

**CPC****COOPERATIVE PATENT CLASSIFICATION****E02D**

**FOUNDATIONS; EXCAVATIONS, EMBANKMENTS** (specially adapted for hydraulic engineering [E02B](#) ) ; **UNDERGROUND OR UNDERWATER STRUCTURE** (tunnels, tunnelling, mining [E21](#) )

**WARNING**

The following IPC groups are not used in the CPC scheme. Subject matter covered by these groups is classified in the following CPC groups:

[E02D 29/09](#) covered by [E02D 29/06](#)

**E02D 1/00**

**Investigation of foundation soil in situ** (investigation involving boring or specially adapted to earth drilling [E21B 25/00](#), [E21B 49/00](#); investigating or analysing materials by determining their chemical or physical properties, in general [G01N](#) , e.g. sampling [G01N 1/00](#))

**E02D 1/02**

. before construction work

**E02D 1/022**

.. {by investigating mechanical properties of the soil ([E02D 1/027](#) takes precedence) }

**E02D 1/025**

... {combined with sampling }

**E02D 1/027**

.. {by investigating properties relating to fluids in the soil, e.g. pore-water pressure, permeability (sampling of groundwater [E02D 1/06](#)) }

**E02D 1/04**

.. Sampling of soil { ([E02D 1/025](#) takes precedence) }

**E02D 1/06**

.. Sampling of ground water

**E02D 1/08**

. after finishing the foundation structure { ([testing of piles E02D 33/00](#)) }

**E02D 3/00**

**Improving or preserving soil or rock, e.g. preserving permafrost soil** (securing of slopes or inclines [E02D 17/20](#); damming or interrupting passage of underground water [E02D 19/12](#); improving soil for agricultural purposes [A01](#) ; soil stabilisation for road building or like purposes [E01C 21/00](#), [E01C 23/10](#); setting rock anchoring bolts [E21D](#) )

**E02D 3/005**

. {Soil-conditioning by mixing with fibrous materials, filaments, open mesh or the like }

**E02D 3/02**

. Improving by compacting ([E02D 3/11](#) takes precedence; compacting soil locally before or while forming foundations [E02D 27/26](#), [E02D 27/28](#))

**E02D 3/026**

.. by rolling with rollers usable only for or specially adapted for soil compaction, e.g. sheepfoot rollers (rollers for soil working in agriculture [A01B 29/00](#); rollers for road paving, such rollers usable also for compacting soil [E01C 19/23](#))

**E02D 3/0265**

... { Wheels specially adapted therefor; Cleats for said wheels }

**E02D 3/032**

... Trench rollers

**E02D 3/039**

... Slope rollers

**E02D 3/046**

.. by tamping or vibrating, e.g. with auxiliary watering of the soil ([E02D 3/026](#), [E02D 3/08](#) take precedence; generating or transmitting mechanical vibrations for performing mechanical work in general [B06B](#) ; tamping or vibrating apparatus for working ballast or railways [E01B 27/00](#), for consolidating paving materials

- [19/30](#), for consolidating concrete in general [E04G 21/06](#))
- E02D 3/054 . . . involving penetration of the soil, e.g. vibroflotation
- E02D 3/061 . . . Tampers with directly acting explosion chambers ([pile drivers with explosion chambers E02D 7/12](#))
- E02D 3/068 . . . Vibrating apparatus operating with systems involving reciprocating masses ([E02D 3/054](#), [E02D 3/061](#) take precedence)
- E02D 3/074 . . . Vibrating apparatus operating with systems involving rotary unbalanced masses ([E02D 3/054](#) takes precedence)
- E02D 3/08 . . by inserting stones or lost bodies, e.g. compaction piles ([sand drains for soil compaction E02D 3/10](#); [stressing soil while forming foundations E02D 27/28](#))
- E02D 3/10 . . by watering, draining, de-aerating or blasting, e.g. by installing sand or wick drains ([E02D 3/11](#) takes precedence; [soil-penetrating vibrators with auxiliary watering E02D 3/054](#); [drainage of soil in general E02B 11/00](#))
- E02D 3/103 . . . {[by installing wick drains or sand bags](#) }
- E02D 3/106 . . . {[by forming sand drains containing only loose aggregates \(sand piles E02D 3/08\)](#) }
- E02D 3/11 . by thermal, electrical or electro-chemical means ([freezing soil for interrupting passage of underground water E02D 19/14](#))
- E02D 3/115 . . by freezing
- E02D 3/12 . Consolidating by placing solidifying or pore-filling substances in the soil ([making piles E02D 5/46](#); [soil-conditioning or soil-stabilising materials C09K 17/00](#); [consolidation of ground around boreholes or wells E21B 33/138B](#), [E21B 43/025](#))
- E02D 3/123 . . {[and compacting the soil \(E02D 3/126 takes precedence\)](#) }
- E02D 3/126 . . {[and mixing by rotating blades](#) }
- E02D 5/00 Bulkheads, piles, or other structural elements specially adapted to foundation engineering ([engineering elements in general F16](#) )**
- E02D 5/02 . Sheet piles or sheet pile bulkheads { ([foundations made with sheet pile bulkheads E02D 27/30](#); [cofferdams E02D 19/04](#)) }
- E02D 5/03 . . Prefabricated parts {[e.g. composite sheet piles](#) }
- E02D 5/04 . . . made of steel
- E02D 5/06 . . . . Fitted piles or other elements specially adapted for closing gaps between two sheet piles or between two walls of sheet piles
- E02D 5/08 . . . . Locking forms; Edge joints; Pile crossings; Branch pieces
- E02D 5/10 . . . made of concrete or reinforced concrete { ([moulds therefor E02D 5/70](#)) }
- E02D 5/105 . . . . {[of prestressed concrete \(E02D 5/12 takes precedence\)](#) }
- E02D 5/12 . . . . Locking forms; Edge joints; Pile crossings; Branch pieces
- E02D 5/14 . . Sealing joints between adjacent {[sheet](#) } piles ([sealing joints not restricted to foundation piles E04B 1/68](#))
- E02D 5/16 . . Auxiliary devices rigidly or detachably arranged on sheet piles for facilitating assembly { ([as parts of driving or pulling apparatus E02D 7/00](#), [E02D 13/00](#)) }
- E02D 5/18 . Bulkheads or similar walls made solely of concrete in situ { ([moulds therefor E02D 5/68](#); [making foundation slots E02D 17/13](#); [sealing diaphragms other than those made of concrete E02D 19/18](#)) }
- E02D 5/182 . . {[using formworks to separate sections](#) }

- E02D 5/185      ..      {with flexible joint members between sections (joints in foundation structures [E02D 29/16](#); flexible joints in hydraulic engineering [E02B 3/16](#), in building [E04B 1/68](#)) }
- E02D 5/187      ..      {the bulkheads or walls being made continuously, e.g. excavating and constructing bulkheads or walls in the same process, without joints }
- E02D 5/20      .      Bulkheads or similar walls made of prefabricated parts and concrete, including reinforced concrete, in situ
- E02D 5/22      .      Piles (sheet piles, {i.e. elements shaped to mutually lock or mate } [E02D 5/02](#); {pile shoes [E02D 5/72](#); foundations on piles [E02D 27/12](#), [E02D 27/20](#) })
- E02D 5/223      ..      { Details of top sections of foundation piles ([E02D 5/54](#) takes precedence) }
- E02D 5/226      ..      {Protecting piles (piles with protecting cases [E02D 5/60](#)) }
- E02D 5/24      ..      Prefabricated piles

**NOTE**

Documents covered both by [E02D 5/26](#) to [E02D 5/32](#) and by one or several of the groups [E02D 5/48](#) to [E02D 5/64](#) are classified in all relevant groups unless specific priority rules to the contrary are given

- E02D 5/26      ...      made of timber with or without reinforcement; Means affording protection against spoiling of the wood (cases [E02D 5/60](#); [impregnating agents B27K 3/16](#)) ; Self-cleaning of piles placed in water
- E02D 5/28      ...      made of steel {or other metals ([E02D 5/52](#) takes precedence) }
- E02D 5/285      ....      {tubular, e.g. prefabricated from sheet pile elements (sheet pile boxes [E02D 27/30](#); concrete piles with metal casings [E02D 5/30](#)) }
- E02D 5/30      ...      made of concrete or reinforced concrete or made of steel and concrete { ([E02D 5/50](#) takes precedence; assembled from segments [E02D 5/523](#); prestressed concrete [E02D 5/58](#)) }
- E02D 5/32      ...      with arrangements for setting {or assisting in setting } in position by fluid jets { (placing piers by using fluid jets in general [E02D 7/24](#)) }
- E02D 5/34      ..      Concrete or concrete-like piles cast in position; {Apparatus for making same ([E02D 5/50](#) takes precedence; moulds [E02D 5/665](#); placing, removing moulds [E02D 7/00](#) to [E02D 11/00](#); placing the concrete [E02D 15/04](#)) }
- E02D 5/36      ...      making without use of mouldpipes or other moulds

**NOTE**

Documents covered both by [E02D 5/34](#) to [E02D 5/46](#) and by one or several of the groups [E02D 5/48](#) to [E02D 5/64](#) are classified in all relevant groups unless specific priority rules to the contrary are given

- E02D 5/38      ...      making by use of mould-pipes or other moulds
- E02D 5/385      ....      {with removal of the outer mould-pipes (documents also covered by one or several of the groups [E02D 5/40](#) to [E02D 5/44](#) are classified in all the relevant groups) }
- E02D 5/40      ....      in open water
- E02D 5/42      ....      by making use of pressure liquid or pressure gas for compacting the concrete
- E02D 5/44      ....      with enlarged footing or enlargements at the bottom of the pile
- E02D 5/445      .....      {by application of pyrotechniques }

- E02D 5/46 . . . making in situ by forcing bonding agents into gravel fillings or the soil  
(consolidating soil in general [E02D 3/12](#))
- E02D 5/48 . . Piles varying in construction along their length, {i.e. along the body between head and shoe, e.g. made of different materials along their length ([E02D 5/50](#), [E02D 5/52](#) take precedence) }
- E02D 5/50 . . Piles comprising both precast concrete portions and concrete portions cast in situ { ([E02D 5/523](#) takes precedence) }
- E02D 5/52 . . Piles composed of separable parts, e.g. telescopic tubes {Piles composed of segments }
- E02D 5/523 . . . {composed of segments }
- E02D 5/526 . . . { Connection means between pile segments }
- E02D 5/54 . . Piles with prefabricated supports or anchoring parts; Anchoring piles { ([E02D 5/44](#) takes precedence; ground anchors [E02D 5/80](#); anchored foundations [E02D 27/50](#)) }
- E02D 5/56 . . Screw piles { (placing piles by screwing down [E02D 7/22](#)) }
- E02D 5/58 . . Prestressed concrete piles { (segmental piles [E02D 5/523](#)) }
- E02D 5/60 . . Piles with protecting cases
- E02D 5/62 . . Compacting the soil at the footing or in {or along } a casing by forcing cement or like material through tubes
- E02D 5/64 . . Repairing piles
- E02D 5/66 . Mould-pipes or other moulds { (for plant use [B28B](#) ) }
- E02D 5/665 . . {for making piles }
- E02D 5/68 . . for making bulkheads or elements thereof
- E02D 5/70 . . for making sheet piles {not used }
- E02D 5/72 . Pile shoes
- E02D 5/74 . Means for anchoring structural elements or bulkheads (anchoring piles [E02D 5/54](#); {anchored foundations [E02D 27/50](#) })
- E02D 5/76 . . Anchoring for bulkheads or sections thereof {in as much as specially adapted therefor }
- E02D 5/765 . . . {removable }
- E02D 5/80 . . Ground anchors { (for galleries, tunnels or shafts [E21D 21/00](#)) }
- E02D 5/801 . . . {driven by screwing }
- E02D 5/803 . . . {with pivotable anchoring members }
- E02D 5/805 . . . {with deformable anchoring members }
- E02D 5/806 . . . {involving use of explosives }
- E02D 5/808 . . . {anchored by using exclusively a bonding material }
- E02D 7/00** **Methods or apparatus for placing sheet pile bulkheads, piles, mouldpipes, or other moulds** (for both placing and removing [E02D 11/00](#); {accessories for coupling driver to piles or the like [E02D 13/10](#); for trees or other plants [A01G 17/16](#); placing posts [E04H 17/26](#) })
- E02D 7/02 . Placing by driving { ([E02D 7/18](#) to [E02D 7/24](#) take precedence) }
- E02D 7/04 . . Hand {(actuated) } pile-drivers

- E02D 7/06 . . . Power-driven drivers { (tampers [E02D 3/061](#)) }
- E02D 7/08 . . . Drop drivers with free-falling hammer { ([E02D 7/10](#) takes precedence) }
- E02D 7/10 . . . with pressure-actuated hammer, {i.e. the pressure fluid acting directly on the hammer structure ([E02D 7/12](#) takes precedence; vibrating drivers [E02D 7/18](#)) }
- E02D 7/12 . . . Drivers with explosion chambers
- E02D 7/125 . . . . {Diesel drivers }
- E02D 7/14 . . . Components for drivers {inasmuch as not specially for a specific driver construction }
- E02D 7/16 . . . . Scaffolds {or supports } for drivers { (guide frames for the elements to be driven per se [E02D 13/04](#); supports of the artificial island type [E02B 17/00](#)) }
- E02D 7/165 . . . . . { of variable length, e.g. foldable or telescopic }
- E02D 7/18 . Placing by vibrating { (vibrators for soil compacting [E02D 3/046](#)) }
- E02D 7/20 . Placing by pressure or pulling power
- E02D 7/22 . Placing by screwing down { (screw piles per se [E02D 5/56](#)) }
- E02D 7/24 . Placing by using fluid jets { (prefabricated concrete piles with arrangements therefor [E02D 5/32](#)) }
- E02D 7/26 . Placing by using several means simultaneously
- E02D 7/28 . Placing of hollow pipes or mould pipes by means arranged inside the piles or pipes { ([E02D 13/08](#) takes precedence) }
- E02D 7/30 . . by driving cores
- E02D 9/00** **Removing sheet piles bulkheads, piles, mould-pipes or other moulds** {or parts thereof } (for both placing and removing [E02D 11/00](#))
- E02D 9/005 . {removing the top of placed piles of sheet piles ([E02D 9/04](#) takes precedence) }
- E02D 9/02 . by withdrawing
- E02D 9/04 . by cutting-off under water
- E02D 11/00** **Methods or apparatus** {specially adapted } for both placing and removing sheet pile bulkheads, piles, or mould-pipes (features relating to placing only [E02D 7/00](#), to removing only [E02D 9/00](#); {placing apparatus which without special provisions, can be operated to remove, e.g. vibrating drivers [E02D 7/00](#) })
- E02D 13/00** **Accessories for placing or removing piles or bulkheads**, {e.g. noise attenuating chambers }
- E02D 13/005 . { Sound absorbing accessories in piling }
- E02D 13/02 . specially adapted for placing or removing bulkheads
- E02D 13/04 . Guide devices; Guide frames { (as parts of the driver scaffold [E02D 7/16](#)) }

- E02D 13/06 . for observation while placing
- E02D 13/08 . Removing obstacles
- E02D 13/10 . Follow-blocks of pile-drivers or like devices

**NOTE**

The IPC wording is replaced by the following wording: Devices adapted to, e.g. interposed on, the top of the pile to be driven, e.g. follow-blocks or the like caps, rings

**E02D 15/00 Handling building or like materials for hydraulic engineering or foundations ( {soil-shifting [E02F](#) ; } conveying or working-up concrete or similar masses in general [E04G 21/02](#) )**

- E02D 15/02 . Handling of bulk concrete specially for foundation {or hydraulic engineering } purposes { (lining canals [E02B 5/02](#); banks of the bodies of water [E02B 3/121](#)) }
- E02D 15/04 . . Placing concrete in mould-pipes, pile tubes, bore-holes or narrow shafts
- E02D 15/06 . . Placing concrete under water { (for surfacing the bottom of bodies of water [E02B 3/121](#)) }
- E02D 15/08 . Sinking workpieces into water or soil {inasmuch as not provided for elsewhere }
- E02D 15/10 . Placing gravel or light material under water {inasmuch as not provided for elsewhere }

**E02D 17/00 Excavations; Bordering of excavations; Making embankments (soil-shifting apparatus [E02F](#) ; earth drilling [E21](#) )**

- E02D 17/02 . Foundation pits
- E02D 17/04 . . Bordering {surfacing } or stiffening the sides of foundation pits
- E02D 17/06 . Foundation {trenches } ditches or narrow shafts
- E02D 17/08 . . Bordering or stiffening the sides of ditches {trenches } or narrow shafts for foundations
- E02D 17/083 . . . {Shoring struts }
- E02D 17/086 . . . {Travelling trench shores }
- E02D 17/10 . . Covering trenches for foundations
- E02D 17/12 . . Back-filling of foundation trenches or ditches { (apparatus therefor [E02F 5/12](#), [E02F 5/22](#)) }
- E02D 17/13 . Foundation slots {or slits }; Implements for making these slots {or slits }
- E02D 17/16 . Loosening of soil or rock, under water (for correcting streams [E02B 3/02](#); by dredgers or excavators [E02F](#) )
- E02D 17/18 . Making embankments, {e.g. dikes, dams } ([E02D 17/20](#) takes precedence; {foundations for dams [E02D 27/40](#) })
- E02D 17/20 . Securing of slopes or inclines { (by soil [E02D 3/12](#); protection against snowslides or

avalanches [E01F 7/04](#), [E01F 15/00](#); securing banks or like surfaces facing on bodies of water [E02B 3/12](#) }

- E02D 17/202 . . {with flexible securing means }
- E02D 17/205 . . {with modular blocks, e.g. pre-fabricated }
- E02D 17/207 . . {with means incorporating sheet piles or piles }

## **E02D 19/00** **Keeping dry foundation sites or other areas in the ground** (sheet piles or bulkheads [E02D 5/02](#))

- E02D 19/02 . Restraining of open water
- E02D 19/04 . . by coffer-dams {,e.g. made of sheet piles (permanent sheet piling boxes [E02D 27/30](#)) }
- E02D 19/06 . Restraining of underground water
- E02D 19/08 . . by employing open ditches arranged below the level of the water
- E02D 19/10 . . by lowering level of ground water { (installation for obtaining or collecting drinking water [E03B 3/00](#)) }
- E02D 19/12 . . by damming or interrupting the passage of underground water
- E02D 19/14 . . . by freezing the soil (in connection with sinking shafts [E21D 1/12](#))
- E02D 19/16 . . . by placing or applying sealing substances ( {[E02D 19/18](#) takes precedence }; consolidating by placing solidifying or pore-filling pore-filling substances in the soil [E02D 3/12](#); {improving soil by chemical substances [C09K 17/00](#) } )
- E02D 19/18 . . . by making use of sealing aprons, {e.g. diaphragms made from bituminous or clay material } ( {concrete diaphragms [E02D 5/18](#) }; sealing or joints for {hydraulic } engineering work [E02B 3/16](#))
- E02D 19/185 . . . . {Joints between sheets constituting the sealing aprons }
- E02D 19/20 . . . by displacing the water, e.g. by compressed air { (pneumatic caissons [E02D 23/04](#)) }
- E02D 19/22 . Lining sumps in trenches {or other foundation pits }

## **E02D 23/00** **Caissons; Construction or placing of caissons** (tunnels submerged into or built in open water [E02D 29/063](#); {moles, piers, quays, breakwaters incorporating caissons [E02B 3/06](#); foundation formed by caissons [E02D 27/18](#) to [E02D 27/22](#); caisson-like artificial islands [E02B 17/00](#) } )

- E02D 23/02 . Caissons able to be floated on water and to be lowered into water in situ { (floating caisson foundations [E02D 27/06](#)) }
- E02D 23/04 . Pneumatic caissons { (sinking of same [E02D 23/10](#)) }
- E02D 23/06 . . bringing persons or material into or out of compressed air caissons { (air locks in mines [E21F 1/14](#)) }
- E02D 23/08 . Lowering or sinking caissons { (sinking mine shaft [E21D 1/00](#)) }
- E02D 23/10 . . Caisson filled with compressed air { ([E02D 23/06](#) takes precedence) }
- E02D 23/12 . . inclined lowering
- E02D 23/14 . . Decreasing the skin friction while lowering
- E02D 23/16 . Jointing caissons to the foundation soil, specially to uneven foundation soil



**E02D 25/00****Joining caissons, sinkers, or other units to each other under water****E02D 27/00****Foundations as substructures**

- E02D 27/01 . Flat foundations
- E02D 27/013 . . { Shuttering specially adapted therefor }
- E02D 27/016 . . { made mainly from prefabricated concrete elements }
- E02D 27/02 . . Flat foundations without substantial excavation ([E02D 27/04](#), [E02D 27/08](#) take precedence)
- E02D 27/04 . . in water or on quicksand
- E02D 27/06 . . . Floating caisson foundations
- E02D 27/08 . . Reinforcements for flat foundations {[E02D 27/48](#) takes precedence }
- E02D 27/10 . Deep foundations
- E02D 27/12 . . Pile foundations
- E02D 27/14 . . . Pile framings, {i.e. piles assembled to form the substructure }
- E02D 27/16 . . . Foundations formed of separate piles
- E02D 27/18 . . Foundations formed by making use of caissons
- E02D 27/20 . . Caisson foundations combined with pile foundations
- E02D 27/22 . . Caisson foundations made by starting from fixed or floating artificial islands by using protective bulkheads
- E02D 27/24 . Foundations constructed by making use of diving-bells ([equipment for dwelling or working under water B63C 11/00](#))
- E02D 27/26 . Compacting soil locally before forming foundations; Construction of foundation structures by forcing binding substances into gravel fillings ([consolidating foundation soil in general E02D 3/02 to E02D 3/12](#); {for piles [E02D 5/02](#), [E02D 5/46](#) })
- E02D 27/28 . Stressing the soil or the foundation structure while forming foundations
- E02D 27/30 . Foundations made with permanent use of sheet pile bulkheads, walls of planks, or sheet piling boxes
- E02D 27/32 . Foundations for special purposes { ([for paving of roads E01C 3/00](#)) }
- E02D 27/34 . . Foundations for sinking or earthquake territories ([building constructions with protection arrangements against earthquakes E04H 9/02](#))
- E02D 27/35 . . Foundations formed in frozen ground, e.g. in permafrost soil
- E02D 27/36 . . Foundations formed in moors or bogs
- E02D 27/38 . . Foundations for large tanks, e.g. oil tanks
- E02D 27/40 . . Foundations for dams across valleys or for dam constructions { ([dams per se E02B 3/10](#), [E02B 7/04](#)) }
- E02D 27/42 . . Foundations for poles, masts or chimneys { ([sockets or holders for poles or masts per se E04H 12/22](#)) }
- E02D 27/425 . . . { specially adapted for wind motors masts ([wind motors per se F03D 1/00](#)) }
- E02D 27/44 . . Foundations for machines, engines or ordnance ([special lay-out of foundations with](#)



- respect to machinery to be supported [F16M 9/00](#))
- E02D 27/46 . . Foundations for supply conduits or other canals { (bridges for supporting conduits [E01D 18/00](#); elevated canals [E02B 5/005](#); penstocks [E02B 9/06](#)) }
- E02D 27/48 . . Foundations inserted underneath existing buildings or constructions { (making a new substructure subsequent to lifting or moving of buildings [E04G 23/06](#)) }
- E02D 27/50 . . Anchored foundations
- E02D 27/52 . . Submerged foundations, {i.e. submerged in open water ([E02D 27/12](#) to [E02D 27/24](#) take precedence) }
- E02D 27/525 . . . { using elements penetrating the underwater ground (sinking work pieces [E02D 15/08](#), sinking caissons [E02D 23/02](#)) }
- E02D 29/00** {Independent } **underground or underwater structures** (underground tanks [B65D 88/76](#); hydraulic engineering, e.g. sealings or joints, [E02B](#) ; underground garages [E04H 6/00](#); underground air-raid shelters [E04H 9/12](#); burial vaults [E04H 13/00](#)) ;
- Retaining walls**
- E02D 29/02 . Retaining or protecting walls (piers or quay walls [E02B 3/06](#))
- E02D 29/0208 . . {Gabions }
- E02D 29/0216 . . {Cribbing walls }
- E02D 29/0225 . . {comprising retention means in the backfill }
- E02D 29/0233 . . . {the retention means being anchors (details of anchors [E02D 5/80](#)) }
- E02D 29/0241 . . . {the retention means being reinforced earth elements }
- E02D 29/025 . . {made up of similar modular elements stacked without mortar }
- E02D 29/0258 . . {not used, see subgroups ([E02D 29/0208](#) to [E02D 29/025](#) take precedence) }
- E02D 29/0266 . . . {made up of preformed elements }
- E02D 29/0275 . . . {cast in situ }
- E02D 29/0283 . . . {of mixed type }
- E02D 29/0291 . . . {made up of filled, bag-like elements }
- E02D 29/04 . Making large underground spaces, e.g. for underground plants, { e.g. stations of underground railways } ; Construction or layout thereof ([E02D 29/10](#) takes precedence; { water-supply or sewerage plants [E03](#) } ; layout of water power plants [E02B 9/00](#); making large underground chambers by underground methods only [E21D 13/00](#))
- E02D 29/045 . Underground structures, e.g. tunnels or galleries, built in the open air or by methods involving disturbance of the ground surface all along the location line; Methods of making them
- E02D 29/05 . . at least part of the cross-section being constructed in an open excavation or from the ground surface, e.g. assembled in a trench
- E02D 29/055 . . . further excavation of the cross-section proceeding underneath an already installed part of the structure, e.g. the roof of a tunnel
- E02D 29/06 . Constructions, or methods of constructing, in water { ([E02D 15/00](#) takes precedence; submerged foundations [E02D 27/52](#)) }
- E02D 29/063 . Tunnels submerged into, or built in, open water (construction or placing of caissons in general [E02D 23/00](#); joining caissons to each other under water, in general [E02D 25/00](#))

- E02D 29/067 . . Floating tunnels; Submerged bridge-like tunnels, i.e. tunnels supported by piers or the like above the water-bed ([pontoons or floating bridges E01D 15/14](#))
- E02D 29/07 . . Tunnels or shuttering therefor preconstructed as a whole or continuously made, and moved into place on the water-bed, e.g. into a preformed trench
- E02D 29/073 . . Tunnels or shuttering therefor assembled from sections individually sunk onto, or laid on, the water-bed, e.g. in a preformed trench ([caisson-type sections lowered onto the water-bed E02D 29/077](#))
- E02D 29/077 . . Tunnels at least partially built beneath the water-bed characterised by being made by methods involving disturbance thereof all along the location line, e.g. by cut-and-cover or caisson methods
- E02D 29/08 . Siphons ([for sewerage E03F 5/20](#); [siphon weirs E02B 7/18](#); { [siphons in general F04F 10/00](#) } )
- E02D 29/10 . Tunnels or galleries specially adapted to house conduits, e.g. oil pipe-lines, sewer pipes ([for pressure water conduits E02B 9/06](#); { [for cables H02G 9/02](#); [layout of tunnels or galleries in general E21D 9/14](#); [road kerbs with housings for pipes or the like E01C 11/222](#) } ); Making conduits in situ, e.g. of concrete ([combined with digging of trenches or ditches E02F 5/10](#); { [making or lining tunnels or galleries E21D](#) ; [constructing tunnels or galleries in open excavations E02D 29/045](#); [in open water E02D 29/063](#) } ); Casings, { i.e. [manhole shafts, access or inspection chambers](#) } or coverings of boreholes or narrow wells ([wells for drinking water E03B 3/08](#); [boreholes or wells formed by deep drilling E21B](#) ; [shafts E21D](#) )
- E02D 29/12 . Manhole shafts; Other inspection or access chambers; Accessories therefor ([for underground tanks B65D 90/10](#); [for sewerage E03F 5/02](#); { [climbing irons or ladders E06C 9/00](#) } )
- E02D 29/121 . . { characterised by the connection between shaft elements, e.g. of rings forming said shaft }
- E02D 29/122 . . { Steps or handrails for shafts }
- E02D 29/124 . . { Shaft entirely made of synthetic material }
- E02D 29/125 . . { characterised by the lining of the shaft }
- E02D 29/127 . . { with devices for impeding fall or injuries of persons }
- E02D 29/128 . . { Repairs of manhole shafts }
- E02D 29/14 . . Covers for manholes or the like; Frames for covers { ([gully gratings E03F 5/06](#)) }
- E02D 29/1409 . . . { adjustable in height or inclination }
- E02D 29/1418 . . . { with implements to assist in lifting, e.g. counterweights, springs ([lifting devices for covers B66F 19/005](#)) }
- E02D 29/1427 . . . { Locking devices ([of bayonet type E02D 29/14](#)) }
- E02D 29/1436 . . . { with overflow or explosion control means, e.g. check or relief valves }
- E02D 29/1445 . . . { Tools for positioning or removing cover frames }
- E02D 29/1454 . . . { Non-circular covers, e.g. hexagonal, elliptic }
- E02D 29/1463 . . . { Hinged connection of cover to frame }
- E02D 29/1472 . . . { Cover entirely made of synthetic material }
- E02D 29/1481 . . . { Security devices, e.g. indicating unauthorised opening ([E02D 29/1427](#) takes precedence) }
- E02D 29/149 . . . { Annular gaskets }
- E02D 29/16 . Arrangement or construction of joints in foundation structures ( {[for hydraulic engineering E02B 3/16](#) } ; [sealing joints not restricted to foundation structures E04B 1/68](#))

<b>E02D 31/00</b>	<b>Protective arrangements for foundations or foundation structures</b> { (protective casings for piles <a href="#">E02D 5/60</a> ) }; <b>Ground foundation measures for protecting the soil or the subsoil water, e.g. preventing or counteracting oil pollution</b> (spillage retaining means for tanks <a href="#">B65D 90/24</a> )
E02D 31/002	. {Ground foundation measures for protecting the soil or subsoil water, e.g. preventing or counteracting oil pollution (not used, see subgroups and <a href="#">E02D 31/00</a> ) }
E02D 31/004	.. {Sealing liners }
E02D 31/006	.. {Sealing of existing landfills, e.g. using mining techniques }
E02D 31/008	. {against entry of noxious gases, e.g. Radon }
E02D 31/02	. against ground humidity or ground water { ( <a href="#">E02D 31/06</a> takes precedence; arrangements other than according to <a href="#">E02D 31/04</a> ; against hydraulic pressure of groundwater <a href="#">E02D 31/10</a> ) }
E02D 31/025	.. { Draining membranes, sheets or fabric specially adapted therefor, e.g. with dimples }
E02D 31/04	.. Watertight packings for use under hydraulic pressure { (sealings for hydraulic engineering in general <a href="#">E02B 3/16</a> ; for building structures in general <a href="#">E04B 1/66</a> ) }
E02D 31/06	. against corrosion by soil or water
E02D 31/08	. against transmission of vibrations or movements in the foundation soil { ( <a href="#">E02D 27/34</a> takes precedence; foundations for machines, engines or ordnance <a href="#">E02D 27/44</a> ; for road foundations <a href="#">E01C 3/06</a> ) }
E02D 31/10	. against soil pressure or hydraulic pressure { (anchored foundations <a href="#">E02D 27/50</a> ; joint sealings for use under hydraulic pressure <a href="#">E02D 31/04</a> ) }
E02D 31/12	.. against upward hydraulic pressure
E02D 31/14	.. against frost heaves in soil
<b>E02D 33/00</b>	<b>Testing foundations or foundation structures</b> (testing methods and apparatus, see the relevant subclasses of class <a href="#">G01</a> ; testing structures or apparatus as regards function, in general, <a href="#">G01M</a> ; testing or determining chemical or physical properties, in general <a href="#">G01N</a> )
<b>E02D 35/00</b>	<b>Straightening, lifting, or lowering of foundation structures or of constructions erected on foundations</b> { (foundations for sinking territories with incorporated means for remedying settlement <a href="#">E02D 27/34</a> ; lifting or moving buildings <a href="#">E04G 23/06</a> ) }
E02D 35/005	. { Lowering or lifting of foundation structures }
<b>E02D 37/00</b>	<b>Repair of damaged foundations or foundation structures</b> { (renewing piles <a href="#">E02D 5/64</a> ; roads <a href="#">E01C 11/005</a> ; bridges <a href="#">E01D 22/00</a> ; repairing buildings <a href="#">E04G 23/02</a> ) }
<b>E02D 2200/00</b>	<b>Geometrical or physical properties</b>
E02D 2200/11	. Height being adjustable
E02D 2200/115	.. with separate pieces

- E02D 2200/12 . corrugated
- E02D 2200/13 . having at least a mesh portion
- E02D 2200/14 . resilient or elastic
- E02D 2200/143 . . helically or spirally shaped
- E02D 2200/146 . . Springs
- E02D 2200/15 . including at least a hinge
- E02D 2200/16 . Shapes
- E02D 2200/1607 . . round, e.g. circle
- E02D 2200/1614 . . . made from single element
- E02D 2200/1621 . . . made from multiple elements
- E02D 2200/1628 . . rectangular
- E02D 2200/1635 . . . made from single element
- E02D 2200/1642 . . . made from multiple elements
- E02D 2200/165 . . polygonal
- E02D 2200/1657 . . . made from single element
- E02D 2200/1664 . . . made from multiple elements
- E02D 2200/1671 . . helical or spiral
- E02D 2200/1678 . . triangular
- E02D 2200/1685 . . cylindrical
- E02D 2200/1692 . . conical or convex
- E02D 2200/17 . including an electric conductive element
- E02D 2220/00 Temporary installations or constructions**
- E02D 2250/00 Production methods**
- E02D 2250/0007 . using a mold
- E02D 2250/0015 . using extrusion
- E02D 2250/0023 . Cast, i.e. in situ or in a mold or other formwork
- E02D 2250/003 . Injection of material
- E02D 2250/0038 . using an auger, i.e. continuous flight type
- E02D 2250/0046 . using prestressing techniques
- E02D 2250/0053 . using suction or vacuum techniques
- E02D 2250/0061 . for working underwater

E02D 2250/0069	..	Welding
E02D 2250/0076	..	Drilling
E02D 2250/0084	..	using pneumatical means
E02D 2250/0092	..	using hydraulical means

## **E02D 2300/00      Materials**

E02D 2300/0001	.	Rubbers
E02D 2300/0003	..	Car tires
E02D 2300/0004	.	Synthetics
E02D 2300/0006	..	Plastics
E02D 2300/0007	...	PVC
E02D 2300/0009	...	PE
E02D 2300/001	...	PP
E02D 2300/0012	...	recycled
E02D 2300/0014	...	PU
E02D 2300/0015	...	HDPE
E02D 2300/0017	...	thermoplastic
E02D 2300/0018	..	Cement used as binder
E02D 2300/002	...	Concrete
E02D 2300/0021	...	Mortar
E02D 2300/0023	...	Slurry
E02D 2300/0025	..	Adhesives, i.e. glues
E02D 2300/0026	.	Metals
E02D 2300/0028	..	Copper
E02D 2300/0029	..	Steel; Iron
E02D 2300/0031	...	in cast iron form
E02D 2300/0032	...	in sheet form, i.e. bent or deformed plate-material
E02D 2300/0034	...	in wire form
E02D 2300/0035	..	Aluminium
E02D 2300/0037	.	Clays
E02D 2300/0039	..	mixed with additives
E02D 2300/004	..	Bentonite or bentonite-like
E02D 2300/0042	...	being modified by adding substances
E02D 2300/0043	...	with other ingredients
E02D 2300/0045	.	Composites
E02D 2300/0046	.	Foams
E02D 2300/0048	..	PU
E02D 2300/005	..	PE

- E02D 2300/0051 . Including fibers
- E02D 2300/0053 . . made from glass
- E02D 2300/0054 . . made from plastic
- E02D 2300/0056 . . . PVC
- E02D 2300/0057 . . . PE
- E02D 2300/0059 . . . PP
- E02D 2300/006 . . . being recycled
- E02D 2300/0062 . . . . Shredded car tires
- E02D 2300/0064 . . made from metal
- E02D 2300/0065 . . made from textile
- E02D 2300/0067 . . made from cellulose
- E02D 2300/0068 . . made from carbon
  
- E02D 2300/007 . Resins including glasfibers
  
- E02D 2300/0071 . Wood
  
- E02D 2300/0073 . Explosives
  
- E02D 2300/0075 . Textiles
- E02D 2300/0076 . . non-woven
- E02D 2300/0078 . . woven
  
- E02D 2300/0079 . Granulates
  
- E02D 2300/0081 . Ceramics
  
- E02D 2300/0082 . Cellulose
  
- E02D 2300/0084 . Geogrids
  
- E02D 2300/0085 . Geotextiles
- E02D 2300/0087 . . woven
- E02D 2300/0089 . . non-woven
- E02D 2300/009 . . with multi-layer structure
- E02D 2300/0092 . . . including a liquid tight layer
- E02D 2300/0093 . . . . including bentonite
- E02D 2300/0095 . . . including a plastic membrane
- E02D 2300/0096 . . with external friction enhancement features
  
- E02D 2300/0098 . Bitumen
  
- E02D 2450/00**
  
- E02D 2450/10 . Membranes

E02D 2450/101	. .	permeable
E02D 2450/102	. . .	for liquids
E02D 2450/103	. . .	for gases
E02D 2450/105	. .	impermeable
E02D 2450/106	. . .	for liquids
E02D 2450/107	. . .	for gases
E02D 2450/108	. .	multi-layered

<b>E02D 2600/00</b>	<b>Miscellaneous</b>
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E02D 2600/10	. comprising sensor means
E02D 2600/20	. comprising details of connection between elements
E02D 2600/30	. comprising anchoring details
E02D 2600/40	. comprising stabilising elements