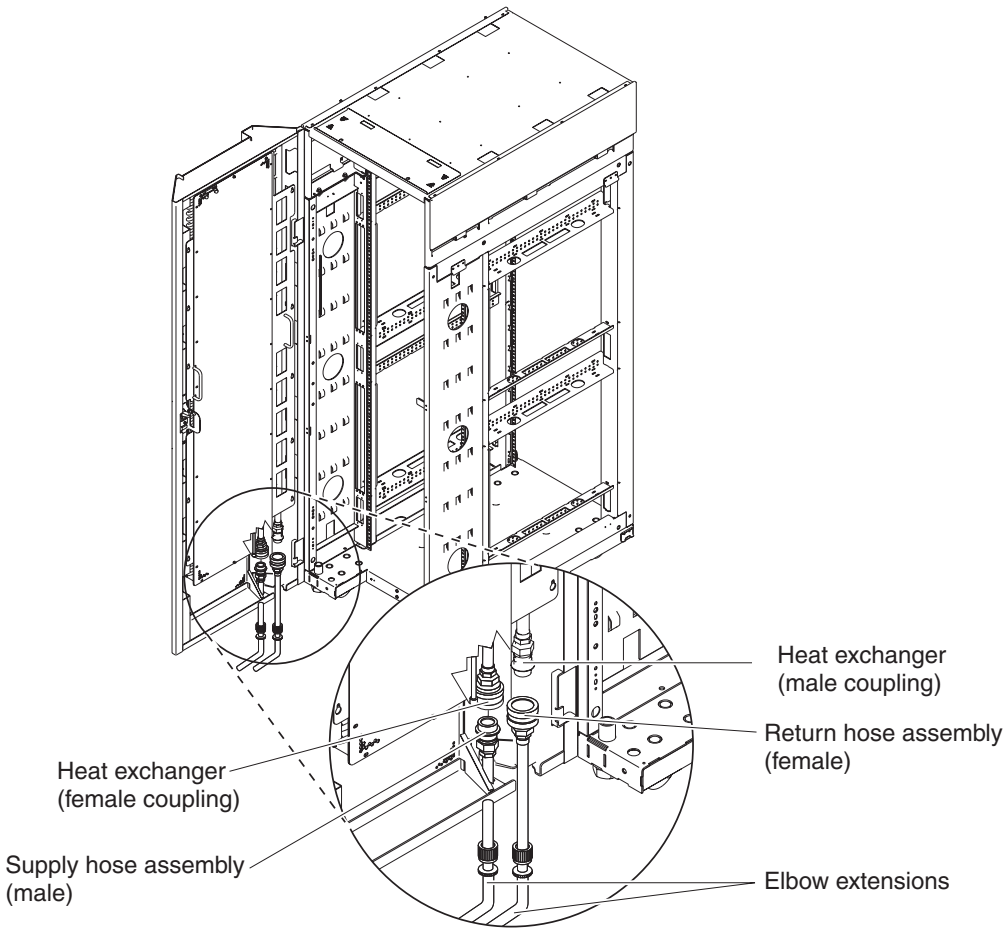


Figure 14. Non-raised-floor hose requirements

Hoses that exit the heat exchanger are routed in a manner similar to that of power cables in a non-raised-floor data center. For example, place the hoses side-by-side and allow them to move freely as they approach the rack (within approximately 3 meters [10 feet] of the rack). When you open the door, it is acceptable for the hoses to move slightly and rotate in parallel at the coupling interface inside the door. As you close the door, the hoses rotate back to their original positions.

Note: When you open or close the door, some manipulation of the hose along the floor might be necessary to prevent unwanted forces on the door and to make it easier to open and close the door.

Hose coverings or protective devices are not provided by IBM. Routing and protection of the hose assemblies exterior to the rack are your responsibility.

Secondary cooling loop parts and services information

IBM supplies the heat exchanger designed for IBM Enterprise server racks, a hinge kit (for those racks), and an air purge tool. This section provides sources and information for other parts and services that are needed for correct function and reliability of the secondary water loop.

Miscellaneous parts suppliers

Table 2 provides supplier and contact information for miscellaneous secondary loop parts. You can contact the supplier listed in the table for all or some of the items listed, depending on your needs.

Table 2. Miscellaneous secondary loop parts supplier information for customers in North America, Europe, Middle East, Africa, Asia Pacific

Supplier	Solution	Contact information
Vette Corporation	• Rear door heat exchangers (designed for non-IBM Enterprise racks) • Cooling distribution units • Hose kits • Water treatment • Chillers • Raised-floor grommets	http://www.vettecorp.com/ Vette Corp Datacom Facilities Cooling Division 2 Wall Street, 4th Floor Manchester, NH 03101 Email: datacom_facilities@vettecorp.com Phone: 877-248-3883 or 603-792-3460

Services supplier

Table 3 provides supplier and contact information for services that can be provided for secondary loop parts.

Table 3. Services supplier information for customers in North America, Europe, Middle East, Africa, Asia Pacific

Supplier	Solution	Contact information
Vette Corporation	• Installation of door and secondary loop items • Preventive maintenance	http://www.vettecorp.com/ Vette Corp Datacom Facilities Cooling Division 2 Wall Street, 4th Floor Manchester, NH 03101 Email: datacom_facilities@vettecorp.com Phone: 877-248-3883 or 603-792-3460

Cooling distribution unit supplier

Table 4 provides supplier and contact information for customers in Europe for a cooling distribution unit that was designed specifically for the IBM Rear Door Heat eXchanger.

Note: Customers in other locations can contact Eaton-Williams Group or Vette Corporation (see Table 3 on page 24).

Table 4. Cooling distribution unit supplier information for customers in Europe

Vendor	Solution	Contact information
Eaton-Williams Group, Ltd (UK)	Cooling distribution unit models: • CDU120 (120 kW, 400V-480V) • CDU121 (120 kW, 208V) • CDU150 (150 kW, 400V-480V) • CDU151 (150 kW, 208V)	http://www.eaton-williams.com Eaton-Williams Group Ltd Station Road Edenbridge Kent TN8 6EZ Phone: (0) 1732 866055 Fax: (0) 1732 867937

The following illustration shows the Eaton-Williams cooling distribution unit features.

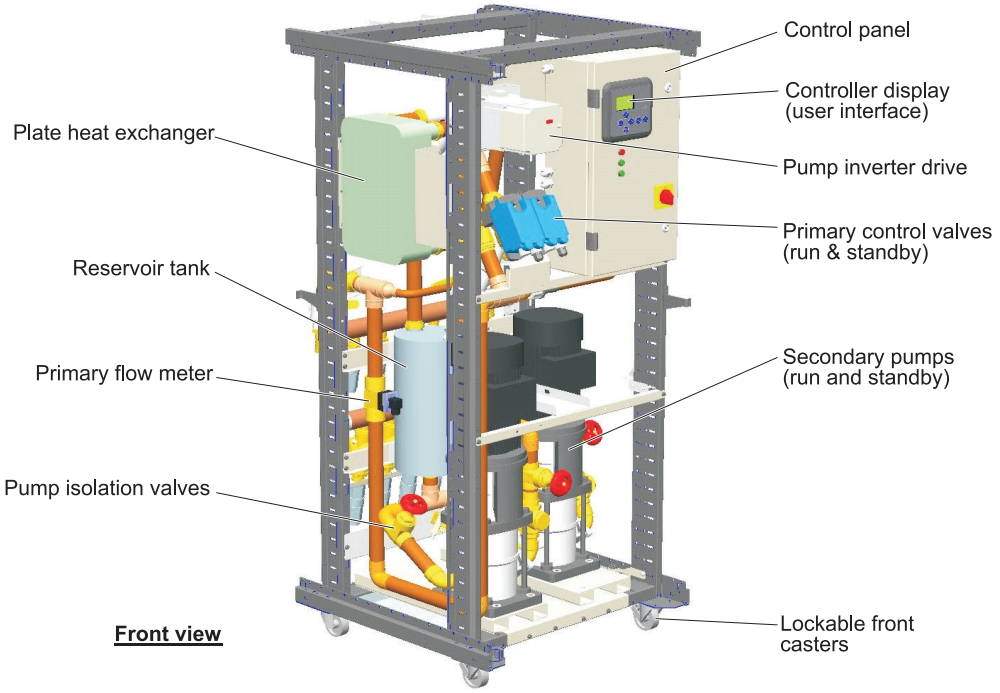


Figure 15. Eaton-Williams cooling distribution unit features

The cooling distribution unit specifications are described in the following table.

Table 5. Eaton-Williams cooling distribution unit specifications

Performance	
Maximum cooling capacity	120 kW (409 450 Btu/hr) or 150 kW (511 815 Btu/hr)
Pump capacity (design flow)	240 L/min (63.4 GPM)
Maximum pump head pressure	355 kPa (51.5 psi) at design duty, excluding cabinet losses
Coolant (liquid) type	Chilled water (with up to 30% glycol)
Primary liquid connections	1 1/2 in. flex tail for sweat connection, top or bottom
Secondary liquid connections	3/4 in. quick connects, hydraulic ISO-B
Unit internal primary circuit liquid capacity	Approximately 10.0 liters (2.6 gallons)
Unit internal secondary circuit liquid capacity	Approximately. 32.0 liters (8.5 gallons)
Noise	< 55 dBA at 3 meters
Electrical	
Power supply	200 - 230 V, 3Ø, 50/60 Hz *or* 400 - 480 V, 3Ø, 50/60 Hz
Maximum power consumption	5.6 kVA at 480 V, 4.9 kVA at 208 V
Physical	
Height	1825 mm (72 in.)
Width	800 mm (31.5 in.)
Depth	1085 mm (43 in.)
Weight (empty)	396 kg (870 lb)
Weight (filled)	438 kg (965 lb)

Note: Other industrial cooling distribution units can be used in a secondary cooling loop with the IBM Rear Door Heat eXchanger, if they meet the specifications and requirements that are described or referred to in this document.

Installation and support from IBM Integrated Technology Services

If you want assistance with coordinating and managing the installation and support of heat exchangers, IBM can supply a focal point.

Before you call, have the following information available:

- Serial numbers of the racks
- Phone number where the racks are located
- Contact name and phone number, building location, and location of the racks within the building

To access the correct contact area in OSC Dispatch, dial the toll-free number, request option 1, 1, 1, and when prompted, enter your 4-digit rack machine type.

Table 6. IBM Integrated Technology Services contact information

North America, Europe, Middle East, Africa	800-426-7378 (OSC Dispatch) Request contact with an IBM Installation Planning Representative in the service branch office closest to your location.
Asia Pacific	Glen Yuan (Site Services Executive - AP Network & Site Integration Services) Phone: 886-910-007690 E-mail: glenyuan@tw.ibm.com

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Problem Determination and Service Guide* on the IBM *Documentation* CD that comes with your system.
- Go to the IBM support Web site at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/systems/support/ and follow the instructions. Also, some documents are available through the IBM Publications Center at http://www.ibm.com/shop/publications/order/.

Getting help and information from the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM systems, optional devices, services, and support. The address for IBM System x™ and xSeries® information is http://www.ibm.com/systems/x/. The address for IBM BladeCenter® information is http://www.ibm.com/systems/bladecenter/. The address for IBM IntelliStation® information is http://www.ibm.com/intellistation/.

You can find service information for IBM systems and optional devices at http://www.ibm.com/systems/support/.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with System x and xSeries servers, BladeCenter products, IntelliStation workstations, and appliances. For information about which products are supported by Support Line in your country or region, see http://www.ibm.com/services/sl/products/.

For more information about Support Line and other IBM services, see http://www.ibm.com/services/, or see http://www.ibm.com/planetwide/ for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

You can receive hardware service through your IBM reseller or IBM Services. To locate a reseller authorized by IBM to provide warranty service, go to http://www.ibm.com/partnerworld/ and click **Find a Business Partner** on the right side of the page. For IBM support telephone numbers, see http://www.ibm.com/planetwide/. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

IBM Taiwan product service

台灣 IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路 7 號 3 樓
電話：0800-016-888

IBM Taiwan product service contact information:
IBM Taiwan Corporation
3F, No 7, Song Ren Rd.
Taipei, Taiwan
Telephone: 0800-016-888

Appendix B. Notices

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Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from IBM.

Maximum memory might require replacement of the standard memory with an optional memory module.

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Product recycling and disposal

This unit must be recycled or discarded according to applicable local and national regulations. IBM encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. IBM offers a variety of product return programs and services in several countries to assist equipment owners in recycling their IT products. Information on IBM product recycling offerings can be found on IBM's Internet site at http://www.ibm.com/ibm/environment/products/index.shtml.

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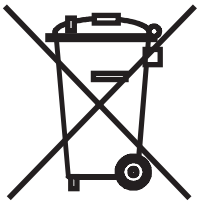

Notice: This mark applies only to countries within the European Union (EU) and Norway.

This appliance is labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

この機器には、EU 諸国に対する廃電気電子機器指令 2002/96/EC(WEEE) のラベルが貼られています。この指令は、EU 諸国に適用する使用済み機器の回収とリサイクルの骨子を定めています。このラベルは、使用済みになった時に指令に従って適正な処理をする必要があることを知らせるために種々の製品に貼られています。

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In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and recovery of WEEE. Customer participation is important to minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local IBM representative.

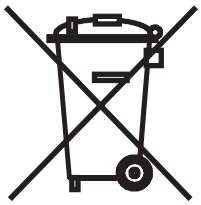
Battery return program

This product may contain a sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, go to http://www.ibm.com/ibm/environment/products/index.shtml or contact your local waste disposal facility.

In the United States, IBM has established a return process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and battery packs from IBM equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Have the IBM part number listed on the battery available prior to your call.

For Taiwan: Please recycle batteries.

For the European Union:



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Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

United Kingdom telecommunications safety requirement

Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

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European Community contact:
IBM Technical Regulations
Pascalstr. 100, Stuttgart, Germany 70569
Telephone: 0049 (0)711 785 1176
Fax: 0049 (0)711 785 1283
E-mail: tjahn@de.ibm.com

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