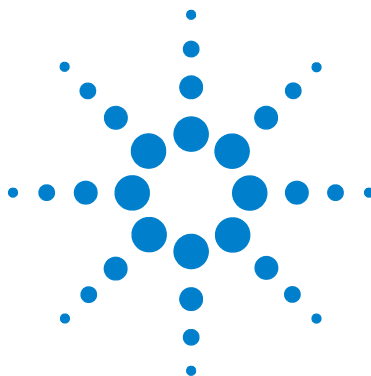




Agilent 7820A GC

Site Preparation Guide



Agilent Technologies

Notices

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CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

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This section outlines the space and resource requirements for GC and automatic liquid sampler (ALS) installation. For a successful and timely installation of the instrument, the site must meet these requirements before beginning installation. Necessary supplies (gases, tubing, operating supplies, consumables, and other usage-dependent items such as columns, vials, syringes, and solvents) must also be available. Note that performance verification requires the use of helium carrier gas. For MS systems using chemical ionization, methane reagent gas or methanol (for internal ionization ion traps) is also required for performance verification. Refer to the Agilent Web site at www.agilent.com for the most up-to-date listing of GC and ALS supplies and consumables.

For 7697A Headspace Sampler site prep specifications, refer to the [7697A Site Prep Guide](#).

If you require any additional clarification on the requirements described in this manual, please visit the Agilent web site at www.chem.agilent.com, or contact your Agilent sales representative.



Customer Responsibilities

The specifications in this manual outline the necessary space, electrical outlets, gases, tubing, operating supplies, consumables, and other usage-dependent items such as columns, vials, syringes, and solvents required for the successful installation of instruments and systems.

If Agilent is delivering installation and familiarization services, users of the instrument should be present throughout these services; otherwise, they will miss important operational, maintenance, and safety information.

If Agilent is delivering installation and familiarization services, delays due to inadequate site preparation could cause loss of instrument use during the warranty period. In extreme cases, Agilent Technologies may ask to be reimbursed for the additional time required to complete the installation. Agilent Technologies provides service during the warranty period and under maintenance agreements only if the specified site requirements are met.

Before contacting Agilent to arrange for installation of your new GC, you must complete the Site Readiness Certification found in [Appendix 3](#), “7820A GC Site Preparation Readiness”.

Site Preparation Good Practices

If you are not already familiar with Agilent instruments or with gas chromatography, prepare for the installation and familiarization service by doing the following:

- Visit the Agilent web site at www.agilent.com/chem, and view the 7820A GC information available there.
- Attend one of the Agilent e-Seminars or training classes. Agilent also provides a variety of training options, from online training to on-site classes.

Having a basic knowledge of the instrument will enhance any the familiarization services.

Agilent Technologies Installation and Familiarization Services

If you purchased installation and familiarization services from Agilent, these services include:

- Installation of the GC
- Installation of purchased Agilent software
- Agilent chemical test to verify GC function
- Several hours of GC familiarization training for 2 operators. Some additional software training time is provided if you have purchased an Agilent software bundle.

The basic installation and familiarization services do NOT include tasks such as:

- Network setup of instruments or computers to the site network
- Customizations
- Method or application setup, development, or testing
- Analysis of customer standards or samples
- Site preparation (such installation of gas cylinders, tubing, traps, electrical supplies, or clearing of suitable bench space)
- Familiarization or installation of non-Agilent software

To arrange for additional services, including training or application development, contact your Agilent sales representative or visit the Agilent web site at www.agilent.com/chem.

Computer Requirements

A computer is required for 7820A GC installation and operation. The computer must meet the minimum requirements to run the Agilent Instrument Utility. [Table 1](#) lists these requirements for version B.01.01 of the Instrument Utility.

Table 1 Computer requirements

	Minimum	Recommended
Processor	1.5 GHz Pentium® 4	Pentium D or higher, Intel® Dual-Core 3.4 GHz or higher
RAM	1 GB	≥ 2 GB (Windows XP Pro) ≥ 4 GB (Windows Vista® Business)
Hard disk	40 GB	≥ 160 GB
Video	1024 x 768 resolution, 16K colors	≥ 1280 x 800 resolution, 16K colors
Removable media	ATAPI DVD drive	ATAPI DVD drive
Mouse	Microsoft® Windows® compatible	Microsoft Windows compatible
LAN	10/100 baseT	10/100 baseT
Operating system	Windows XP Pro, Service Pack 3	Windows XP Pro, Service Pack 3 or Windows Vista Business, Service Pack 1
Printer	Operating system printer using PCL 5e or PCL 6	Operating system printer using PCL 5e or PCL 6

Agilent also provides a free utility that can verify if your computer meets the requirements for a selected Agilent software product. To download the tool, go to the Agilent web site at www.agilent.com/chem, then search for “PC Utility.”

Basic Tools and Consumable Supplies

The GC comes with a few basic tools and consumables depending on the specific inlet and detector that you ordered. Below is a general list of what comes with the instrument.

Table 2 Basic tools

Tool or consumable	Used for
7820A GC	
FID flow measuring insert	FID troubleshooting.
Column cutter, ceramic or diamond	Column installation.
Inlet septa appropriate for type	Inlet seal.
Inlet insert or liner	Contains sample during vaporization in inlet.
Toolkit, 19199T	Routine maintenance tasks
Tubing kit, 19199TF	Preassembled tubing for installing supply gases

[Table 3](#) lists other useful tools not included with the GC.

Table 3 Useful tools not included with GC

Tool	Used for
Custom Tee, G3430-60009	Connecting the same gas to front and back EPC or EPR module.
μECD/TCD Detector plug, 5060-9055	Inlet pressure decay test
1/8-inch Ball Valve, 0100-2144	Inlet pressure decay test (one per inlet)
Digital flow meter, Flow tracker 1000	Verifying flows, checking for leaks and plugs
Electronic gas leak detector (G3388B)	Locating gas leaks; safety checks when using Hydrogen
Electronic vial crimper	Assuring consistently air-tight vial closure, regardless of who does the crimping

Table 4 lists consumables that you may wish to order. First time GC users should consider purchasing the following supplies in order to maintain their system and prevent interruptions in the use of their system. Please refer to the latest Agilent consumables and supplies catalog and to the Agilent web site at www.agilent.com/chem for part numbers and recommended maintenance periods.

Table 4 Additional consumables

Consumable category	Consumable
Inlet supplies	Septa, o-rings, liners, adapter, and seals
Inlet preventative maintenance (PM) kits	Kits with individual parts needed to maintain an inlet
Pneumatic supplies	Gases, traps, o-rings, seals, Swagelok fittings
Column supplies	Nuts, ferrules, adapters, guard columns, retention gaps
Detector supplies	Jets, beads, liners, adapters, cleaning kits
Application supplies	Standards, columns, syringes

Dimensions and Weight

Select the laboratory bench space before the system arrives. Make sure the area is clean, clear, and level. Pay special attention to the total height requirements. Avoid bench space with overhanging shelves. See [Table 5](#).

The instrument needs space for proper convection of heat and ventilation. Allow at least 25 cm (10 in) clearance between back of the instrument and wall to dissipate hot air and allow for routine maintenance.

Table 5 Required instrument height, width, depth, and weight

Product	Height	Width	Depth	Weight
GC				
7820A GC	49 cm (19.5 in)	56 cm (22 in)	51 cm (20.5 in)	50 kg (110 lb)
GC operational oven access		Requires ≥ 30 cm (12 in) open space above GC		
Headspace sampler (HS)				
7697A Headspace sampler				
111 vial model	80 cm (32 in)	69 cm (27 in)	70 cm (27.5 in)	46 kg (101 lb)
12 vial model	61 cm (24 in)	64 cm (25 in)	69 cm (27 in)	38.2 kg (84 lb)
ALS				
• GC with 7693A ALS injector		Requires 50 cm (19.5 in) above the GC		3.9 kg (8.6 lb) each
• GC with 7650A ALS injector		Requires 50 cm (19.5 in) above the GC		3.9 kg (8.6 lb) each
• GC with 7697A Headspace sampler		Requires 69 cm (27 in) to the right of the GC (G4557A), or 64 cm (25 in) to the right of the GC (G4556A).		

A 7820A system that includes a GC, ALS injector, and a computer would require about 126 cm (4 ft 2 in.) of bench space. Allowing for operational access and a printer, a total of 168 cm (5.5 ft) of bench space should be available for a full GC system. Some repairs to the GC will also require access to the back of the instrument.

A 7820 MSD system that includes a GC, ALS injector, 5977 or 5975 MSD and a computer would require about 165 cm (5 ft 5 in.) of bench space. Some repairs to the GC will also require access to the back of the instrument.

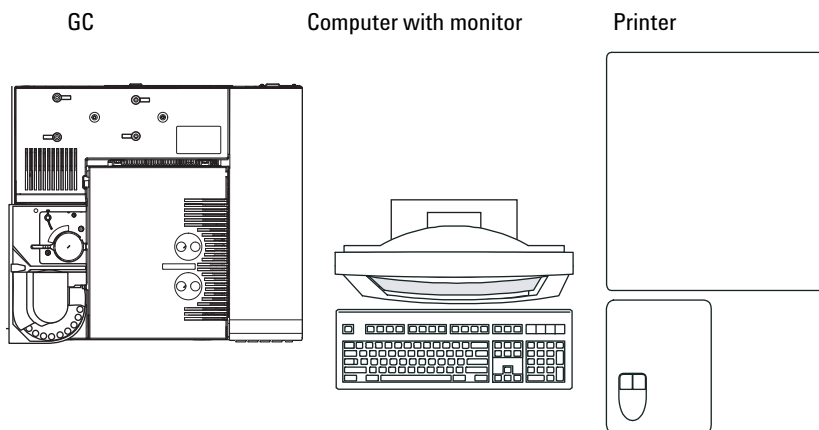


Figure 1 Top view of typical installation (7820A GC system)

Power Consumption

Table 106 lists site power requirements.

- The number and type of electrical outlets depend on the size and complexity of the system.
- Power consumption and requirements depend on the country to which the unit ships.
- The voltage requirements for your instrument are printed near the power cord attachment.
- The electrical outlet for the unit should have a dedicated ground.
- All instruments should be on a dedicated circuit.
- Power line conditioners should not be used with Agilent instruments.

Table 6 Power requirements

Product	Oven type	Line voltage (VAC)	Frequency (Hz)	Maximum continuous power consumption (VA)	Current rating (amps)	Power outlet current rating
7820A GC	Standard	100 single phase (–10% / +10%)	48–63	1500	12.5	15 Amp Dedicated
7820A GC	Standard	120 single phase (–10% / +10%)	48–63	2250	18.8	20 Amp Dedicated
7820A GC	Standard	200/220/230/240 single phase (–10% / +10%)	48–63	2250	9.6/9.3/ 9.3/9.2	10 Amp Dedicated
HS						
7697A Headspace		Americas: 120 single phase (–10% / +10%)	48–63	2250	18.8	20 Amp Dedicated
7697A Headspace		220/230/240 single/split phase (–10% / +10%)	48–63	2250	10.2/9.8/ 9.4	10 Amp Dedicated

Table 6 Power requirements (continued)

Product	Oven type	Line voltage (VAC)	Frequency (Hz)	Maximum continuous power consumption (VA)	Current rating (amps)	Power outlet current rating
All						
Data system PC (monitor, CPU, printer)		100/120/200-240 (–10% / +5%)	50/60 ± 5%	1000	15	15 Amp Dedicated

WARNING

Do not use extension cords with Agilent instruments. Extension cords normally are not rated to carry enough power and can be a safety hazard.

Although your GC should arrive ready for operation in your country, compare its voltage requirements with those listed in [Table 106](#). If the voltage option you ordered is not suitable for your installation, contact Agilent Technologies. Note that ALS instruments receive their power from the GC.

Grounding

CAUTION

A proper earth ground is required for GC operations. Any interruption of the grounding conductor or disconnection of the power cord could cause a shock that could result in personal injury.

To protect users, the metal instrument panels and cabinet are grounded through the three-conductor power line cord in accordance with International Electrotechnical Commission (IEC) requirements.

The three-conductor power line cord, when plugged into a properly grounded receptacle, grounds the instrument and minimizes shock hazard. A properly grounded receptacle is one that is connected to a suitable earth ground. Be sure to verify proper receptacle grounding.

Connect the GC to a dedicated circuit.

Canadian installation

When installing a GC in Canada, make sure your GC's power supply circuit meets the following additional requirements:

- The circuit breaker for the branch circuit, which is dedicated to the instrument, is rated for continuous operation.
- The service box branch circuit is marked as a “Dedicated Circuit.”

Common instrument power cord plugs

Table 7 below shows common Agilent power cord plugs.

Table 7 Power cord terminations

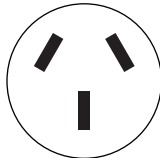
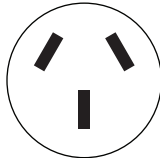
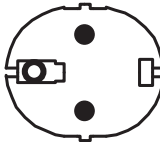
Country	Voltage	Amps	Cable length (m)	Termination type	Plug Termination
Australia	240	16	2.5	AS 3112	
China	220	15	4.5	GB 1002	
Europe, Korea	220 / 230 / 240	10	2.5	CEE/7/V11	

Table 7 Power cord terminations (continued)

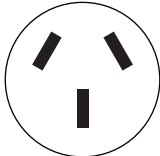
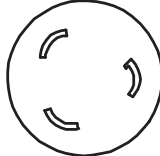
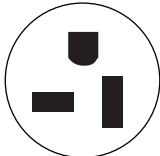
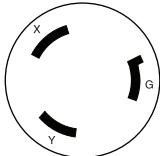
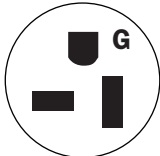
Country	Voltage	Amps	Cable length (m)	Termination type	Plug Termination
Denmark, Switzerland	230	16	2.5	Swiss/Denmark 1302	
India, South Africa	240	15	4.5	AS 3112	
Japan	200	20	4.5	NEMA L6-20P	
United Kingdom, Hong Kong, Singapore, Malaysia	240	13	2.5	BS89/13	
United States	120	20, 12 AWG	4.5	NEMA 5-20P	
United States	240	15, 14 AWG	2.5	NEMA L6-15P	

Table 7 Power cord terminations (continued)

Country	Voltage	Amps	Cable length (m)	Termination type	Plug Termination
Taiwan, South America		20, 12 AWG	2.5	NEMA 5-20P	

Heat Dissipation

Use [Table 8](#) to estimate the additional BTUs of heat dissipated from this equipment. Maximums represent the heat given off when heated zones are set for maximum temperatures.

Table 8 Heat dissipation

	Oven type
	Standard heater ramp
7820A GC	7681 BTU/hour maximum (8103 kJ/h) 5120 BTU/hour maximum (100 V power option) (5402 kJ/h)

Exhaust Venting

During normal operation, the GC exhausts hot oven air. Depending on the installed inlet and detector types, the GC can also exhaust (or vent) uncombusted carrier gas and sample. Proper venting of these exhausts is required for operation and safety.

Hot air

Hot air (up to 425 °C) from the oven exits through a vent in the rear. Allow at least 25 cm (10 in) clearance behind the instrument to dissipate this air.

WARNING

Do not place temperature-sensitive items (for example, gas cylinders, chemicals, regulators, and plastic tubing) in the path of the heated exhaust. These items will be damaged and plastic tubing will melt. Be careful when working behind the instrument during cool-down cycles to avoid burns from the hot exhaust.

Other gases

During normal operation of the GC with many detector and inlet types, some of the carrier gas and sample vents outside the instrument through the split vent, septum purge vent, and detector exhaust. If any sample components are toxic or noxious, or if hydrogen is used as the carrier gas or detector fuel gas, these exhausts must be vented to a fume hood. Place the GC in the hood or attach a large diameter venting tube to the outlet for proper ventilation.

To further prevent contamination from noxious gases, attach a chemical trap to the vent(s).

If using a μ ECD, always plan to connect the μ ECD exhaust vent to a fume hood or vent it to the outside. See the latest revision of 10 CFR Part 20 (including Appendix B), or the applicable state regulation. For other countries, consult with the appropriate agency for equivalent requirements. Agilent recommends a vent line internal diameter of 6 mm (1/4-inch) or greater. With a line of this diameter, the length is not critical.

Exhaust vent fittings

The various inlet and detector vents terminate in the following fittings:

- TCD, μ ECD: The detector exhaust terminates in a 1/8-inch od tube.
- All inlets: The septum purge vent terminates in 1/8-inch od tubing.

Environmental Conditions

Operating the instrument within the recommended ranges optimizes instrument performance and lifetime. Performance can be affected by sources of heat and cold from heating, air conditioning systems, or drafts. See [Table 9](#). The conditions assume a noncondensing, noncorrosive atmosphere. The instrument meets the following International Electrotechnical Commission (IEC) classifications: Equipment Class I, Laboratory Equipment, Installation Category II, and Pollution Degree 2.

Table 9 Environmental conditions for operation and storage

Product	Conditions	Operating temp range	Operating humidity range	Maximum altitude
7820A GC	Standard oven ramp	5 to 45 °C	5 to 90%	3,100 m
	Storage	–20 to 65 °C	0 to 90%	

Gas and Reagent Selection

NOTE

Nitrogen and Argon/Methane are generally not suitable for GC/MS carrier gas.

[Table 10](#) lists gas recommendations for packed column use. In general, makeup gases are not required with packed columns.

Table 10 Gases usable with Agilent GCs and packed columns

Detector type	Carrier gas	Comments	Detector, anode purge, or reference
Electron capture (ECD)	Nitrogen	Maximum sensitivity	Nitrogen
	Argon/methane	Maximum dynamic range	Argon/Methane
Flame ionization (FID)	Nitrogen	Maximum sensitivity	Hydrogen and air for detector.
	Helium	Acceptable alternative	
Flame photometric (FPD)	Hydrogen Helium Nitrogen Argon		Hydrogen and air for detector.
Nitrogen-Phosphorus (NPD)	Helium	Optimum performance	Hydrogen and air for detector.
	Nitrogen	Acceptable alternative	
Thermal conductivity (TCD)	Helium	General use	Reference must be same as carrier and makeup.
	Hydrogen	Maximum sensitivity ¹	
	Nitrogen	Hydrogen detection ²	
	Argon	Maximum hydrogen sensitivity ¹	

- 1 Slightly greater sensitivity than helium. Incompatible with some compounds.
- 2 For analysis of hydrogen or helium. Greatly reduces sensitivity for other compounds.

For installation checkout, Agilent requires the gas types shown in [Table 11](#).

Table 11 Gases required for checkout

Detector	Gases required
FID	Carrier: helium Makeup: nitrogen Fuel: hydrogen Aux gas: Air
TCD	Carrier and reference: helium
NPD	Carrier: helium Makeup: nitrogen Fuel: hydrogen Aux gas: Air
uECD	Carrier: helium Anode purge and makeup: nitrogen
FPD	Carrier: helium Makeup: nitrogen Fuel: hydrogen Aux gas: Air

WARNING

When using hydrogen (H_2) as the carrier gas or fuel gas, be aware that hydrogen gas can flow into the GC and create an explosion hazard. Therefore, be sure that the supply is turned off until all connections are made and ensure the inlet and detector column fittings are either connected to a column or capped at all times when hydrogen gas is supplied to the instrument.

Hydrogen is flammable. Leaks, when confined in an enclosed space, may create a fire or explosion hazard. In any application using hydrogen, leak test all connections, lines, and valves before operating the instrument. Always turn off the hydrogen supply at its source before working on the instrument.

Please refer to the Hydrogen Safety Guide shipped with your instrument.

Gas and Reagent Purity

Agilent recommends that carrier and detector gases be 99.9995% pure. See [Table 12](#). Air needs to be zero grade or better. Agilent also recommends using high quality traps to remove hydrocarbons, water, and oxygen.

Table 12 Carrier and reagent gas purity

Carrier and reagent gas requirements	Purity	Notes
Helium (carrier)	99.9995%	Hydrocarbon free
Hydrogen (carrier)	99.9995%	SFC grade
Nitrogen (carrier)	99.9995%	
Nitrogen (drying gas, nebulizer pressure) ¹	99.999%	Research grade

¹ Purity specification is the minimum acceptable purity. Major contaminants can be water, oxygen, or air. Drying gas and nebulizer pressure gas can be supplied by a nitrogen gas generator, house nitrogen system, or liquid nitrogen dewar.

WARNING

When using hydrogen (H₂) as the carrier gas or fuel gas, be aware that hydrogen gas can flow into the GC and create an explosion hazard. Therefore, be sure that the supply is turned off until all connections are made and ensure the inlet and detector column fittings are either connected to a column or capped at all times when hydrogen gas is supplied to the instrument.

Hydrogen is flammable. Leaks, when confined in an enclosed space, may create a fire or explosion hazard. In any application using hydrogen, leak test all connections, lines, and valves before operating the instrument. Always turn off the hydrogen supply at its source before working on the instrument.

Please refer to the Hydrogen Safety Guide shipped with your instrument.

Gas Supplies

General requirements

Supply instrument gases using tanks, an internal distribution system, or gas generators. If used, tanks require two-stage pressure regulators with packless, stainless steel diaphragms. The instrument requires 1/8-inch Swagelok connections to its gas supply fittings. See [Figure 32](#).

NOTE

Plumb the gas supply tubing/regulators so that one 1/8-inch Swagelok female connector is available for each gas needed at the instrument.

[Table 13](#) lists available Agilent two-stage tank regulators. All Agilent regulators are supplied with the 1/8-inch Swagelok female connector.

Table 13 Tank regulators

Gas type	CGA number	Max pressure	Part number
Air	346	125 psig (8.6 Bar)	5183-4641
Industrial Air	590	125 psig (8.6 Bar)	5183-4645
Hydrogen, Argon/Methane	350	125 psig (8.6 Bar)	5183-4642
Oxygen	540	125 psig (8.6 Bar)	5183-4643
Helium, Argon, Nitrogen	580	125 psig (8.6 Bar)	5183-4644

[Table 14](#) and [Table 15](#) list minimum and maximum delivery pressures for inlets and detectors, measured at the bulkhead fittings on the back of the instrument.

Table 14 Delivery pressures for inlets required at the GC, in kPa (psig)

	Inlet type	
	Split/Splitless	Purged packed
Carrier (max)	827 (120)	827 (120)
Carrier (min)	(20 psi) above pressure used in method	

Table 15 Delivery pressures for detectors required at the GC/MS, in kPa (psig)

	Detector type				
	FID	NPD	TCD	uECD	FPD
Hydrogen	240–690 (35–100)	240–690 (35–100)			310–690 (45–100)
Air	380–690 (55–100)	380–690 (55–100)			690–827 (100–120)
Makeup	380–690 (55–100)	380–690 (55–100)	380–690 (55–100)	380–690 (55–100)	380–690 (55–100)
Reference			380–690 (55–100)		

Conversions: 1 psi = 6.8947 kPa = 0.068947 Bar = 0.068 ATM

Requirements for hydrogen as a carrier gas

Hydrogen can be supplied from a generator or from a cylinder.

Agilent recommends use of a high-quality hydrogen gas generator. A high-quality generator can consistently produce purity > 99.9999%, and the generator can include built-in safety features such as limited storage, limited flow rates, and auto-shutdown. Select a hydrogen generator that provides low (good) specifications for water and oxygen content.

If using a hydrogen gas cylinder, Agilent recommends use of Gas Clean Filters to purify the gas. Consider additional safety equipment as recommended by your company safety personnel.

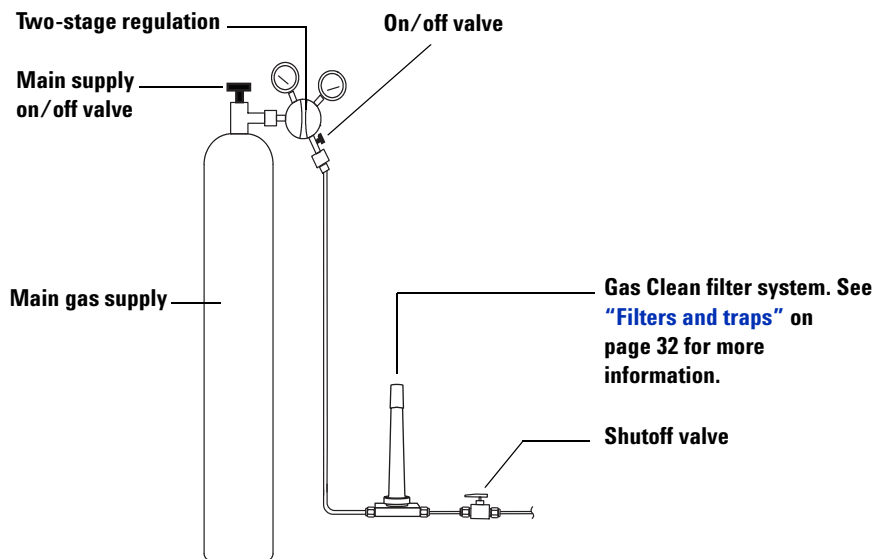
Gas Plumbing

WARNING

All compressed gas cylinders should be securely fastened to an immovable structure or permanent wall. Compressed gases should be stored and handled in accordance with the relevant safety codes.

Gas cylinders should not be located in the path of heated oven exhaust.

To avoid possible eye injury, wear eye protection when using compressed gas.



Gas Clean filter configuration will vary depending on the application.

Figure 2 Recommended filters and plumbing configuration from a carrier gas cylinder

- If you have not requested option 305 (pre-plumbed tubing), you must supply pre-cleaned, 1/8-inch copper tubing and a variety of 1/8-inch Swagelok fittings to connect the GC to inlet and detector gas supplies. See the [Installation Kits](#) for recommended parts.
- Agilent strongly recommends two-stage regulators to eliminate pressure surges. High-quality, stainless-steel diaphragm-type regulators are especially recommended.
- On/off valves mounted on the outlet fitting of the two-stage regulator are not essential but are very useful. Be sure the valves have stainless-steel, packless diaphragms.
- Agilent strongly recommends installation of shut-off valves at each GC inlet supply fitting to allow the GC to be isolated for maintenance and troubleshooting. Order part number 0100-2144. (Note that some optional installation kits include one shut-off valve. See [Installation Kits](#).)
- If you purchased automated valving, the valve actuation requires a **separate** pressurized, dry air supply at 380 kPa (55 psig). This air supply must end in a male fitting compatible with a 1/4-inch id plastic tube at the GC.
- FID, FPD, and NPD detectors require a dedicated air supply. Operation may be affected by pressure pulses in air lines shared with other devices.
- Flow- and pressure-controlling devices require at least 10 psi (138 kPa) pressure differential across them to operate properly. Set source pressures and capacities high enough to ensure this.
- Situate auxiliary pressure regulators close to the GC inlet fittings. This ensures that the supply pressure is measured at the instrument (rather than at the source); pressure at the source may be different if the gas supply lines are long or narrow.
- **Never use liquid thread sealer to connect fittings.**
- **Never use chlorinated solvents to clean tubing or fittings.**

Supply tubing for most carrier and detector gases

Use only preconditioned copper tubing (part number 5180-4196) to supply gases to the instrument. Do not use ordinary copper tubing—it contains oils and contaminants.

CAUTION

Do not use methylene chloride or other halogenated solvent to clean tubing that will be used with an electron capture detector. They will cause elevated baselines and detector noise until they are completely flushed out of the system.

CAUTION

Do not use plastic tubing for supplying detector and inlet gases to the GC. It is permeable to oxygen and other contaminants that can damage columns and detectors. Plastic tubing can melt if near hot exhaust or components.

The tubing diameter depends on the distance between the supply gas and the GC and the total flow rate for the particular gas. Tubing of 1/8-in diameter is adequate when the supply line is less than 15 feet (4.6 m) long.

Use larger diameter tubing (1/4-in) for distances greater than 15 feet (4.6 m) or when multiple instruments are connected to the same source. Use larger diameter tubing if high demand is anticipated (for example, air for an FID).

Be generous when cutting tubing for local supply lines—a coil of flexible tubing between the supply and the instrument lets you move the GC without moving the gas supply. Take this extra length into account when choosing the tubing diameter.

Supply tubing for hydrogen gas

Agilent recommends using new chromatographic quality stainless steel tubing and fittings when using hydrogen.

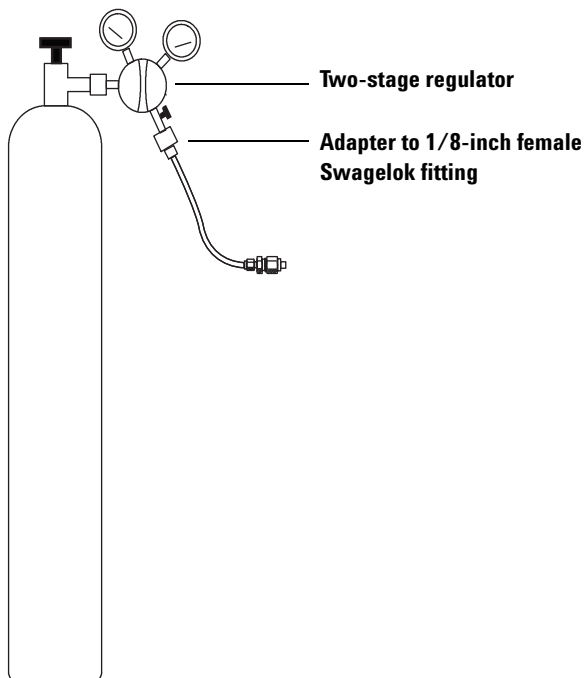
- Do not re-use old tubing when installing or switching to hydrogen supply lines for carrier gas or the JetClean ion source system. Hydrogen gas tends to remove contaminants left on old tubing by previous gases (by helium, for example). These contaminants can appear in output as high background noise or hydrocarbon contamination for several weeks.
- Especially do not use old copper tubing, which can become brittle.

WARNING

Do not use old copper tubing with hydrogen gas. Old copper tubing can become brittle and create a safety hazard.

Two-stage pressure regulators

To eliminate pressure surges, use a two-stage regulator with each gas tank. Stainless steel, diaphragm-type regulators are recommended.



The type of regulator you use depends on the gas type and supplier. The Agilent catalog for consumables and supplies contains information to help you identify the correct regulator, as determined by the Compressed Gas Association (CGA). Agilent Technologies offers pressure-regulator kits that contain all the materials needed to install regulators properly.

Pressure regulator-gas supply tubing connections

Use PTFE tape to seal the pipe-thread connection between the pressure regulator outlet and the fitting to which you connect the gas tubing. Instrument grade PTFE tape (part number 0460-1266), from which volatiles

have been removed, is recommended for all fittings. **Do not use pipe dope to seal the threads**; it contains volatile materials that will contaminate the tubing.

Pressure regulators typically end in fittings that must be adapted to the correct style or size. [Table 16](#) lists parts needed to adapt a standard 1/4-inch male NPT fitting to a 1/8-inch or 1/4-inch Swagelok fitting.

Table 16 Parts for adapting NPT fittings

Description	Part number
Swagelok 1/8-inch to female 1/4-inch NPT, brass	0100-0118
Swagelok 1/4-inch to female 1/4-inch NPT, brass	0100-0119
Reducing union, 1/4-in. to 1/8-in., brass, 2/pk	5180-4131

Filters and traps

Using chromatographic-grade gases ensures that the gas in your system is pure. However, for optimum sensitivity, install high-quality filters or traps to remove traces of water or other contaminants. After installing a filter, check the gas supply lines for leaks.

Agilent recommends the Gas Clean Filter system. The Gas Clean Filter system delivers high purity gases to your analytical instruments, reducing the risk of column damage, sensitivity loss, and instrument downtime. The filters are designed for use with the GC, GC/MS, ICP-OES, ICP-MS, LC/MS, and any other analysis instrument using carrier gas. Six filters are available, including CO₂, oxygen, moisture, and organics trap (charcoal).

Filter types

Each Gas Clean Filter type is designed to filter out a specific impurity that may exist in the gas supply. The following filter types are available:

- **Oxygen** - Prevents oxidation of the GC column, septum, liner, and glass wool.
- **Moisture** - Delivers fast stabilization times for increased GC productivity, and prevents hydrolization damage to the stationary phase, column, liner, glass wool, or septum in the GC.

- **Process Moisture** - Prevents oxidation of GC components and is safe to use with acetylene in process GC applications.
- **Charcoal** - Removes organic compounds and ensures correct performance of FID detectors in the GC.
- **GC/MS** - Delivers fast stabilization times for increased GC productivity, removes oxygen, moisture, and hydrocarbons from the carrier gas for MS applications, and provides ultimate GC column protection.

[Table 17](#) on page 34 shows recommended filter connection diagrams for common instrument configurations.

Table 17 Connection diagrams for common detectors

Detector	Connection Diagram
ECD Electron Capture Detector	<pre> graph LR CG[Carrier Gas] --> OF1[Oxygen Filter] OF1 --> MF1[Moisture Filter] MF1 --> Col[Column] Col --> ECD[ECD] N2[Nitrogen] --> OF2[Oxygen Filter] OF2 --> MF2[Moisture Filter] MF2 -- Anode Purge Gas --> ECD MF2 -- Make-Up Gas --> ECD </pre>
FID Flame Ionization Detector (Carrier Gas = Make-Up Gas)	<pre> graph LR CG[Carrier Gas] --> OF[Oxygen Filter] OF --> MF[Moisture Filter] MF --> Col[Column] Col --> FID[FID] H2[Hydrogen] --> CF1[Charcoal Filter] Air[Air] --> CF2[Charcoal Filter] CF1 --> FID CF2 --> FID </pre>
FID Flame Ionization Detector (Carrier Gas differs from Make-Up Gas)	<pre> graph LR CG[Carrier Gas] --> GCMF[GC/MS Filter] GCMF --> Col[Column] Col --> FID[FID] MG[Make-Up Gas] --> CF1[Charcoal Filter] CF1 --> FID H2[Hydrogen] --> CF2[Charcoal Filter] Air[Air] --> CF3[Charcoal Filter] CF2 --> FID CF3 --> FID </pre>
FPD Flame Photometric Detector	<pre> graph LR CG[Carrier Gas] --> OF[Oxygen Filter] OF --> MF[Moisture Filter] MF --> Col[Column] Col --> FPD[FPD] H2[Hydrogen] --> CF1[Charcoal Filter] Air[Air] --> CF2[Charcoal Filter] CF1 -- Flame 1 --> FPD CF2 -- Flame 2 --> FPD </pre>

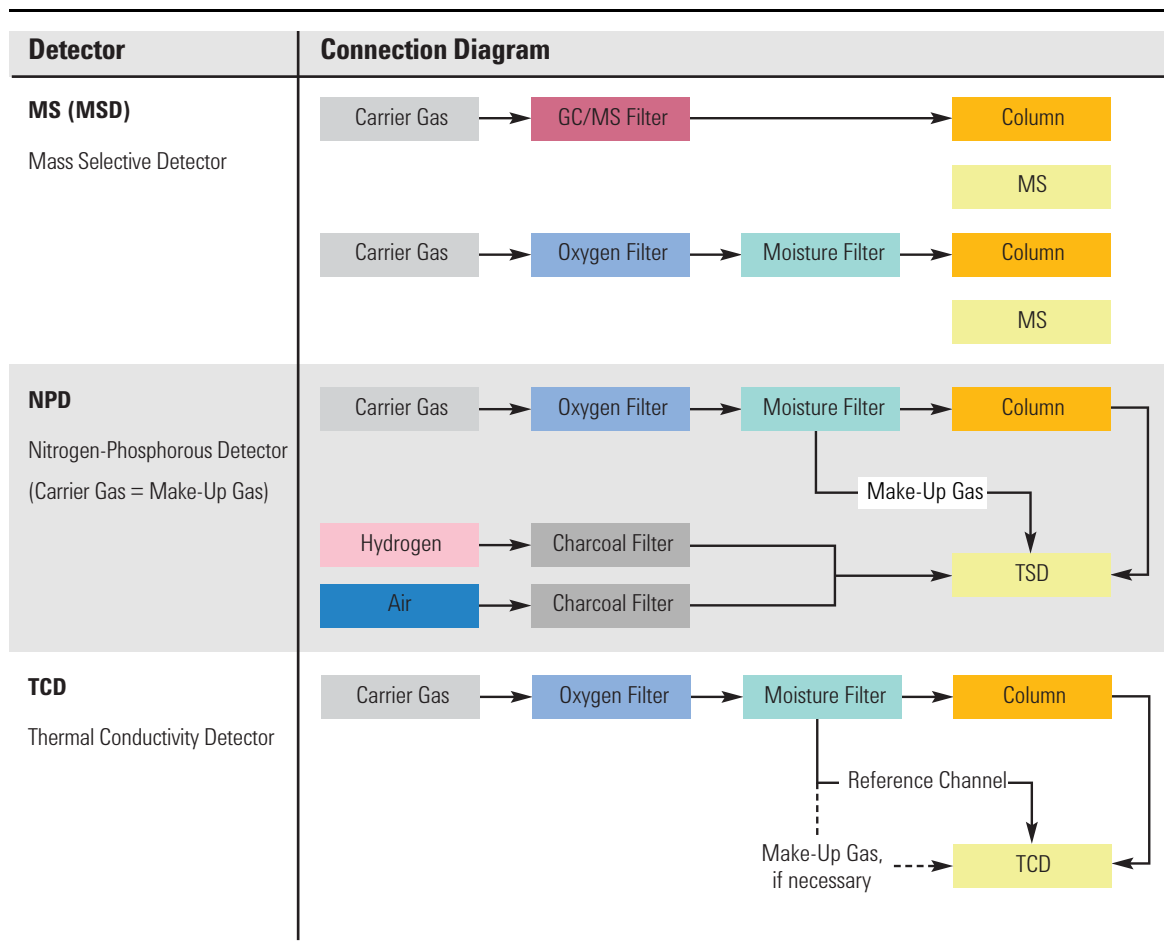
Table 17 Connection diagrams for common detectors (continued)

Table 18 lists the most common Gas Clean Filter system kits. See the Agilent online store or contact your local Agilent sales representative for additional filters, parts, and accessories applicable to your instrument configuration.

Table 18 Recommended Gas Clean Filter kits

Description	Part number	Use
Gas Clean Filter kit (connecting unit for four filters, including four filters, 1/4-inch connections)	CP7995	FID, FPD, NPD
Gas Clean Filter kit (connecting unit for four filters, including four filters, 1/8-inch connections)	CP736530	FID, FPD, NPD
GC/MS Gas Clean Filter kit (includes one connecting unit and two GC/MS filters, 1/8-inch connections)	CP17976	ECD, GC/MS
GC/MS Gas Clean Filter kit (includes one connecting unit and two GC/MS filters, 1/4-inch connections)	CP17977	ECD, GC/MS
GC/MS Gas Clean Filter installation kit (includes CP17976, 1 m copper tubing, and two 1/8-inch nuts and ferrules)	CP17978	ECD, GC/MS
TCD filter kit (with oxygen and moisture filters)	C0738408	TCD

Each separate gas supply requires its own filters.

GC/MS Gas and Reagent Requirements

Table 113 lists the limits on total gas flow into the 5975 Series MSD.

Table 19 5975 Series MSD total gas flow limitations

Feature	G3170A	G3171A	G3172A	G3174A
High vacuum pump	Diffusion	Standard turbo	Performance turbo	Performance turbo, EI/PCI/NCI
Optimal gas flow mL/min ¹	1.0	1.0	1.0 to 2.0	1.0 to 2.0
Maximum recommended gas flow, mL/min	1.5	2.0	4.0	4.0
Maximum gas flow, mL/min ²	2.0	2.4	6.5	2.0
Max column id	0.25 mm (30 m)	0.32 mm (30 m)	0.53 mm (30 m)	0.53 mm (30 m)

1 Total gas flow into the MSD = column flow + reagent gas flow (if applicable) + Agilent CFT device flow (if applicable). Instruments using a JetClean ion source system may also add a small (~0.075 mL/min) hydrogen flow.

2 Expect degradation of spectral performance and sensitivity.

Table 118 lists the limits on total gas flow into the 5977 Series MSD.

Table 20 5977 Series MSD total gas flow limitations

Feature	5977A MSD	G7037A	G7038A, G7039A, G7040A
	5977B MSD	G7080B	G7081B, G7077B, G7078B, G7079B
High vacuum pump		Diffusion	Performance turbo
Optimal gas flow mL/min ¹		1.0	1.0 to 2.0
Maximum recommended gas flow, mL/min		1.5	4.0
Maximum gas flow, mL/min ²		2.0	6.5
Max column id		0.25 mm (30 m)	0.53 mm (30 m)

7820A GC Site Preparation

- 1 Total gas flow into the MSD = column flow + reagent gas flow (if applicable) + Agilent CFT device flow (if applicable). Instruments using a JetClean ion source system may also add a small (~ 0.075 mL/min) hydrogen flow.
- 2 Expect degradation of spectral performance and sensitivity.

Maximum Length of Cables

The distance between system modules may be limited by some of the cabling and the vent or vacuum hoses.

- The length of the Agilent-supplied remote cable is 2 meters (6.6 feet).
- The length of the Agilent-supplied LAN cable is 10 meters (32.8 feet).
- The lengths of the power cords are 2 meters (6.6 feet).
- The length of a 7697A Headspace Sampler transfer line is about 99 cm (39 inches).

Site LAN Network

If you intend to connect your system to your site's LAN network, you must have an additional shielded twisted pair network cable (8121-0940).

NOTE

Agilent Technologies is not responsible for connecting to or establishing communication with your site LAN network. The representative will test the system's ability to communicate on a mini-hub or LAN switch only.

NOTE

The IP addresses assigned to the instrument(s) must be fixed (permanently assigned) addresses. If you intend to connect your system to your site's network, each piece of equipment must have a unique, fixed (static) IP address assigned to it.

NOTE

For a Single Quad GC/MS system, Agilent recommends, sells, and supports the use of a PC with one (1) network interface card (NIC) and a network switch to isolate the GC/MS system from the site LAN. The network switch supplied with Agilent systems prevents instrument-to-PC network traffic from entering the site LAN and keeps site LAN network traffic from interfering with instrument-to-PC communications. Agilent develops and tests all Single Quad GC/MS hardware and software using the single NIC configuration and has no known network configuration issues. Alternate network configurations can be configured and managed by the end user at their own risk and expense.



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7693A and 7650 Automatic Liquid Sampler Site Preparation

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This section outlines the space and resource requirements for a 7693A and 7650 automatic liquid sampler (ALS). For a successful and timely installation of the ALS, the site must meet these requirements before beginning installation. Necessary supplies (operating supplies, consumables, and other usage-dependent items such as vials, syringes, and solvents) must also be available. Refer to the Agilent Web site at www.agilent.com/chem for the most up-to-date listing of GC, GC/MS, and ALS supplies and consumables.

Refer to your GC documentation for compatibility with a specific ALS model.



Customer Responsibilities

The specifications in this manual outline the necessary space, electrical outlets, tubing, operating supplies, consumables, and other usage-dependent items such as vials, syringes, and solvents required for the successful installation of instruments and systems.

If Agilent is delivering installation and familiarization services, users of the instrument should be present throughout these services; otherwise, they will miss important operational, maintenance, and safety information.

If Agilent is delivering installation and familiarization services, delays due to inadequate site preparation could cause loss of instrument use during the warranty period. In extreme cases, Agilent Technologies may ask to be reimbursed for the additional time required to complete the installation. Agilent Technologies provides service during the warranty period and under maintenance agreements only if the specified site requirements are met.

Basic Tools and Consumable Supplies

The 7693A and 7650 ALS come with a few basic tools and consumables depending on the hardware that you ordered. Below is a general list of what comes with the instrument.

Table 21 Basic tools and consumables

Tool or consumable	Used for
T10 Torx wrench	Replacing turret. Replacing syringe carriage.
T35 Torx wrench	Removing tray.
Sample vial starter pack	
Syringe, 10 μ L	

Agilent also recommends ordering other useful supplies, listed in as needed.

Table 22 Additional ALS supplies and parts

Part number	Description
Crimpers and decappers	
5062-0207	11 mm electronic crimper with 4.8 V rechargeable battery pack and charger.
5062-0210	11 mm electronic decapper with 4.8 V rechargeable battery pack and charger.
5040-4667	Ergonomic manual crimper for 11 mm caps.
5040-4668	Ergonomic manual decapper for 11 mm caps.
5040-4674	11 mm electronic crimper, manual decapper, and cap bundle. Includes 1 electronic crimper, 1 manual decapper, 100 silvertone aluminum caps with PTFE/rubber septa.
Vial racks (7693A)	
9301-0722	Rack for 12 mm, 2 mL vials, holds 50 vials per rack. 5/pk.
5182-0575	Vial storage container, holds 50 vials per container.

Dimensions and Weight

Select the laboratory bench space before the system arrives. Pay special attention to the total height requirements. Avoid bench space with overhanging shelves. See [Table 23](#).

Table 23 Required height, width, depth, and weight

Product	Height (cm)	Width (cm)	Depth (cm)	Weight (kg)
G4513A Injector	51	16.5	16.5	3.9
G4514A Tray ¹	29	44	43	6.8
G4515A Bar Code Reader ¹	not applicable	not applicable	not applicable	0.3
G4522A Cooling Accessory	not applicable	not applicable	not applicable	2.2 (plus water weight)
7650A Injector	51	22	24	4.5
Additional space requirements				
• GC with 7693A ALS injector		Requires 50 cm (19.5 in) above the GC		
• GC with 7693A ALS tray		Requires 45 cm (17.5 in) left of the GC		
• GC with 7650 ALS injector		Requires 50 cm (19.5 in) above the GC Requires 9 cm (3.6 in) in front of the GC Requires 3 cm (1.2 in) to the left of the GC		

¹ The **G4520A** Tray with a bar code reader is available with a G4514A Tray and G4515A bar code reader.

Power Consumption

The ALS components draw power from the GC. No other power source is required.

Environmental Conditions

Operating the instrument within the recommended ranges optimizes instrument performance and lifetime. The sampler system operates in the same environment as its parent GC. See:

[7820A GC](#)

The conditions assume a noncondensing, noncorrosive atmosphere.

Table 24 Environmental conditions for operation and storage

Product	Conditions	Operating temp range	Operating humidity range	Maximum altitude
G4513A Injector G4514A Tray ¹ G4515A Bar Code Reader ¹	Operation	0 to 40 °C	5–95%	4,300 m
7650 Injector	Operation	0 to 40 °C	5–95%	4,300 m

¹ The **G4520A** Tray with a bar code reader is available with a G4514A Tray and G4515A bar code reader.

Chiller Supplies

If using the optional G4522A Cooling Accessory, you will need to supply:

- A water chiller
- Tubing and 1/8-inch Swagelok fittings to connect the chilled water and return water to the chiller
- A container or drain to dispose of condensate from the tray



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7820A GC Site Preparation Readiness

Before Contacting Agilent for Installation 48

Site Readiness Certification 49

This appendix contains an important form that Agilent requires as a prerequisite to Agilent installation and familiarization services.

This appendix applies only to the 7820A GC.



Before Contacting Agilent for Installation

If you have purchased Agilent installation and familiarization services, it is important that your facility has been completely prepared for GC installation and operation *before* the Agilent service representative arrives. This helps ensure the most timely and efficient service possible.

Before Agilent will schedule installation, you must certify that the site has been prepared and that the GC has arrived and is ready for installation.

To certify your installation site:

- 1 Prepare the site as described in this manual.
- 2 Print out the form on the following page.
- 3 Fill in and return the completed Readiness Certification to Agilent **before** arranging for an installation date. See the form for instructions (next page).

Table 25 Agilent contact information

	FAX	Email
India	Hyderabad : +91-40-23116224	cag_india@agilent.com
	Bangalore : +91-80-41665120	
	Gurgoan : +91-124-4727102	
	Mumbai : +91-22-30648339	
China	+86 8008203278	lsca-china_800@agilent.com

- 4 Arrange the installation date.

After arranging an installation date, you must still make sure that the appropriate personnel will be available during the installation.



Site Readiness Certification

I have read and understand the 7820A GC Site Preparation requirements, and certify that the site has been prepared for instrument installation as described in this manual, including:

- ? Adequate space and suitable supporting bench available
- ? Adequate electrical power available at the correct voltages and frequencies
- ? Environmental control systems adequate to maintain a correct, stable operating environment
- ? Necessary supplies for instrument performance evaluation are available, including solvents, helium carrier gas and other gases as needed for your detectors, and printer paper
- ? Adequate computer with LAN connectivity
- ? User with administrative privileges on the computer
- ? Appropriate personnel will be available during installation

I understand that delays due to inadequate site preparation could cause loss of instrument use during the warranty period.

Return the completed form by:

FAX See [Table 25](#)

E-mail See [Table 25](#)

Contact your Agilent representative for assistance.

For more information, refer to the Agilent support page at www.agilent.com/chem.

Company Name	
Company Address	
Contact Information (name, phone / e-mail)	
Comments	
Manager responsible for site preparation	Date

