



# COMMERCIAL POOL CONTRACTORS GENERAL TRADE KNOWLEDGE EXAMINATION CONTENT INFORMATION

Revised September 14

The General Trade Knowledge portion of the examination is administered daily in Computer Based Testing (CBT) format. It will consist of 80 equally weighted questions.

The examination will have questions relating to the following content areas and necessary knowledge for each area includes:

- reading and interpreting plans and specifications
- reading and interpreting codes
- basic mathematics (addition, subtraction, multiplication, division, calculations of area and volume, fractions, decimals, percentages, calculating the sides of triangles, square roots, powers of numbers, and solving simple algebraic equations for unknown variables)

You should be prepared to respond to examination questions on any of the content areas listed. Questions asked and content areas tested on previous examinations should not be assumed to be the only possible questions to be asked or content areas to be tested on this examination.

The percentage of questions shown for each content area may vary by as much as plus or minus three (3) percent. Please refer to the Candidate Information Brochure and the Reference List for additional information.

## **Content Area A** **5%** **Pre-Installation and Site Preparation**

- 1. Interpret plans that meet job requirements**
  - knowledge of symbols
  - knowledge of abbreviations
  - knowledge of terminology
  - knowledge of site dimensions
  - knowledge of scale dimensions
  - knowledge of soil types

- 2. Checking code and ordinance requirements to determine appropriate equipment needed for jobs**

- knowledge of site conditions
- knowledge of subsoil conditions
- knowledge of water tables
- knowledge of characteristics of concrete, tile, steel, fiberglass, vinyl, piping and wiring
- knowledge of OSHA requirements

## **Content Area B** **15%** **Pool and Spa Excavation**

- 1. Locating underground, above ground and overhead obstructions**

- knowledge of where to find information
- knowledge of site conditions
- knowledge of how to identify obstructions
- knowledge of when and how to notify appropriate authorities
- knowledge of permissible working conditions

- 2. Excavating or clearing sites**

- knowledge of staking out excavation
- knowledge of determining location of excavation
- knowledge of basic surveying
- knowledge of layout methods
- knowledge of interpreting plans and specifications
- knowledge of surveying and leveling equipment
- knowledge of compaction equipment
- knowledge of earth moving and excavation equipment
- knowledge of structural support systems
- knowledge of protection of surrounding structures

- 3. Performing site grading**

- knowledge of elevation requirements
- knowledge of basic surveying and leveling techniques
- knowledge of surveying and leveling equipment
- knowledge of identification of obstructions
- knowledge of removal of site debris

4. **Determining water tables**  
 knowledge of subsoil conditions  
 knowledge of aquifers and tidal influences  
 knowledge of drilling equipment and practices
5. **Determining water and soil conditions**  
 knowledge of excavation  
 knowledge of sampling  
 knowledge of soil composition  
 knowledge of soil testing requirements
6. **Performing de-watering, de-mucking and well-pointing**  
 knowledge of dewatering equipment  
 knowledge of piping requirements  
 knowledge of soils  
 knowledge of soil permeability  
 knowledge of excavation equipment  
 knowledge of excavating techniques and requirements  
 knowledge of water table  
 knowledge of well points  
 knowledge of drawdown  
 knowledge of pump requirements and techniques
7. **Removing sod**  
 knowledge of calculating area  
 knowledge of compaction  
 knowledge of soil conditions
8. **Backfilling and compacting**  
 knowledge of different types of backfill material  
 knowledge of surveying and leveling equipment  
 knowledge of surveying and leveling techniques  
 knowledge of soil properties  
 knowledge of compaction methods  
 knowledge of correct moisture content  
 knowledge of percent compaction  
 knowledge of soil density testing techniques  
 knowledge of the amount of dirt to fill
9. **Removing foreign materials and debris**  
 knowledge of hand tools  
 knowledge of excavation equipment  
 knowledge of hauling equipment  
 knowledge of materials disposal requirements  
 knowledge of environmental standards protection

**Content Area C**  
**Plumbing Work**

12½%

1. **Installing recirculating, drainage and waste lines**  
 knowledge of piping materials and applications  
 knowledge of placement  
 knowledge of associated fittings  
 knowledge of valve requirements  
 knowledge of related components  
 knowledge of pipe support  
 knowledge of gravity, pressure, suction and drainage systems
2. **Pressure testing recirculating lines**  
 knowledge of theory  
 knowledge of psi  
 knowledge of hook-up and placement  
 ability to understand test results  
 knowledge of dangers of pressure plugs  
 knowledge of open trench inspections  
 knowledge of pressure testing techniques  
 knowledge of the dangers of pressurized lines
3. **Installing filter equipment**  
 knowledge of filtration requirements  
 knowledge of type of filters  
 knowledge of gauges and valves  
 knowledge of placement of pumps  
 knowledge of piping requirements  
 knowledge of flow rates and piping pressures  
 knowledge of inlets and outlets
4. **Installing pumps**  
 knowledge of types of pumps and pump loads  
 knowledge of grounding  
 knowledge of piping techniques and requirements  
 knowledge of pressures and flow requirements  
 knowledge of types and capacities of motors  
 knowledge of hair and lint strainers
5. **Installing skimmers**  
 knowledge of types of skimmers  
 knowledge of skimmer housings  
 knowledge of strainer baskets  
 knowledge of weirs and valves  
 knowledge of vacuum cleaning connections

- 6. Installing solar heaters**  
 knowledge of solar heating requirements and practices  
 knowledge of solar collectors  
 knowledge of piping techniques and requirements  
 knowledge of pipe fittings  
 knowledge of control requirements  
 knowledge of pump requirements
- 7. Installing conventional heaters (gas, heat pump, electric)**  
 knowledge of state and local codes  
 knowledge of location requirements  
 knowledge of fire and gas codes  
 knowledge of sizing and flow rates  
 knowledge of heat exchangers for gas heaters  
 knowledge of location of L.P. as tanks for gas heaters  
 knowledge of heat pumps for electric heaters  
 knowledge of immersion elements for electric heaters  
 knowledge of ventilation requirements
- 8. Installing automatic cleaners**  
 knowledge of piping requirements  
 knowledge of pipe fitting  
 knowledge of fittings  
 knowledge of pumps  
 knowledge of filtration requirements  
 knowledge of materials  
 knowledge of processes for automatic feeders
- 9. Installing automatic feeders**  
 Knowledge of types of automatic feeders  
 knowledge of piping techniques and requirements  
 knowledge of pipe fitting requirements  
 knowledge of pipe materials  
 knowledge of processes for automatic feeders  
 knowledge of feeder sizing requirements
- 10. Sizing pipes**  
 knowledge of basic hydraulics

**Content Area D** **5%**  
**Electrical Work**

- 1. Bonding**  
 knowledge of safety requirements  
 knowledge of bonding requirements

- 2. Grounding**  
 knowledge of safety requirements  
 knowledge of electrical grounding requirements
- 3. Installing light niches**  
 knowledge of proper installation requirements (conduit)  
 knowledge of safety requirements  
 knowledge of types of niches  
 knowledge of location and amount of illumination  
 knowledge of bonding requirements  
 knowledge of product specifications  
 knowledge of elevation and placement of niche
- 4. Installing, replacing and repairing electrical components**  
 knowledge of local and state codes  
 knowledge of automatic timers  
 knowledge of lights  
 knowledge of electrical connections to chlorinating generators

**Content Area E** **10%**  
**Shell Placement**

- 1. Installing steel reinforcing bars**  
 knowledge of reinforcing practices and procedures  
 knowledge of measurement requirements  
 knowledge of measuring equipment
- 2. Installing vinyl pool walls (steel, wood, fiberglass, plastic, and structural polymer)**  
 knowledge of material properties  
 knowledge of specific handling requirements  
 knowledge of supports and anchorage  
 knowledge of backfilling requirements  
 knowledge of surveying and leveling equipment  
 knowledge of surveying and leveling techniques  
 knowledge of soil properties and angle of repose  
 knowledge of excavation techniques
- 3. Testing for leakage in pool and spa shells**  
 knowledge of measuring elevation differentials  
 knowledge of evaporation

- 4. Installing concrete walls and flooring**
  - knowledge of mixing pneumatically applied concrete
  - knowledge of setting concrete beam elevations
  - knowledge of concrete properties
  - knowledge of concrete testing
  - knowledge of placement techniques
  - knowledge of finishing techniques
  - knowledge of pressurized concrete equipment
- 5. Testing strength of concrete**
  - ability to identify inferior materials
  - knowledge of slump
  - knowledge of concrete testing
  - knowledge of properties of concrete
- 6. Installing structural support systems**
  - knowledge of soils
  - knowledge of piling support systems

**Content Area F** **5%**  
**Deck Work**

- 1. Laying out and forming decks**
  - knowledge of surveying and leveling equipment
  - knowledge of surveying and leveling techniques
  - knowledge of excavation, backfill and compaction
  - knowledge of drainage requirements
  - knowledge of form work
  - knowledge of safety requirements
  - knowledge of site requirements
- 2. Installing wood and composite decks**
  - knowledge of pressure treated wood
  - knowledge of other wood protection
  - knowledge of carpentry
  - knowledge of carpentry tools
  - knowledge of foundations
- 3. Installing concrete decks**
  - knowledge of concrete properties
  - knowledge of concrete reinforcement
  - knowledge of concrete placement
  - knowledge of concrete finishing
  - knowledge of form work
  - knowledge of expansion and contraction protection
  - knowledge of drainage and slope
  - knowledge of drains and plumbing
  - knowledge of deck finishes

- 4. Installing masonry type decks (tile, stone, and brick)**
  - knowledge of sub-base materials
  - knowledge of work requirements
  - knowledge of material placement
  - knowledge of drainage and slope
  - knowledge of drains and plumbing
- 5. Tying different kinds of decks to pool shells (wood, concrete, stone)**
  - knowledge of shell and deck interface

**Content Area G** **10%**  
**Tile, Coping and Trim Work**

- 1. Installing tiles**
  - knowledge of material properties
  - knowledge of specific handling requirements
  - knowledge of measurements
  - knowledge of measuring equipment
  - knowledge of types of grouts and requirements
  - knowledge of adhesive requirements
  - knowledge of mortar requirements
  - knowledge of cleaning
  - knowledge of leveling techniques and requirements
  - knowledge of architectural effects
- 2. Installing masonry trims (brick, stone, and precast coping)**
  - knowledge of material properties
  - knowledge of specific handling requirements
  - knowledge of measurements
  - knowledge of measuring equipment
  - knowledge of types of grouts and requirements
  - knowledge of adhesive requirements
  - knowledge of mortar requirements
  - knowledge of cleaning
  - knowledge of leveling techniques and requirements
  - knowledge of architectural effects
  - knowledge of mitering
- 3. Checking for level placement of materials**
  - knowledge of leveling equipment
  - knowledge of leveling techniques and requirements

**4. Installing gutters and seams in commercial pools**

- knowledge of leveling
- knowledge of slopes
- knowledge of concrete
- knowledge of marcite
- knowledge of tile
- knowledge of plumbing
- knowledge of inlets and outlets
- knowledge of form work

**5. Checking code requirements**

- knowledge of step height requirements
- knowledge of gutter level requirements
- knowledge of depth and “no diving” marker tiles

**Content Area H Accessory Work 10%**

**1. Installing retaining walls**

- knowledge of design characteristics
- knowledge of limitations
- knowledge of proper footers
- knowledge of shotcrete and gunite walls
- knowledge of segmented wall systems

**2. Installing fencing**

- knowledge of state and local codes
- knowledge of location requirements
- knowledge of picket spacing
- knowledge of safety requirements
- knowledge of primary and secondary barrier codes and insurance requirements

**3. Installing diving boards and diving platforms**

- knowledge of materials for diving boards
- knowledge of installation requirements
- knowledge of safety requirements
- knowledge of proper placement

**4. Installing slides**

- knowledge of materials for slides
- knowledge of installation requirements
- knowledge of proper placement
- knowledge of safety requirements

**5. Constructing equipment rooms and housing**

- knowledge of small structure requirements for housing

- knowledge of equipment requirements
- knowledge of piping placement
- knowledge of drainage requirements
- knowledge of ventilation requirements

**6. Installing auxiliary lighting**

- knowledge of fiber optic lighting
- knowledge of low voltage accent lighting

**7. Installing alternate sanitation devices**

- knowledge of different types of devices
- knowledge of installation requirements

**Content Area I Interior Surface Preparation and Finishing 5%**

**1. Performing interior pool and spa clean-ups**

- knowledge of drawdown
- knowledge of possible uplift
- knowledge of chemicals
- knowledge of cleaning solutions
- knowledge of cleaning procedures
- knowledge of safety requirements
- knowledge of disposal requirements

**2. Performing interior pool and spa plastering of concrete pools**

- knowledge of finishing
- knowledge of surface preparation
- knowledge of plaster installation methods

**3. Installing lining in vinyl-lined pools**

- knowledge of materials
- knowledge of methods
- knowledge of soils
- knowledge of retaining walls
- knowledge of coping
- knowledge of leveling and installing
- knowledge of anchoring

**4. Resurfacing fiberglass pools**

- knowledge of hydrostatic uplift
- knowledge of fiberglass materials, procedures and requirements

**Content Area J**  
**Start Up**

5%

- 1. Pre-testing fill water**  
knowledge of water chemistry  
knowledge of testing procedures and requirements  
knowledge of reagents  
knowledge of saturation  
knowledge of pH  
knowledge of total alkalinity  
knowledge of hardness
- 2. Testing filters and filtration**  
knowledge of turnover rates  
knowledge of testing procedures  
knowledge of cleaning procedures
- 3. Balancing pool water**  
knowledge of water chemistry  
knowledge of testing procedures and requirements  
knowledge of solutions  
knowledge of reagents  
knowledge of saturation  
knowledge of pH  
knowledge of total alkalinity  
knowledge hardness  
knowledge of disinfecting  
knowledge of sanitizing  
knowledge safety requirements  
knowledge of chemical dangers
- 4. Starting pool and spa auxiliary equipment**  
knowledge of equipment specifications  
knowledge of system design
- 5. Testing heating equipment**  
knowledge of testing procedures  
knowledge of temperature measurement  
knowledge of system design
- 6. Testing pump startup**  
knowledge of testing procedures  
knowledge pump requirements  
knowledge of system design
- 7. Performing final exterior inspection**  
knowledge of material procedures  
knowledge of safety requirements

**Content Area K**  
**Service and Maintenance**

10%

- 1. Demonstrating pool operation to owners**  
knowledge of mechanical and hydraulic systems  
knowledge of chemical systems  
knowledge of general pool care requirements  
knowledge of communicating safety requirements  
knowledge of equipment  
knowledge of communication skills  
knowledge of daily reports
- 2. Sanitizing pool and spa water**  
knowledge of water chemistry  
knowledge of pH  
knowledge of effects of pool chemicals  
knowledge of safety requirements  
knowledge of reporting requirements  
knowledge of chlorinating requirements  
knowledge of chlorinating procedures  
knowledge of shock treatments or super-chlorinations  
knowledge of breakpoint chlorination  
knowledge of testing techniques and requirements  
knowledge of adjusting techniques and requirements  
knowledge of sanitation with other pool sanitizers  
knowledge of sanitation through oxidation  
knowledge of testing and adjusting cyanuric acid
- 3. Balancing pool and spa water**  
knowledge of chemical balancing techniques and requirements  
knowledge of testing and adjusting water hardness  
knowledge of testing and adjusting total alkalinity  
knowledge of pH  
knowledge of saturation index
- 4. Testing and adjusting for metals and other water problems**  
knowledge of flocculants  
knowledge of algaecides  
knowledge of sequestering agents  
knowledge of degreasers and defoamers

knowledge of metal testing techniques and requirements

**5. Checking accurate turbidity**

knowledge of testing techniques and requirements

knowledge of reagents

knowledge adjusting techniques and requirements

**6. Cleaning D.E. filters by pressure backwashing and jet spraying**

knowledge of system design

knowledge of pump requirements

knowledge of flow rates

knowledge of safety requirements

knowledge of testing procedures

knowledge of water clarity

knowledge of gauges

knowledge of drainage

knowledge of valves

**7. Backwashing sand filters**

knowledge of system design

knowledge of pump requirements

knowledge of flow rates

knowledge of safety requirements

knowledge of testing procedures

knowledge of water clarity

knowledge of gauges

knowledge of drainage

knowledge of valves

**8. Cleaning cartridge filters**

knowledge of system design

knowledge of pump requirements

knowledge of flow rates

knowledge of safety requirements

knowledge of testing procedures

knowledge of water clarity

knowledge of gauges

knowledge of drainage

knowledge of valves

**9. Knowledge of the effect of chemical balances on staining**

knowledge of safety requirements

knowledge of chemicals

knowledge of chemical properties

knowledge of mixing procedures

knowledge of chemical effects

knowledge of storage procedures and requirements

**10. Replacing light bulbs and underwater lights**

knowledge of different voltage lights

knowledge of proper safety procedures and requirements

knowledge of importance of GFIR

knowledge of safe wiring and sealing water out

knowledge of material specifications

knowledge of bonding and grounding requirements

**11. Utilizing pool blankets and covers**

knowledge of materials and types

knowledge of the properties of materials

knowledge of safety requirements

knowledge of installation

knowledge of securing installation

knowledge of chemical balance effects

**12. Installing markers and signs to notify the public of safety procedures**

knowledge of safety requirements

knowledge of placement

knowledge of location

**13. Maintaining and repairing plumbing and equipment**

knowledge of safety requirements

knowledge of piping requirements

knowledge of fittings

knowledge of pipe fittings

knowledge of piping protection

knowledge of pressure requirements

knowledge of gauges

knowledge of pressure testing

knowledge of flow rates

knowledge of pumps

knowledge of leak detection

**14. Maintaining and repairing decks**

knowledge of bonding new material to old

knowledge of cleaning in preparation for repair

knowledge of safety requirements

knowledge of expansion joints

knowledge of codes

knowledge of maintaining strength of the deck

knowledge of soil conditions

knowledge of compaction

knowledge of concrete placement

**15. Maintaining and repairing accessory fixtures**

- knowledge of safety requirements
- knowledge of solar heating
- knowledge of conventional heating
- knowledge of materials
- knowledge of the properties of materials
- knowledge of procedures
- knowledge of material handling
- knowledge of system design
- knowledge of system design capacity

**16. Maintaining and repairing pool shells**

- knowledge of leak detection
- knowledge of leak testing
- knowledge of safety requirements
- knowledge of materials
- knowledge of the properties of materials
- knowledge of crack repair procedures

**17. Evaluating and adjusting pool and spa system requirements**

- knowledge of system design
- checking for correct turnover rate
  - knowledge of testing techniques and requirements
  - knowledge calculating turnover rate
  - knowledge of adjusting techniques and requirements
- checking for effectiveness of filtering media
  - knowledge of system design
  - knowledge of pump requirements
  - knowledge of flow rates
  - knowledge of safety requirements
  - knowledge of testing procedures
  - knowledge of water clarity
  - knowledge of gauges
  - knowledge of drainage
  - knowledge of valves
- testing and adjusting for water clarity
  - knowledge of water chemistry
  - knowledge of pH
  - knowledge of pool chemicals
  - knowledge of effects of pool chemicals
  - knowledge of practices of pool chemicals
  - knowledge of dangers of chlorinating agents
  - knowledge of chlorinating requirements
  - knowledge of chlorinating procedures
  - knowledge of chemical balancing techniques and requirements

- knowledge of testing techniques and requirements
- knowledge of reagents
- knowledge of adjusting techniques and requirements

checking and clearing outlet strainers

- knowledge of system design
- knowledge of pump requirements
- knowledge of flow rates
- knowledge of safety requirements
- knowledge of testing procedures
- knowledge of gauges
- knowledge of drainage
- knowledge of valves

**18. Performing heater care and maintenance**

- checking heaters or heating systems for efficiency
  - knowledge of safety requirements
  - knowledge of testing procedures and requirements
  - knowledge of system design
- performing heater sizing
  - knowledge of safety requirements
  - knowledge of system design
  - knowledge of system capacity
- checking thermostats
  - knowledge of temperature measurements
  - knowledge of effects of temperature
  - knowledge of changes in temperature
- knowledge of effects of water chemistry on heater components
- knowledge of pool chemistry
- knowledge of gas and electric requirements
- knowledge of safety requirements

**Content Area L  
Equipment**

**7 ½%**

**1. Using torches**

- knowledge of safety requirements
- knowledge of OSHA requirements
- knowledge of cutting materials and techniques
- knowledge of welding materials and techniques
- knowledge of oxygen
- knowledge of acetylene

**2. Using jackhammers**

- knowledge of safety requirements
- knowledge of OSHA requirements
- knowledge of equipment characteristics



- 3. Using saw cutting machines**
  - knowledge of safety requirements
  - knowledge of OSHA requirements
  - knowledge of equipment characteristics
  
- 4. Using bobcats or backhoes**
  - knowledge of safety requirements
  - knowledge of OSHA requirements
  - knowledge of equipment characteristics
  - knowledge of traffic regulations
  
- 5. Using pneumatically placed or poured concrete**
  - knowledge of safety requirements for pumping equipment
  
- 6. Using compressors**
  - knowledge of safety requirements
  - knowledge of OSHA requirements
  - knowledge of pressure regulators
  - knowledge of air tools
  
- 7. Using cement guns**
  - knowledge of safety requirements
  - knowledge of OSHA requirements
  
- 8. Using concrete pumps**
  - knowledge of safety requirements
  - knowledge of OSHA requirements
  - knowledge of concrete properties
  - knowledge of concrete procedures
  - knowledge of concrete testing
  - knowledge of concrete placement