

Water

Parsons The New School for Design
School of Constructed Environments

Interior Design (AAS)

Environmental Design

PAID 1028-X1

SP-17

Hikida

Learning Objectives

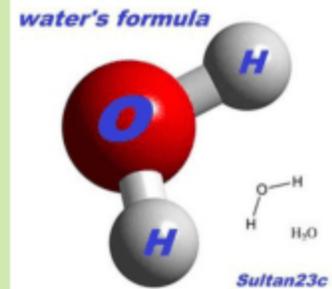
- At the end of this presentation you should know:
 - The percentage of the earth's surface that is covered with water.
 - The percentage of a human being that is composed of water.
 - The uses of water globally by use group as a percentage.
 - The uses of water for residential use by percentage.
 - The US Environmental Protection Act of 1992 (EPA Act 1992) flow rates for household plumbing fixtures.

Questions about water

- What do we use water for?
- Where does our water come from?
- How much water do we use every day? Every year?
- How can we reduce our water consumption?
- How would you design a space without any plumbing?

Water facts:

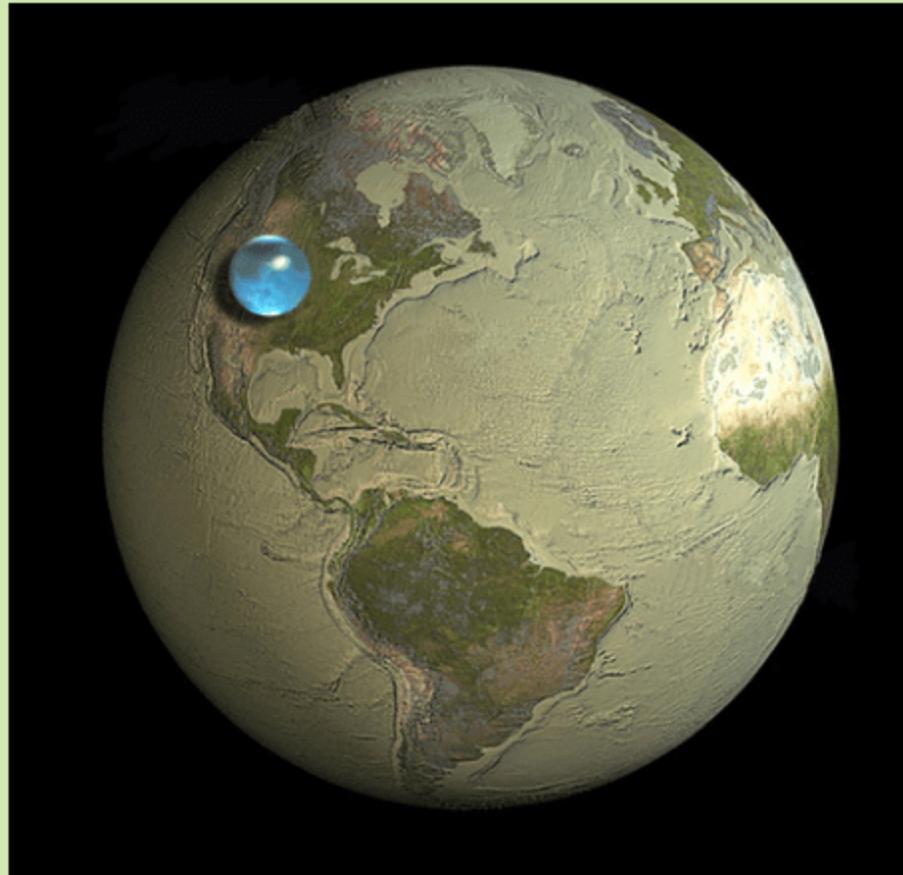
- *Chemical composition: H₂O. Its molecule contains one oxygen and two hydrogen atoms connected by covalent bonds.*
- *Water is the only pure substance found naturally in all three states of matter: solid (ice), liquid (water), and gas (steam or vapor).*
- Hydrophilic = “water attracting”, examples: wood, and paper.
- Hydrophobic = “water repelling”, example: oil.
- Capillary action = “*the ability of a liquid to flow in narrow spaces without the assistance of, and in opposition to, external forces like gravity*”.
- *Water finds its own level.*



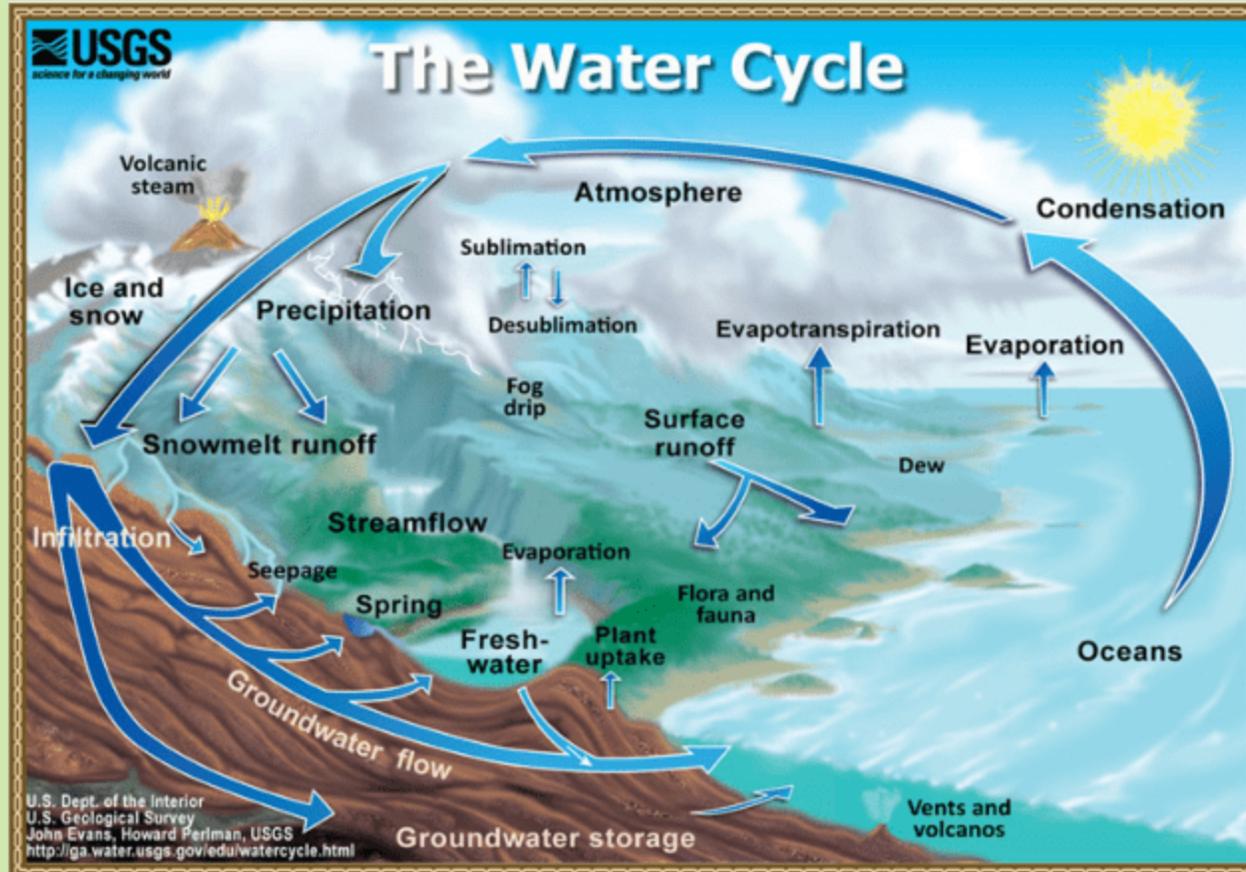
71% of the earth's surface is covered with water



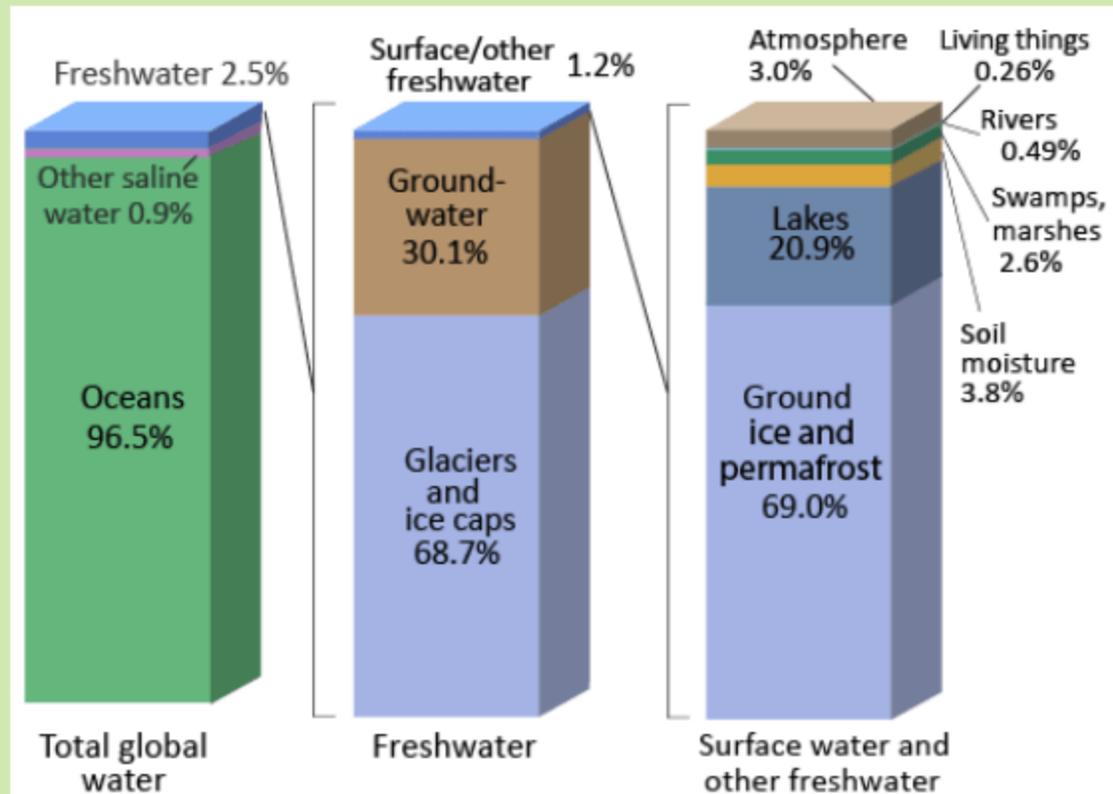
Volumetric representation of earth's water



The water cycle



Where is the earth's water?



Source: Igor Shiklomanov's chapter "World fresh water resources" in Peter H. Gleick (editor), 1993, *Water in Crisis: A Guide to the World's Fresh Water Resources*.
NOTE: Numbers are rounded, so percent summations may not add to 100.

Humans are 61% water

Consequences of Dehydration

THIRST

Thirst is a useful indicator of daily fluid requirements. Unfortunately, it's not fully reliable since the body is already mildly dehydrated by the time an average person starts to notice thirst.¹

MENTAL

Dehydration can degrade specific aspects of cognitive performance including visual vigilance, tension, anxiety, fatigue and visual working memory. Dehydration was also linked to negative mood rating, impaired motor performance and short-term memory.⁶

SKIN

Dehydration results in dry skin and wrinkles.²

DEHYDRATION

A 1% loss of body mass due to fluid loss is defined as dehydration.⁷

KIDNEYS

Higher water intake is shown to have a protective impact on the kidneys, and there is initial evidence that CKD (Chronic Kidney Disease) may be inversely related to higher water intake.³

A study by Dai et al found a strong protective effect of fluid intake in preventing kidney stone formation in men.⁴

WEIGHT LOSS

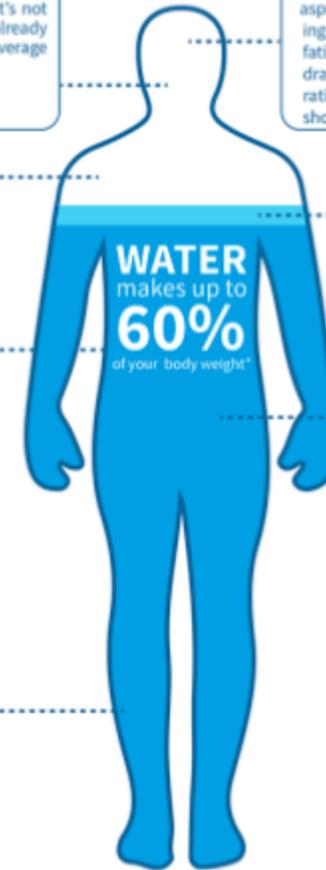
Opting for water instead of sugary drinks can help reduce body weight and fat levels. According to Stookey,⁵ just drinking 500 ml (17 oz) of water increases energy expenditure by 100kJ. Findings in the same study indicate that an absolute increase in drinking water to to $\geq 1l$ (34 oz)/day was associated with ~ 2 kg or 5 lbs weight loss over 12 months.

PHYSICAL

Studies have shown that the modest level of dehydration (2% of body mass) can result in around a 20% decrease in physical performance levels in temperate climates and up to a 40% decrease in hot temperatures.⁸

*WATER

Water plays crucial roles, in transporting nutrients and waste products between our major organs and helping regulate temperature.⁹



1. Nelson, K.M., Leitch, C.J. & Goodson, A.C. Hydration and health promotion. *Nutrition Today*, 2009, 44, 190-201.
2. Alvarado-Dominguez, R. *Journal of Applied Physiology*, 2012, 112, 1000-1005.
3. Savelkoul, H.F.J., et al. *Journal of Applied Physiology*, 2012, 112, 1000-1005.
4. Dai, D., et al. *Journal of Applied Physiology*, 2012, 112, 1000-1005.
5. Stookey, J.D. *Journal of Applied Physiology*, 2012, 112, 1000-1005.
6. Stookey, J.D., et al. *Journal of Applied Physiology*, 2012, 112, 1000-1005.
7. Stookey, J.D., et al. *Journal of Applied Physiology*, 2012, 112, 1000-1005.
8. Stookey, J.D., et al. *Journal of Applied Physiology*, 2012, 112, 1000-1005.
9. Stookey, J.D., et al. *Journal of Applied Physiology*, 2012, 112, 1000-1005.

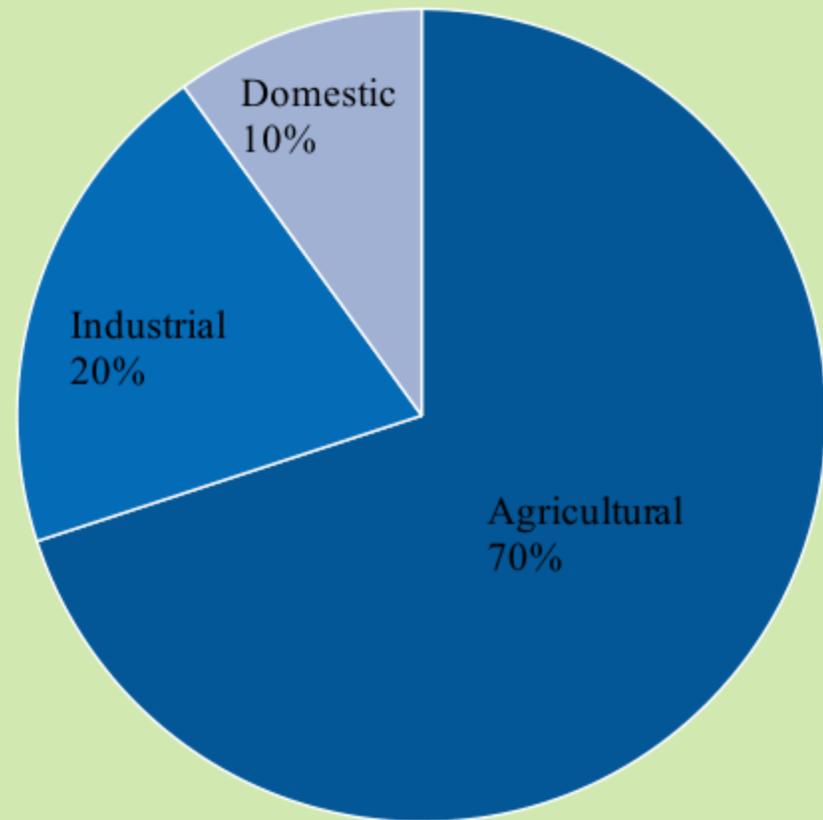
What do we use water for?

Worldwide

Agricultural use accounts for 70%
of all water consumption

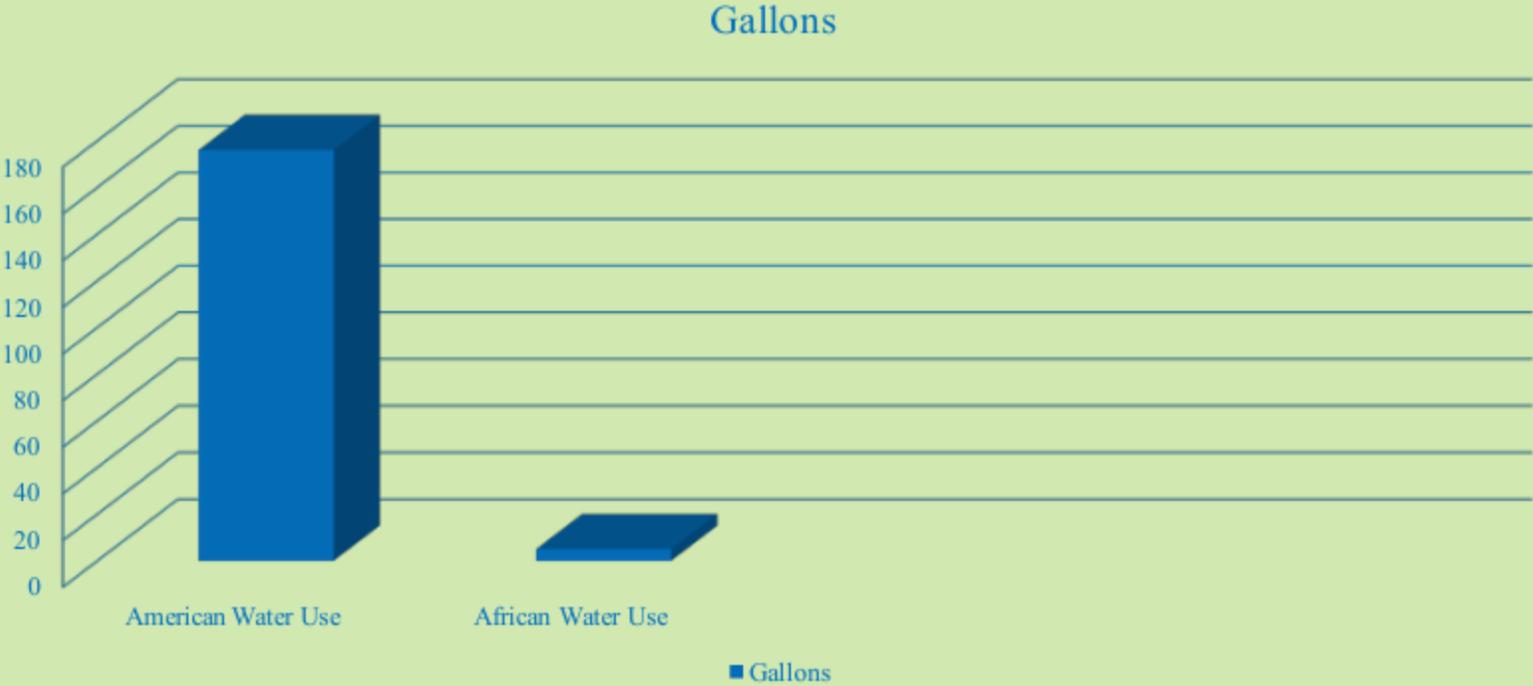
Industrial use 20%

Domestic use 10%



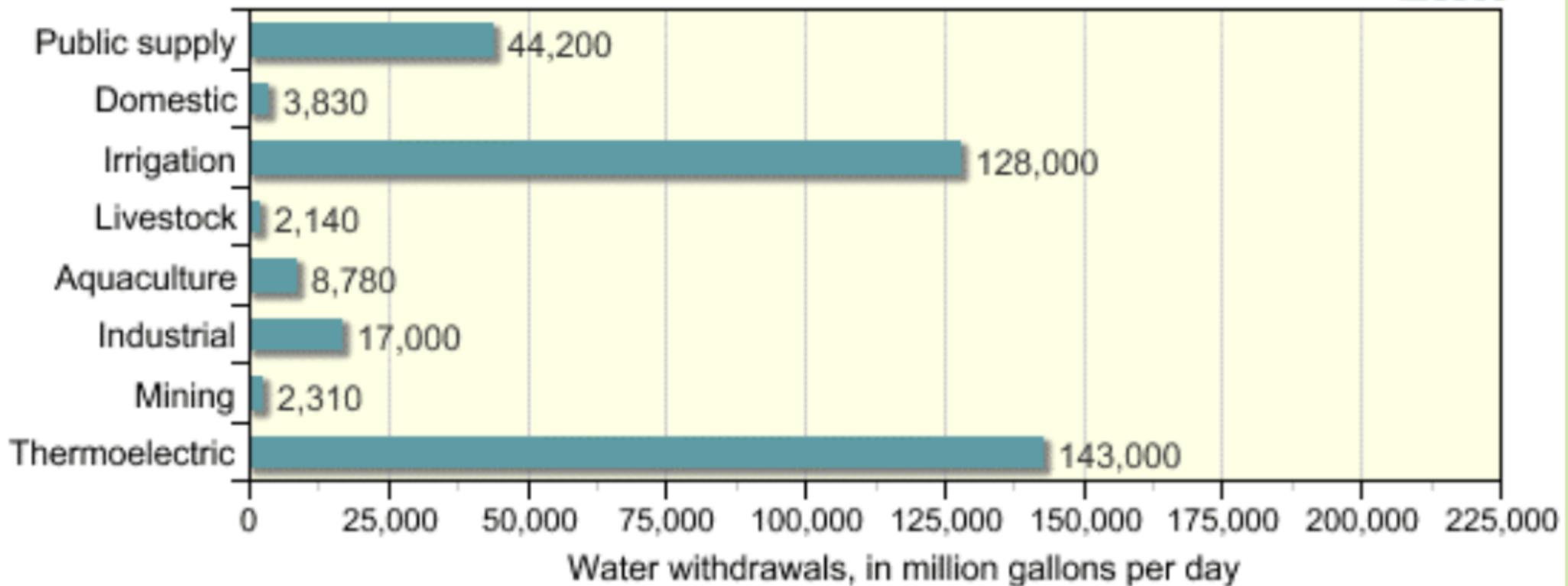
■ Agricultural ■ Industrial ■ Domestic

The average American uses 176 gallons of water per day compared to 5 gallons of water the average African family uses each day.



U.S. Freshwater Use (2005)

Total freshwater withdrawals in the United States, 2005

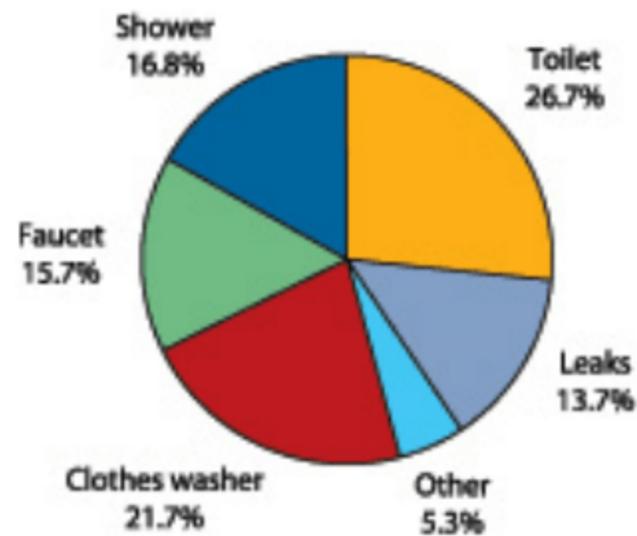


Household water using devices

- Water closets (toilets)
- Urinals
- Lavatories (sink faucets)
- Shower heads
- Bathtub faucets
- Kitchen sink faucets
- Dishwashers
- Clothes washers
- Garden hoses

What do we use water for at home?

How Much Water Do We Use?



Source: American Water Works Association Research Foundation, "Residential End Uses of Water," 1999

Current U.S. Environmental Protection Act Plumbing Fixture Flow Rates

- Water closets (toilets) = 1.6 gallons per flush (gpf)
- Urinals = 1.0 gpf
- Lavatories (sink faucets) = 2.2 gallons per minute (gpm) at 60 pounds per square inch (psi)
- Shower heads = 2.5 gpm at 80 psi
- Bathtub faucets = no standard
- Kitchen sink faucets = 2.2 gpf at 60 psi
- Dishwashers = 4.5 to 6.5 gallons per cycle
- Commercial clothes washers = 9.5 gallons per cycle per cubic feet
- Garden hoses = no standard

**CHAMPION® 4 ELONGATED
RIGHT HEIGHT™ ONE-PIECE TOILET**
VITREOUS CHINA

**CHAMPION® 4 ELONGATED RIGHT HEIGHT™
ONE-PIECE TOILET**

- 2034.014
 - Vitreous china
 - EverClean® surface inhibits the growth of stain- and odor-causing bacteria, mold, and mildew on the surface
 - **Low-consumption (6.0 Lpf/1.6 gpf)**
 - Features **Champion® 4 Flushing System** performance platform
 - 4" non-adjustable, piston action Accelerator™ flush valve
 - 16-1/2" rim height for accessible applications
 - Elongated siphon action jetted bowl
 - 2-3/8" fully-glazed trapway
 - Chrome trip lever
 - 100% factory flush tested
 - 2 bolt caps
 - 10 year warranty

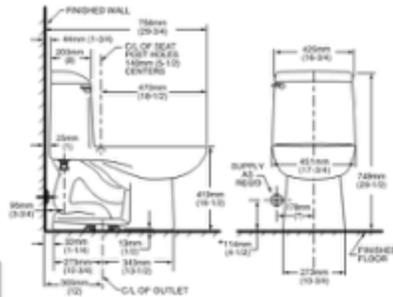


Nominal Dimensions:
756 x 451 x 749mm
(29-3/4" x 17-3/4" x 29-1/2")

Fixture only, seat and supply by others

**Compliance Certifications -
Meets or Exceeds the Following Specifications:**

- ASME A112.19.2M for Vitreous China Fixtures- Includes Flush Performance, Ball Pass Diameter, Trap Seal Depth and all Dimensions



To Be Specified:

- Color:
 - White □ Bone □ Silver □ Linen □ Black
- Trip Lever 738772-XXXXA:
 - 002 Chrome (supplied)
 - 068 Blackened Bronze
 - 099 Polished Brass
 - 295 Satin Nickel
- Seat:
 - Champion® Slow Close Elongated #5325.010
 - EverClean® Elongated Seat, with Cover and Slow Close Snap-Off Hinges #5321.110
- Supply with Stop (by other)

NOTES:

THIS TOILET IS DESIGNED TO ROUGH-IN AT A MINIMUM DIMENSION OF 305MM (12") FROM FINISHED WALL TO C/L OF OUTLET. SUPPLY NOT INCLUDED WITH FIXTURE AND MUST BE ORDERED SEPARATELY. * DIMENSION SHOWN FOR LOCATION OF SUPPLY IS SUGGESTED.

IMPORTANT: Dimensions of fixtures are nominal and may vary within the range of tolerance established by ANSI Standard A112.19.2. These measurements are subject to change or cancellation. No responsibility is assumed for use of superseded or voided pages.



**MEETS THE AMERICANS WITH DISABILITIES ACT
GUIDELINES AND ANSI A117.1 REQUIREMENTS FOR
ACCESSIBLE AND USABLE BUILDING FACILITIES-CHECK
LOCAL CODES.**

- When installed, top of seat meets minimum requirement of 432 to 483mm (17" to 19") from the finished floor.

**BOULEVARD FloWise™ RIGHT HEIGHT™
ELONGATED ONE-PIECE TOILET**
VITREOUS CHINA

**BOULEVARD FloWise™ RIGHT HEIGHT™
ELONGATED ONE-PIECE TOILET**

- 2891.128
 - Vitreous china
 - **LXP (Luxury Performance) Toilet**
 - **Meets definition for HET (High Efficiency Toilet) 1.28 gpf/4.8 Lpf**
 - Meets EPA WaterSense™ criteria
 - Contributes to a LEED solution
 - Elongated siphon action bowl with smooth-sided, concealed trapway
 - PowerWash™ rim scrubs bowl with each flush
 - 16-1/2" rim height for accessible applications
 - Fully glazed 2" trapway
 - Oversized 3" flush valve with chemically resistant flapper
 - Chrome trip lever
 - 2 color-matched bolt hole covers
 - Includes color-matched Duroplast Slow Close Toilet Seat and cover with concealed seat ring and easy lift-off feature for simple removal and reattachment for cleaning
 - 100% factory flush tested
 - **Design coordinates with Studio and Boulevard lavatories**
 - 10 year warranty on entire toilet

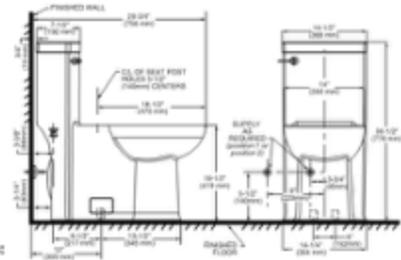


Nominal Dimensions:
756 x 368 x 778mm
(29-3/4" x 14-1/2" x 30-1/2")

Fixture only, supply by others

**Compliance Certifications -
Meets or Exceeds the Following Specifications:**

- ASME A112.19.2-2008 / CSA B45.1-08
- US EPA WaterSense™ Specification for HET's



IMPORTANT: Water supply on the wall is required at 3.0" or 3" from centerline of the toilet (see rough in). First suggested position is hidden behind the toilet. The geometry of the toilet gives space for the installation. The second suggested position is next to the toilet. Between these two positions, the space for the supply between wall and toilet is limited to 3-1/4". In this case, check your supply and hose dimensions.

To Be Specified:

- Color:
 - White □ Bone □ Linen
- Supply with Stop:



NOTES:

THIS TOILET IS DESIGNED TO ROUGH-IN AT A MINIMUM DIMENSION OF 305MM (12") FROM FINISHED WALL TO C/L OF OUTLET. SUPPLY NOT INCLUDED WITH FIXTURE AND MUST BE ORDERED SEPARATELY. * DIMENSION SHOWN FOR LOCATION OF SUPPLY IS SUGGESTED.

IMPORTANT: Dimensions of fixtures are nominal and may vary within the range of tolerance established by ANSI Standard A112.19.2. These measurements are subject to change or cancellation. No responsibility is assumed for use of superseded or voided pages.

**MEETS THE AMERICANS WITH DISABILITIES ACT GUIDELINES AND
ANSI A117.1 REQUIREMENTS FOR ACCESSIBLE AND USABLE
BUILDING FACILITIES-CHECK LOCAL CODES.**

American Standard

BARrier FREE

LYNBROOK 1.0 GPF BLOWOUT URINAL

- Vitreous china
- **Low consumption (3.8 Lpf/1.0 gpf)**
- Flushing rim
- Blowout flush action
- Privacy shields
- 1-1/4" inlet spud
- Outlet connection threaded 2" inside (NPTF)
- 2 wall hangers
- Fixture only
- Meets ASME flush requirements at 1.0 GPF

6501.012 Top spud

Nominal Dimensions:

356 x 470 x 730mm
(14" x 18-1/2" x 28-3/4")

Recommended working pressure – between
20 psi at valve when flushing and 80 psi static

Compliance Certifications -

Meets or Exceeds the Following Specifications:
• ASME A12.19.2 for Vitreous China Fixtures



SEE REVERSE FOR ROUGHING-IN DIMENSIONS

To Be Specified:

- Color: □ White
- Flush Valve:
 - American Standard 6045.601 Manual (1-1/4" Top Spud)
 - American Standard Selectronic 6062.601 DC Power (1-1/4" Top Spud)

LYNBROOK® URINAL VITREOUS CHINA

American Standard

BARrier FREE

WASHBROOK® FloWise® 0.5 GPF HIGH EFFICIENCY URINAL SYSTEM

6590.505 0.5 gpf Exposed Top Spud Urinal and
Selectronic® Urinal Flush Valve

URINAL:

- Vitreous china
- **Ultra High Efficiency. Operates in the range of 0.125 gpf to 1.0 gpf (0.5 Lpf to 3.8 Lpf)**
- Flushing rim
- Elongated 14" rim from finished wall
- Washout flush action
- Extended sides for privacy
- 3/4" inlet spud
- Outlet connection threaded 2" inside (NPTF)
- Strainer included
- Meets ASME flush requirements at 0.125 to 1.0 gpf
- Model 6590.001 top spud

SELECTRONIC® FLUSH VALVE:

- Factory-installed CR-P2 Lithium Battery
- Pressure Compensation feature ensures accurate flush volume regardless of inlet water pressure
- Self-Cleaning Piston with integral wiper spring significantly reduces clogging and maintenance
- Selectronic® Proximity System with universal sensor provides hygienic, "hands free" operation
- State-of-the-Art Electronics prevent ghost flushing
- Dezincification Resistant semi-red brass alloy
- Fully Mechanical Manual Override Button can flush the valve without power
- Fail-Safe: Valve automatically closes upon loss of power or water pressure and does not need to be reset
- Adjustable Sanitary Flush cleans the fixture & maintains the trap seal.
- Stadium Feature: Valve automatically switches to water savings mode during periods of heavy usage
- Chemical Resistant EPDM Seals for extended life
- Adjustable Tailpiece for rough-in flexibility
- Can be installed left or right handed
- Model 6063.051

Includes:

- 2 Wall hangers
- 3/4" angle stop with back-flow protection and vandal-resistant cap
- Sweat solder kit including cover tube and wall flange
- 3/4" High back pressure vacuum breaker, spud coupling and flange

WASHBROOK® FloWise® 0.5 GPF HIGH EFFICIENCY URINAL SYSTEM SELECTRONIC® FLUSH VALVE



SEE REVERSE FOR ROUGHING-IN DIMENSIONS

High-Efficiency Urinal Systems:

- 50% water savings when compared to a 1.0 gpf urinal system

Battery Life:

- 4 years @ 4,000 flushes per month

Operating Pressure:

Overall Range: 20-125 psi**
Recommended: 20 psi (flowing)-80 psi (static)
** Water pressure over 80 psi is not recommended for most plumbing fixtures.

Flow Requirement:

10 gpm (37.9 L/min)

Nominal Fixture Dimensions:

360 x 480 x 664mm (14-1/8" x 18-7/8" x 26-1/8")





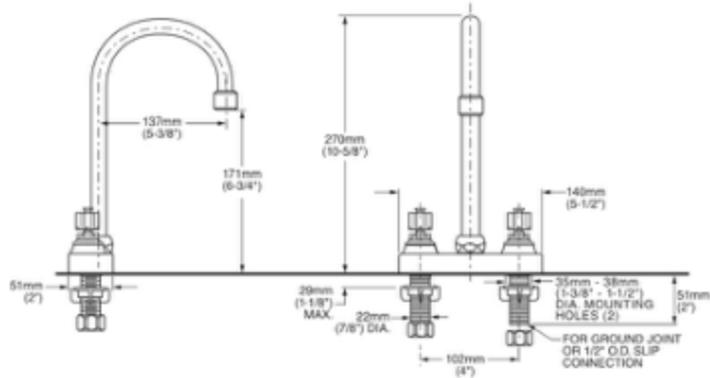
HERITAGE
TWO-HANDLE CENTERSET BAR SINK FAUCET
WITH BRASS GOOSENECK SPOUT



MODEL NUMBER:

- 7490.000 Centerset Bar Sink Faucet
Gooseneck swivel spout. Less handles.

Handles must be ordered separately.



GENERAL DESCRIPTION:

Durable brass construction. Amaris 1/4 turn washerless ceramic disc valve cartridges. One-half inch male inlet shanks with brass coupling nuts. Brass gooseneck swivel spout. **2.2gpm@3.8L/min, maximum flow rate.**

PRODUCT FEATURES:

Ceramic Disc Valve Cartridges: Assures a lifetime of drip-free performance.

Brass Construction: Durable - Excellent in high use applications. Ideal for prolonged contact with water.

Lead Free: Faucet contains ≤ 0.25% total lead content by weighted average.

SUGGESTED SPECIFICATION:

Centerset bar sink faucet shall be cast brass construction with all brass coupling nuts. Shall also feature 1/4 turn washerless ceramic disc valve cartridges. Fitting shall be American Standard Model # 7490.000 and handle kit # 0000.

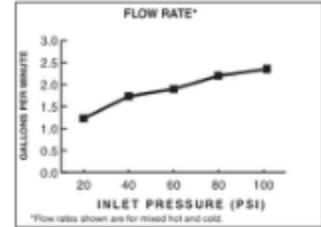


HERITAGE
TWO-HANDLE CENTERSET BAR SINK FAUCET
WITH BRASS GOOSENECK SPOUT

CODES AND STANDARDS

These products meet or exceed the following codes and standards:

- ASME A112.18.1
- CSA B 125
- NSF 61/Section 9 and Annex G
- NSF 372



Product Number	Description	Finish
		Polished Chrome
7490.000	Bar Sink faucet. Less handles.	002

MEETS THE AMERICANS WITH DISABILITIES ACT GUIDELINES AND ANSI A117.1 REQUIREMENTS FOR ACCESSIBLE AND USABLE BUILDING FACILITIES-CHECK LOCAL CODES

Handles must be ordered separately.

To order **Less Handles** - Specify: 4 digit style number followed by three zeros and 3 digit finish number. Example 7490.000.002 = Bar Sink faucet in Polished Chrome finish.

The above fittings will accept the following Amaris-Series handles.



Other Aerators Available:

Part Suffix	Description
LV15	1.5 gpm (5.7 Lpm) Vandal-Resistant PCA Non-Aerated Laminar Flow Outlet
L15	1.5 gpm (5.7 Lpm) PCA Non-Aerated Laminar Flow Outlet
V15	1.5 gpm (5.7 Lpm) Vandal-Resistant PCA Aerator
LV10	1.0 gpm (3.8 Lpm) Vandal-Resistant PCA Non-Aerated Laminar Flow Outlet
L10	1.0 gpm (3.8 Lpm) PCA Non-Aerated Laminar Flow Outlet
V10	1.0 gpm (3.8 Lpm) Vandal-Resistant PCA Aerator
V05	0.5 gpm (1.9 Lpm) Vandal-Resistant PCA Non-Aerated Spray
V035	0.35 gpm (1.3 Lpm) Vandal-Resistant PCA Non-Aerated Spray

*PCA - Pressure Compensating
All modifications meet CALGreen Code



Buy it for looks. Buy it for life.®

DESCRIPTION

- Chrome plated metal construction
- 1/2" connections: IPS - exterior, CC - interior
- Includes showerhead, arm and flange

OPERATION

- Dual control
- Lever handles
- Volume and temperature controlled by rotating handles toward spout to open

FLOW

- Showerhead is limited to 2.5 gpm (9.5 L/min) max.
- EP suffix showerheads are limited to 2.0 gpm (7.6 L/min) max.

CARTRIDGE

- 1224 cartridge design
- Nonmetallic and stainless steel materials

STANDARDS

- Third party certified to ASME A112.18.1/CSA B125.1, and all applicable requirements referenced therein

- ADA for lever handles

- Meets WaterSense® criteria for EP suffix models
- Meets New York City Local Law No. 57 for EP suffix models

WARRANTY

- Lifetime limited warranty against leaks, drips and finish defects to the original consumer purchaser
- 5 year warranty if used in commercial installations

Specifications

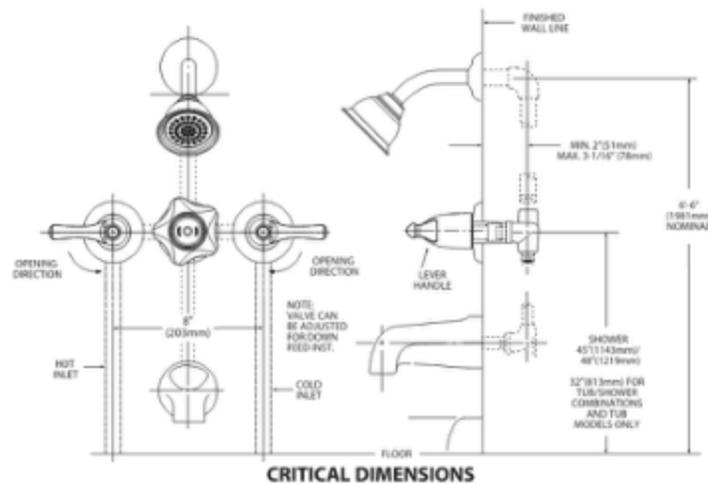


MOEN®
Three-Handle Tub/Shower Valve

Models: 82403 series



(for EP suffix models)



Rev. 1/13

FOR MORE INFORMATION CALL: 1-800-BUY-MOEN
www.moen.com

Sources

- [Redacted]
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- <http://www.waterinfo.org/resources/water-facts>
- [Redacted]
- <http://www.worldometers.info/water/>
- <http://www.epa.gov/WaterSense/pubs/indoor.html>
- [Redacted]