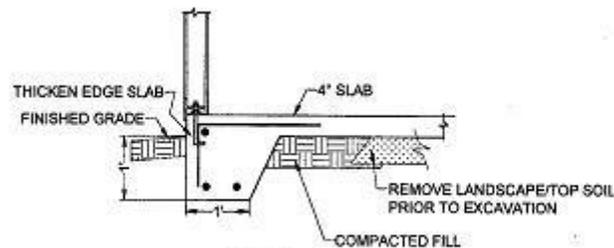


DIVISION 3 - CAST IN PLACE CONCRETE

TERMINOLOGY

A. CONCRETE: A mixture of 1 part Portland Cement (22 lbs)
2 Parts Dry Sand (41 lbs)
3 Parts Dry Aggregate (70 lbs)
½ Part Water (10 lbs)
Admixtures (7 lbs)
Total Weight Per Cu. Foot = 150 lbs.
Area of 1 CU. FT. 1,728 cu. Inches

1. **CAST IN PLACE CONCRETE:** Concrete that is formed, poured and cured in it's permanent position.
2. **CURED CONCRETE:** Concrete which has reached dehydration and obtained it's maximum compressive strength.
3. **GREEN CONCRETE:** Concrete which remains hydrated and is in it's earliest setting stage and has not hardened or cured appreciably.
4. **LIGHTWEIGHT CONCRETE:** A concrete mixture of substantially lower unit weight and compressive strength than that made from crushed stone or rock aggregate. Typically used on upper floors or roof tops where normal compressive strength is not a requirement and weight is a factor.
5. **MONOLITHILIC CONCRETE:** A single pour which includes the footing and slab concrete in a single pour .



DETAIL 14

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6. **POST-TENSION CONCRETE:** A method of stressing reinforced concrete by which the tendons or cables are tightened after the concrete slab has hardened and in place.



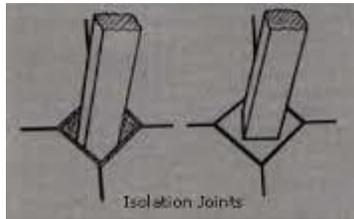
7. **PRE-CAST CONCRETE:** Concrete which is cast and cured in a place other than it's final resting position. (Beams, Columns, Slabs, Lintels)
8. **PRE-STRESSED CONCRETE:** A process of preparing concrete slabs and beams for extra strength by pouring concrete over tightly drawn steel cables, steel rods or tendons.
9. **REINFORCED CONCRETE:** Concrete with added materials such as steel rod, wire mesh, fiber mesh, dowel bars, expanded metal fabric, or cold drawn wire cable which act together with the concrete to resist cracking or movement

B. ADMIXTURES: Chemicals added to concrete mix which increase strength, workability, lowers freezing points, accelerates or decelerates curing, entrains air, or otherwise affects the placement or curing of concrete.

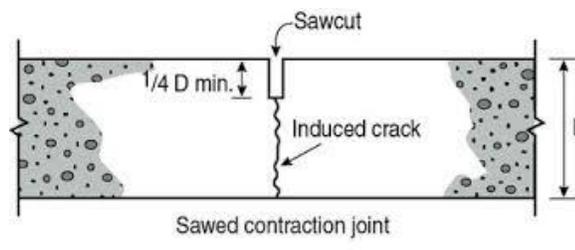
1. **ACCELARATOR:** A chemical which increases the rate of hydration, shortens the time of set or increases the rate of hardening and strength development. This product is most often utilized in cold weather to prevent the freezing of water in the concrete mix.
2. **AIR ENTRAINMENT AGENT:** An agent which causes air to be incorporated in minute bubbles in the concrete mixture. This increases workability, increases volume and frost resistance. The air pockets allow for the expansion of concrete without excessive cracking in cold weather pours.
3. **FLYASH:** A substitute for cement which reduces shrinkage and retards setting. (Not to exceed 25% by weight of Portland Cement)
4. **MICRO SILICA:** (Silica Fume) A concrete additive which drastically increases strength and reduces permeability. It also makes concrete "sticky" and difficult to finish.
5. **PLASTICIZER:** A Chemical which is used to increase the workability of concrete without negatively affecting the compressive strength of the concrete. It places the concrete in a suspended "plastic state" without the addition of excess water. It can adjust a 3" slump to the workability of a 7" slump or better.
6. **RETARDER:** An additive used to delay the rate of hardening or setting of concrete. This product is most often used in hot weather to prevent premature dehydration of the concrete.
7. **WATER REDUCER:** A chemical which lowers water to cement ratios resulting in higher compression strength.

C. GLOSSARY / COMMON TERMS:

1. **AGGREGATE:** An inert material used as a filler or strength enhancer in concrete mix. The material can vary according to the availability of natural resources. It can be sand, limestone, coral, or gravel. Some aggregates add significantly to the compressive strength of the concrete while others merely act as fillers.
2. **BLEEDING:** A term used to describe the rising of excessive water in concrete to the surface. This is a normal process which can be enhanced or reduced by the addition of admixtures to the concrete mixture.
3. **BONDING AGENTS:** A substance used to insure adhesion between newly poured concrete structures and existing substrates. They can be two part epoxies or one part latex / acrylic products.
4. **CONSTRUCTION JOINT:** A joint formed by construction design between successive placements of concrete such as column bases, walls and slabs.



5. **CONTROL JOINT:** A joint formed by metal key way or saw cutting which is intended to dictate the location of inevitable concrete cracking. A saw cut should be 1/4 of the depth of the slab.



6. **COLD JOINT:** A stop in a pour whereby the concrete has cured and poured against at a later date. A non continuous pour.
7. **COMPACTION:** The density required of the surface of on which concrete is to be poured. This process insures a consistent surface and prevents slab cracking due to soft under surfaces.

8. **EXPANSION JOINT:** A separation between adjoining structures to allow for expansion and contraction of concrete due to changes in ambient temperature. Fibrous, Asphaltic, synthetic rubber and other materials are used to fill these joints to allow for movement and still maintain a level surface.



**ASTM 1751: Standard Specification for rigid quick recovery fibered
Expansion Joint**

**ASTM 1752: Standard Specification for Preformed Sponge Rubber Cork and
Recycled PVC Expansion Joint for Structural Concrete.**

9. **FIBERMESH:** A silica fiber placed in the concrete mix which adds reinforcement and prevents excessive surface cracking. It is intended to replace labor intensive wire mesh.
10. **FOOTING:** The foundation for vertical walls (continuous footings) and Columns (isolated footings / Pier). The area of the slab designed to support the weight of the roof and walls as well as provide stability for concrete slabs.
11. **PILASTER:** A vertical beam or column cast or constructed with in a wall to add structural Integrity.
12. **SLUMP:** The measure of the consistency of concrete rated in terms of inches. A mixture with a 3” slump will have less flowability than a mixture with a 9” slump. Higher slumps are required when pouring walls to insure that the concrete penetrates to the bottom of the form and completely surrounds any reinforcement steel in the form. Higher slumps are achieved by the addition of admixtures such as plasticizers which increase flowability without decreasing strength.
13. **SODIUM SILICATE:** A chemical which reduces the porosity of concrete by reacting with the free lime on the surface to expand and crystallize the lime thus reducing dehydration. It does not form a membrane and does not meet the requirements of ASTM C- 309

14. **VAPOR BARRIER:** A product used to prevent the transmission of water and water vapors in and out of a slab, through wall, or ceiling. These materials are only vapor retarders since they have varying degrees of permeability.
15. **VIBRATION;** The use of mechanical vibration to facilitate the consolidation of concrete in deep pours or pours with low slumps.

D. CONCRETE CURING:

The process of maintaining hydration (water) in concrete until it has reached maximum compressive strength.

ASTM C - 309: The specification for liquid membrane forming curing compounds.

- Qualifications:
- a. The product must form a membrane on the surface of the Concrete.
 - b. It must not allow the concrete to lose more than .55 kg of water per square meter of area in 72 hours.

Types of Curing Compound:

Type 1 = Clear or Translucent without dye.

Type 1D = Clear with a Fugitive Dye

Type 2 = White Pigmented

Classes of Curing Compounds:

Class A = No restrictions on vehicle solids

Class B = The vehicle solid material must be resin

1. **MEMBRANE CURING:** The chemical sealing of concrete to achieve ASTM C-309.
2. **WATER SPRAY:** Curing with a continuous flow of water on the surface through the use of lawn sprinklers or other means of “ponding” or soaking the surface of the concrete.
3. **WATERPROOF PAPER:** A heavy bond Kraft paper which retains moisture without deteriorating.
4. **BURLAP CURING:** Water soaked burlap cloth (usually 9 Oz. per Sq. Yd.) which maintains hydration on the surface of the slab.
5. **BURLENE:** A combination of 5 mil white poly and 10 Oz. burlap blankets which reflects heat and retains moisture.
6. **DISSIPATING CURE:** A chemical cure which meets the requirements of ASTM C-309 by forming a membrane which will break up under ultra-Violet rays and foot traffic. However, most of these products WILL NOT dissipate if they are not exposed to continuous sunlight or foot traffic.

This process can take 4 to 6 weeks. It is often necessary to mechanically remove the membrane by scrubbing or the use of chemicals.

7. **VOC COMPLIANT: (Volatile Organic Compounds)** This product must meet Federal, State & Local requirements for Solvent contents. It has a petroleum based carrier for resin or wax based solids and is primarily used for exterior applications.
8. **WATER BASED:** The carrier for the product is water based rather than solvent based. This product may be used in interior or exterior applications.
9. Either product can use resin or wax based solids to form the membrane required by ASTM C-309

Always be cautious when choosing membrane curing compounds on surfaces which are to receive subsequent toppings such as tile, deck coatings, or any other material which must bond to the surface of the concrete slab. Membranes can inhibit bonding. Even if they are specified.

ASTM C – 1315 A new specification that deals with curing and sealing compounds. It does not replace ASTM C-309 which covers membrane forming cures. This specification allows specifiers to distinguish high performance materials with particular characteristics desirable for various types of projects.

The ASTM C-1315 standard provides precise requirements for membrane forming liquids. These membrane forming liquids are intended to be applied to the surface of either fresh concrete or hardened concrete. It must demonstrate alkali resistance, mild acid resistance, and promote adhesion properties. It should also exhibit a predictable level of resistance to Ultraviolet rays.

CALCULATING REBAR / MESH SUPPORTS

SLAB BOLSTERS / CONTINUOUS HIGH CHAIRS

- A. Divide the area of the slab by 4 feet to determine the number of feet needed.
- B. This gives you the number of linear feet you need.
- C. Divide the linear footage by 5 and this will give you the number of pieces.

EXAMPLE: Slab Dimensions 50' X 150' = 7,500 Sq Feet
7,500 Sq. Feet Divided by 4 = 1,875 Linear Feet
1,875 Linear Feet Divided by 5' = 375 Pieces

INDIVIDUAL HIGH CHAIRS

- A. Divide the area of the slab by 16 to determine the number of IHCs needed.

EXAMPLE: Slab Dimensions 50' X 150' = 7,500 SQ. FEET
7,500 Sq Feet Divided by 16 = 469 PIECES

WIRE MESH CHAIRS

- A. Divide the Area of the slab by 9 to determine the quantity of chairs needed.

EXAMPLE: Slab Dimensions 50' X 150' = 7,500 Sq. Feet
7,500 SQ. Feet Divided by 9 = 833

COMMON ABBREVIATIONS

SB = Slab Bolster	IHC = Individual High Chair
SBP = Slab Bolster W/Plate	HCP = Individual High Chair W/Plate
SBU = Slab Bolster Upper	BC = Bar Chair
BB = Beam Bolster	BGP = Bar Chair W/ Plate
BBP = Beam Bolster W/Plate	CHC = Continuous High Chair
BBU = Beam Bolster Upper	CHCU = Continuous High Chair Upper

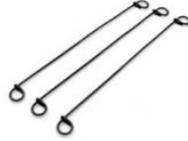
VARIATIONS

Plastic Tipped (Dipped)
Stainless Steel Tipped

Plastic Tipped (Baked On)
Epoxy Coated

CONCRETE TERMINOLOGY

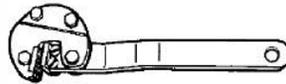
BAR TIES: 6" or 8" wire ties with loops on each used to tie rebar.



BAR SPLICERS: A mechanical device for splicing rebar.



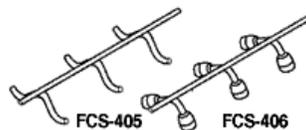
BREAK BACK WRENCH: A tool used to remove snap ties from a form and break the tie at the predetermined break back location.



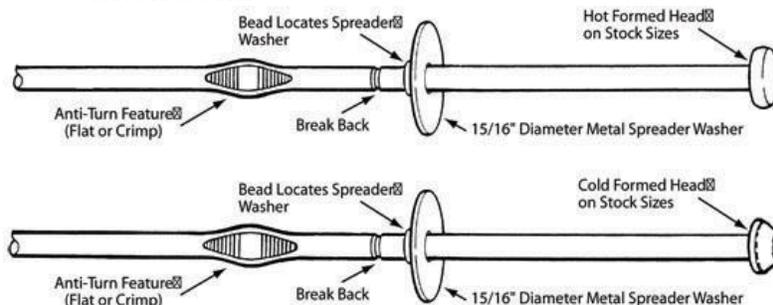
BATTERED WALL: A wall which is thicker at the bottom than the top, designed to accommodate higher stress loads.



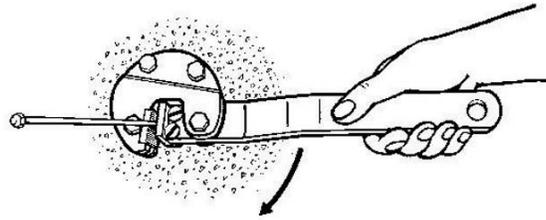
BEAM BOLSTER: A rod which provides support for steel reinforcement in formwork for a reinforced concrete beam. It is available with a plain or plastic tip foot.



BREAK BACK: A point on a snap tie designed to break off in the concrete wall when bent.



BREAK BACK WRENCH: A Ratchet wrench used to twist snapties and the pre-determined brakk back point.



BLOW OUT: A term used to describe the failure of a concrete forming system which cause the form walls to collapse and concrete to spread beyond original intention.

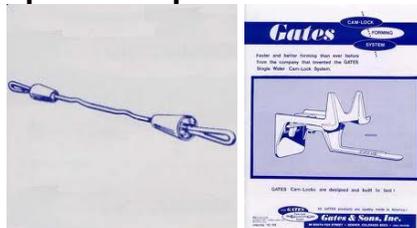


BURKE BAR: A trade name for a Heavy Duty Wrecking bar used to disassemble concrete forms. It typically has a 3” blade and a 56” shaft.



CAT HEAD: (SEE FORM CLAMP)

CAMLOCK SYSTEM: A handset system designed by Gates & Sons. It involves special loop end ties as well as special brackets.



CHAMFER: A wood, plastic or rubber three sided material attached to a form to bevel the top of the pour or to create a void in a form.



COIL INSERTS: Cast in place inserts used for a variety of lifting applications or to attach the bottom of a form for additional pours.



COIL BOLTS: A high threaded bolt designed primarily for use with concrete forming systems. It is used in conjunction with coil inserts.



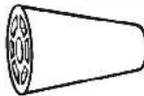
COIL ROD: Deeply threaded rod used in heavy concrete forming. It is typically purchased in 20' lengths and cut to specifications.



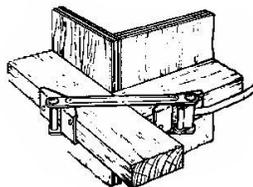
COIL TIE SYSTEM: A system used in heavy or unique forming applications. This system utilizes coil rod, coil ties, plate washers and coil nuts. The load capacity can vary from 4,500 lbs to almost 30,000 lb.



CONE: A plastic cone shaped block installed at the snap tie break back to insure the distance of the tie break from the face of the wall. Stock cones are 1" long.

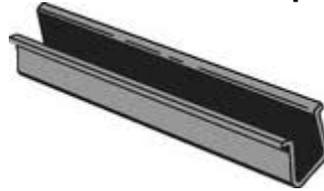


CORNER BRACKET; A device used to reinforce the corners of concrete forms.

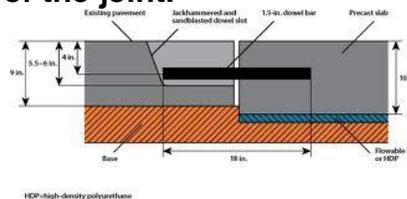


CRANE SET FORMS: Concrete Forming panels of sufficient size to require the use Of a crane to set in place.

DOVETAIL ANCHOR SLOT: A foam filled extruded metal strip cast vertically in the face of the form wall to accept dovetail anchors.



DOWELS: A smooth or deformed steel bar used to bridge load factors between adjoining concrete slabs. They are typically used in concrete paving applications. One side is bonded to the existing slab while the other is lubricated or sealed to allow expansion and contraction of the joint.

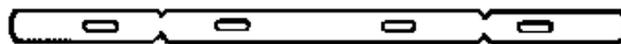


DOWEL BASKETS: A wire system embedded in the concrete slab which holds concrete dowels in place and allows uniform distribution of dowel placement and slab weight load.



FORM LINER: A plastic, vinyl, or rubber mold attached to the form to cast an Architectural finish to the surface of the concrete.

FLAT TIE: A concrete form tie for use on handset & gang forms.



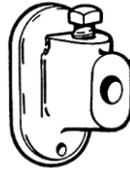
FORM SAVER: (Dowel Bar Substitute) A mechanical devise used to join rebar in staged construction without damaging existing Concrete Forms



FORM RELEASE: A chemical applied to the face of a concrete form to prevent the bonding of freshly poured concrete to the surface of the form. Types may vary from wax base, water base, vegetable oil, petroleum base and other reactive chemicals.



FORM CLAMP: A forged iron clamp attached to the end of pencil rod. Also known as a “cat head” or a “monkey fist.” See Rod Clamp.



FULL LIQUID HEAD: A term used when concrete is poured or pumped completely to the top of the form rather than pouring in lifts or stages.

INDIVIDUAL HIGH CHAIR: A singular support for suspending reinforcement steel in A concrete slab. It is available in a plain or plastic tipped foot.



HC-Individual High Chair
(Plastic Tipped Legs Available)
Available in heights of 2' to 4' in increments of 1/4'

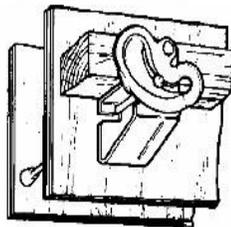
GANG FORM A crane set form system of large form panels for repetitious forming applications.

HAND SET FORMS: A form system of smaller forms capable of setting by hand by one or two men.

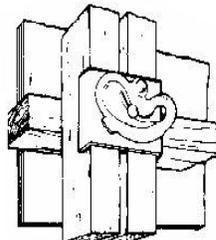
JAHN BRACKETS: Brackets used to stabilize conventional snap tie systems.

Type A: Used for single waler, “short end” (4 3 / 4”) ties

Type C; Used for double waler, “long end” (8 1 / 4”) ties.

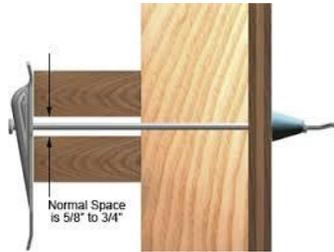


TYPE A



TYPE C

LONG END TIE: A tie with a 8 ¼” end used with a double waler.



LOOP TIES: Snap ties with loops on each end rather than buttons.

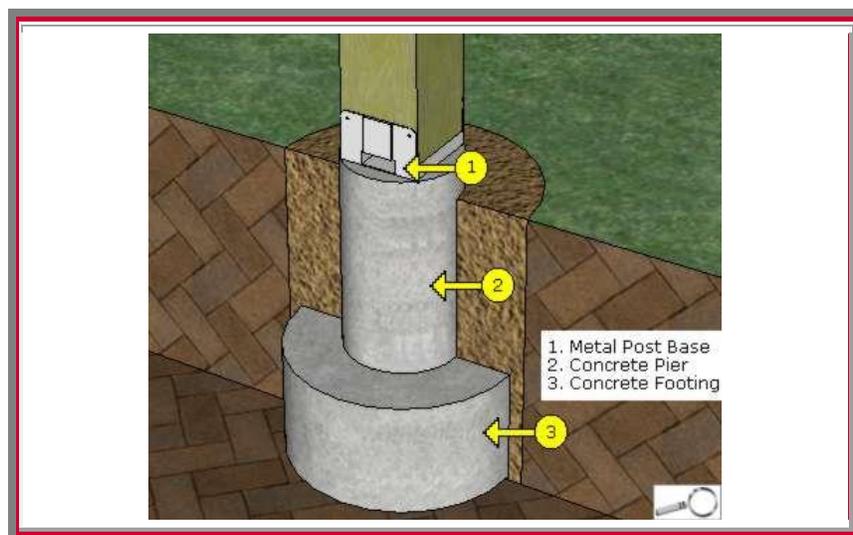


MODULAR FORMS: Factory built form panels for hand set systems. Steel frame forms which act as walers, utilizing flat steel panel ties with wedge bolts.



PANEL TIES: Another name for flat ties used with modular systems.

PIER: A non-continuous footing designed to support the weight of a column, beam or concrete slab.

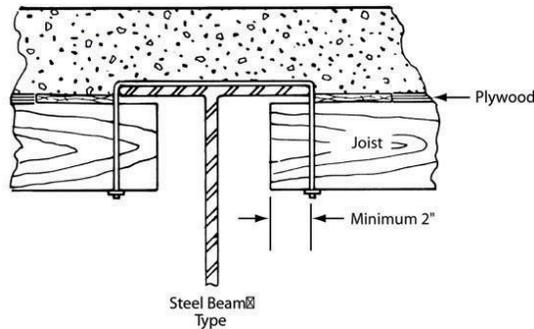


PIGS FEET: (See Steel Wedge Clamp)

PENCIL ROD: Cold drawn smooth wire, 1 / 4", 3 / 8", or 1 / 2" in diameter used with form clamps for larger mass pours or below grade non-wall applications. Pile caps, piers, pile caps, equipment foundations, and grade beams. Typically sold in 20' lengths or 100 lb rolls.



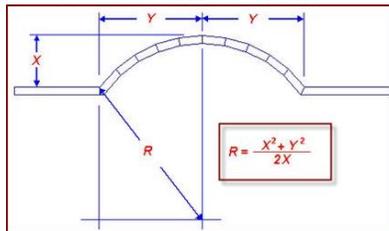
PLATE SADDLE HANGERS: Primarily used with steel beam construction or pre-cast beams and block walls.



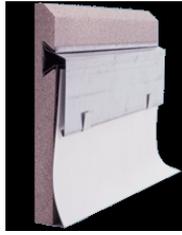
PLYFORM: Plywood used for Concrete Forming.

- | | |
|---------------------|---|
| BB Plyform: | 5 Ply Pine for 1-5 reuses |
| BB Fir: | 7 Ply Fir for 5-15 reuses |
| C+ / C+ | Class C Veneer with imperfections |
| CDX | Cheapest grade of Plyform usually for 1 use |
| HDO | High Density Overlay with Phenolic resin for up to 50 uses. |
| MDO Overlay: | Medium Density Overlay, 7 Ply with Phenolic Resin / Craft Paper Face 10-25 uses. |
| OSB | Oriented Strand Board |

RADIUS WALL: A round or curved formed wall.



REGLET: A foam filled extruded metal strip cast into the face of the concrete wall to accept the top run of through wall flashing.



REBAR COUPLERS: Threaded rebar connectors with a flanged female (she) section used in cold joints, haunches, stair landings and other applications. It saves labor and prevents the drilling of holes in a bulkhead or form.



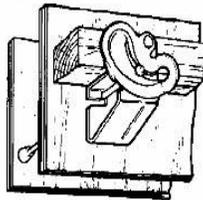
ROD TIGHTENER: A tool used to pull and tighten pencil rod through the form and form clamp.



RUBBING: A term used for dressing or smoothing a concrete wall after the form is stripped. Usually with Portland Cement or Non-Shrink Grout.

ROD CLAMP: See Form Clamp

SHORT END SNAP TIE: A tie with a 4 3/4" end used with a single waler.



SLAB BOLSTER: A support for suspending reinforcement steel above the base of a concrete slab. Comes in various heights, typically 5 feet long. It is available with a plain or plastic tipped foot



SNAP TIE: The form connector most commonly used in concrete forming applications. Made from steel wire with formed button ends to form a device which connects the sides of a concrete form .



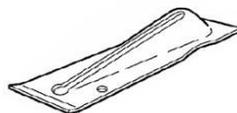
SONNOTUBE: (Sleek Tube or Round Fiber Form) A waxed paper cylinder for forming columns 6” to 48” in diameter. They are typically 12’ in length.



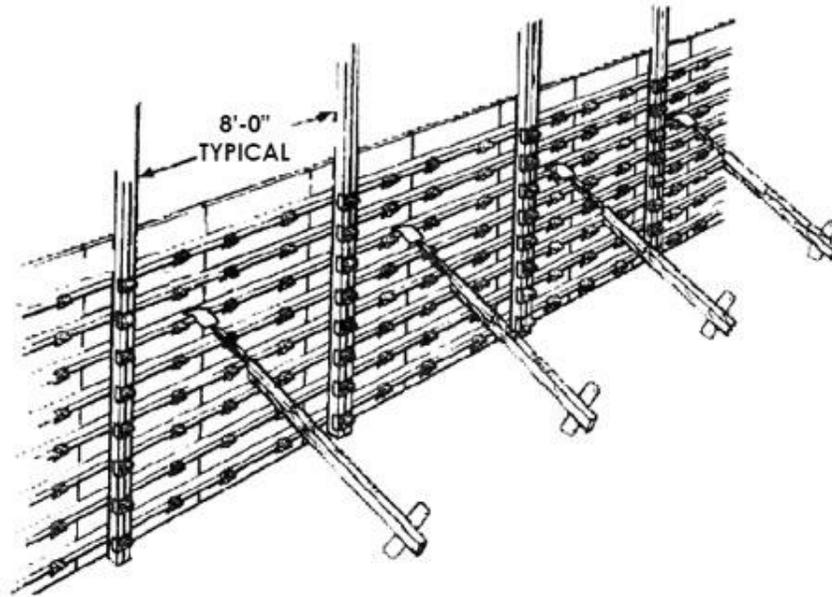
STEEL PLY FORMS: Individual Steel reinforced panels used in conjunction to create a Concrete Form. Typically for Concrete Walls



STEEL WEDGE: (Pigs Feet, Wedge Clamp) A stamped steel plate with a slot to accept the button end of a snap tie.



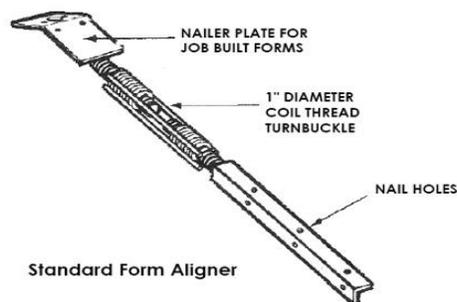
STRONG BACK: A vertical or horizontal reinforcing member, usually lumber, which is attached to a form for added strength or support. They are also used to reinforce Tilt Wall Panels with narrow legs.



SHORING: Bracing used primarily in multi-story buildings to protect workers from overhead concrete pours and to support form works for multi floor pours.



TURNBUCKLE: An adjustable steel angle with coil adjustments and nail plates. Used for plumb adjustment or support on concrete forms



VIBRATING: The use of a mechanical vibrator to consolidate concrete in a form. It reduces air pockets in the form and consolidates concrete around the steel reinforcement

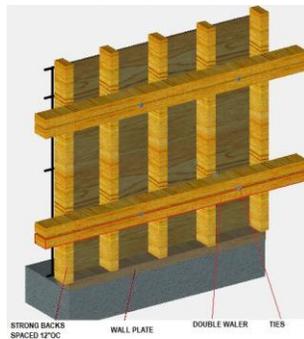


Common mechanical vibrators consist of and are sold in three parts:

- a. Motor: Ranging from 1.5 to 3 Horse power
- b. Whip / Shaft: Ranging from 2' to 21' lengths
- c. Head: Diameters of $\frac{3}{4}$ " to $2\frac{1}{2}$ ". X 14" in length

They are available with cordless, electrical or pneumatic power sources.

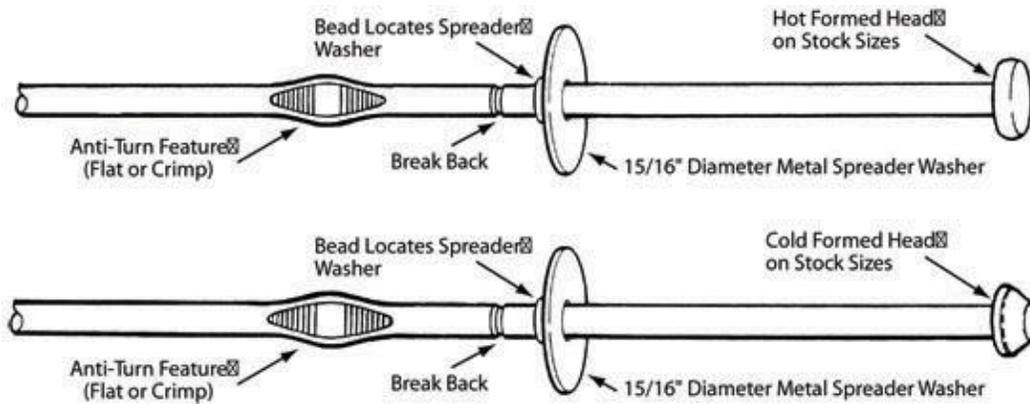
WALER: A wood, steel or aluminum member used to distribute pressure on a concrete form wall. Horizontal walers are strictly for load distribution, whereas vertical walers or strong backs support load and align the form. Usually 2" X 4" dimensional lumber. There are single Walers which involve one 2" x 4" support member and Double Walers which involve two 2" x 4" Walers



WALER BRACKET: Metal Brackets used to reinforce and hold Walers in place.



WASHER TIE: A snaptie with a metal washer used to stabilize a tie in a form in the place of a cone tie.

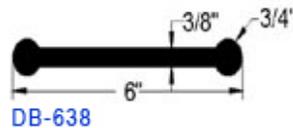


WATERSEAL TIE: A snap tie with a neoprene washer installed in the middle of the tie to restrict water seepage through the snap tie location. It is typically used in concrete tanks such as water treatment plants, waste water tanks and other concrete structures design to contain liquids.

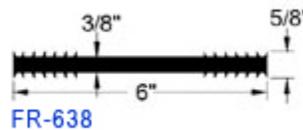


WATERSTOP: PVC, Rubber or bituminous strips used to stop water filtration at footings or concrete joints. It is available in several configurations.

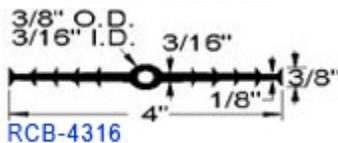
DUMBBELL WITH CENTER BULB



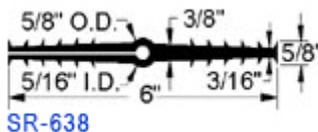
DUMBBELL



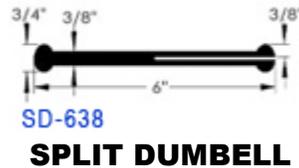
FLAT RIBBED



RIBBED CENTER BULB

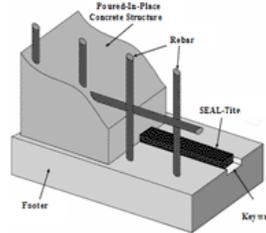


SPLIT RIBBED CENTER BULB



Joints for PVC or Rubber Waterstops must be mechanically spliced with the use of heat transmitting Waterstop Irons.

EXPANSIVE WATERSTOP



Expansive (Hydrophillic) Waterstop typically consist of materials that react to moisture by swelling and creating a seal, which prevents the intrusion of water through a concrete joint. It typically requires a primer. Common manufactures are Snykoflex, Henry and CETCO.

WELDED WIRE MESH : Wire mesh has been used for centuries to control cracking in concrete slabs. Historically it has been identified by the gauge of the wire . 6 X 6 X 10 / 10 would indicate wire that is spaced 6” X 6” and composed of 10 Gauge wire. More and more Engineers are using metric designations to differentiate between gauge and spacing. The typical lap on wire mesh is 6”

It is now identified as; 6 X 6 X W1.4 / W1.4

10 Gauge Wire that is spaced on 6” grids is 6 X 6 X W1.4 / W1.4

- 6 X 6 X W1.4 / W1.4 = 10 Gauge
- 6 X 6 X W2.1 / W2.1 = 8 Gauge
- 6 X 6 X W2.9 / W2.9 = 6 Gauge
- 6 X 6 X W4 / W4 = 4 Gauge
- 4 X 4 X W1.4 / W1.4 = 10 Gauge
- 4 X 4 X W2.1 / W2.1 = 8 Gauge
- 4 X 4 X W2.9 / W2.9 = 6 Gauge
- 4 X 4 X W4 / W4 = 4 Gauge

WRECK FORM: A field term used for stripping or removing forms from poured in place concrete.