

CPC COOPERATIVE PATENT CLASSIFICATION

E FIXED CONSTRUCTIONS

BUILDING

E02 HYDRAULIC ENGINEERING; FOUNDATIONS; SOIL SHIFTING

E02D FOUNDATIONS; EXCAVATIONS; EMBANKMENTS (specially adapted for hydraulic engineering [E02B](#)); UNDERGROUND OR UNDERWATER STRUCTURES {(tunnels, tunnelling, mining [E21](#))}

NOTES

1. This subclass covers underground structures made by foundation engineering, i.e. involving disturbance of the ground surface.
2. This subclass does not cover underground spaces, made by underground mining methods only, i.e. not involving disturbance of the ground surface, which are covered by subclass [E21D](#).

WARNINGS

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:
[E02D 29/09](#) covered by [E02D 29/06](#)
2. In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

1/00	Investigation of foundation soil <u>in situ</u> (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)	3/0265	. . . {Wheels specially adapted therefor; Cleats for said wheels}
1/02	. before construction work	3/032	. . . Trench rollers
1/022	. . {by investigating mechanical properties of the soil (E02D 1/027 takes precedence)}	3/039	. . . Slope rollers
1/025	. . . {combined with sampling}	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 E01C 19/30 , for consolidating concrete in general E04G 21/06)
1/027	. . {by investigating properties relating to fluids in the soil, e.g. pore-water pressure, permeability (sampling of groundwater E02D 1/06)}		
1/04	. . Sampling of soil {(E02D 1/025 takes precedence)}	3/054	. . . involving penetration of the soil, e.g. vibroflotation
1/06	. . Sampling of ground water	3/061	. . . Tampers with directly acting explosion chambers (pile drivers with explosion chambers E02D 7/12)
1/08	. after finishing the foundation structure {(testing of piles E02D 33/00)}	3/068	. . . Vibrating apparatus operating with systems involving reciprocating masses (E02D 3/054 , E02D 3/061 take precedence)
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)	3/074	. . . Vibrating apparatus operating with systems involving rotary unbalanced masses (E02D 3/054 takes precedence)
3/005	. {Soil-conditioning by mixing with fibrous materials, filaments, open mesh or the like}	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)
3/02	. Improving by compacting (E02D 3/11 takes precedence; compacting soil locally before or while forming foundations E02D 27/26 , E02D 27/28)	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)
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)	3/103	. . . {by installing wick drains or sand bags}
		3/106	. . . {by forming sand drains containing only loose aggregates (sand piles E02D 3/08)}

- 3/11 . by thermal, electrical or electro-chemical means (freezing soil for interrupting passage of underground water [E02D 19/14](#))
- 3/115 . . by freezing
- 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 43/025](#))
- 3/123 . . {and compacting the soil ([E02D 3/126](#) takes precedence)}
- 3/126 . . {and mixing by rotating blades}
- 5/00 Bulkheads, piles, or other structural elements specially adapted to foundation engineering (engineering elements in general [F16](#))**
- 5/02 . Sheet piles or sheet pile bulkheads {(foundations made with sheet pile bulkheads [E02D 27/30](#); cofferdams [E02D 19/04](#))}
- 5/03 . . Prefabricated parts {, e.g. composite sheet piles}
- 5/04 . . . made of steel
- 5/06 Fitted piles or other elements specially adapted for closing gaps between two sheet piles or between two walls of sheet piles
- 5/08 Locking forms; Edge joints; Pile crossings; Branch pieces
- 5/10 . . . made of concrete or reinforced concrete {(moulds therefor [E02D 5/70](#))}
- 5/105 {of prestressed concrete ([E02D 5/12](#) takes precedence)}
- 5/12 Locking forms; Edge joints; Pile crossings; Branch pieces
- 5/14 . . Sealing joints between adjacent {sheet} piles (sealing joints not restricted to foundation piles [E04B 1/68](#))
- 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](#))}
- 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](#))}
- 5/182 . . {using formworks to separate sections}
- 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](#))}
- 5/187 . . {the bulkheads or walls being made continuously, e.g. excavating and constructing bulkheads or walls in the same process, without joints}
- 5/20 . Bulkheads or similar walls made of prefabricated parts and concrete, including reinforced concrete, in situ
- 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](#))}
- 5/223 . . {Details of top sections of foundation piles ([E02D 5/54](#) takes precedence)}
- 5/226 . . {Protecting piles (piles with protecting cases [E02D 5/60](#))}
- 5/24 . . Prefabricated piles
- NOTE**
- Documents covered both by [E02D 5/26](#) - [E02D 5/32](#) and by one or several of the groups [E02D 5/48](#) - [E02D 5/64](#) are classified in all relevant groups unless specific priority rules to the contrary are given
- 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
- 5/28 . . . made of steel {or other metals ([E02D 5/52](#) takes precedence)}
- 5/285 {tubular, e.g. prefabricated from sheet pile elements (sheet pile boxes [E02D 27/30](#); concrete piles with metal casings [E02D 5/30](#))}
- 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](#))}
- 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](#))}
- 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](#) - [E02D 11/00](#); placing the concrete [E02D 15/04](#))}
- 5/36 . . . making without use of mouldpipes or other moulds
- 5/38 . . . making by use of mould-pipes or other moulds
- 5/385 {with removal of the outer mould-pipes (documents also covered by one or several of the groups [E02D 5/40](#) - [E02D 5/44](#) are classified in all the relevant groups)}
- 5/40 in open water
- 5/42 by making use of pressure liquid or pressure gas for compacting the concrete
- 5/44 with enlarged footing or enlargements at the bottom of the pile
- 5/445 {by application of pyrotechniques}
- 5/46 . . . making in situ by forcing bonding agents into gravel fillings or the soil (consolidating soil in general [E02D 3/12](#))
- 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)}
- 5/50 . . Piles comprising both precast concrete portions and concrete portions cast in situ {([E02D 5/523](#) takes precedence)}
- 5/52 . . Piles composed of separable parts, e.g. telescopic tubes {; Piles composed of segments}
- 5/523 . . . {composed of segments}
- 5/526 {Connection means between pile segments}
- 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](#))}
- 5/56 . . Screw piles {(placing piles by screwing down [E02D 7/22](#))}

- 5/58 . . Prestressed concrete piles {(segmental piles [E02D 5/523](#))}
- 5/60 . . Piles with protecting cases
- 5/62 . . Compacting the soil at the footing or in {or along} a casing by forcing cement or like material through tubes
- 5/64 . . Repairing piles
- 5/66 . Mould-pipes or other moulds {(for plant use [B28B](#))}
- 5/665 . . {for making piles}
- 5/68 . . for making bulkheads or elements thereof
- 5/70 . . for making sheet piles {not used}
- 5/72 . Pile shoes
- 5/74 . Means for anchoring structural elements or bulkheads (anchoring piles [E02D 5/54](#) {; anchored foundations [E02D 27/50](#))}
- 5/76 . . Anchorings for bulkheads or sections thereof {in as much as specially adapted therefor}
- 5/765 . . . {removable}
- 5/80 . . Ground anchors {(for galleries, tunnels or shafts [E21D 21/00](#))}
- 5/801 . . . {driven by screwing}
- 5/803 . . . {with pivotable anchoring members}
- 5/805 . . . {with deformable anchoring members}
- 5/806 . . . {involving use of explosives}
- 5/808 . . . {anchored by using exclusively a bonding material}
- 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](#))}**
- 7/02 . Placing by driving {([E02D 7/18](#) - [E02D 7/24](#) take precedence)}
- 7/04 . . Hand {(actuated)} pile-drivers
- 7/06 . . Power-driven drivers {(tamperers [E02D 3/061](#))}
- 7/08 . . . Drop drivers with free-falling hammer {([E02D 7/10](#) takes precedence)}
- 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](#))}
- 7/12 . . . Drivers with explosion chambers
- 7/125 {Diesel drivers}
- 7/14 . . . Components for drivers {inasmuch as not specially for a specific driver construction}
- 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](#))}
- 7/165 {of variable length, e.g. foldable or telescopic}
- 7/18 . Placing by vibrating {(vibrators for soil compacting [E02D 3/046](#))}
- 7/20 . Placing by pressure or pulling power
- 7/22 . Placing by screwing down {(screw piles per se [E02D 5/56](#))}
- 7/24 . Placing by using fluid jets {(prefabricated concrete piles with arrangements therefor [E02D 5/32](#))}
- 7/26 . Placing by using several means simultaneously
- 7/28 . Placing of hollow pipes or mould pipes by means arranged inside the piles or pipes {([E02D 13/08](#) takes precedence)}
- 7/30 . . by driving cores
- 9/00 Removing sheet piles bulkheads, piles, mould-pipes or other moulds {or parts thereof}(for both placing and removing [E02D 11/00](#))**
- 9/005 . {removing the top of placed piles of sheet piles ([E02D 9/04](#) takes precedence)}
- 9/02 . by withdrawing
- 9/04 . by cutting-off under water
- 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](#))}**
- 13/00 Accessories for placing or removing piles or bulkheads {, e.g. noise attenuating chambers}**
- 13/005 . {Sound absorbing accessories in piling}
- 13/02 . specially adapted for placing or removing bulkheads
- 13/04 . Guide devices; Guide frames {(as parts of the driver scaffold [E02D 7/16](#))}
- 13/06 . for observation while placing
- 13/08 . Removing obstacles
- 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
- 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](#))}**
- 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](#))}
- 15/04 . . Placing concrete in mould-pipes, pile tubes, bore-holes or narrow shafts
- 15/06 . . Placing concrete under water {(for surfacing the bottom of bodies of water [E02B 3/121](#))}
- 15/08 . Sinking workpieces into water or soil {inasmuch as not provided for elsewhere}
- 15/10 . Placing gravel or light material under water {inasmuch as not provided for elsewhere}
- 17/00 Excavations; Bordering of excavations; Making embankments (soil-shifting apparatus [E02F](#); earth drilling [E21](#))**
- 17/02 . Foundation pits
- 17/04 . . Bordering {surfacing} or stiffening the sides of foundation pits
- 17/06 . Foundation {trenches} ditches or narrow shafts
- 17/08 . . Bordering or stiffening the sides of ditches {trenches} or narrow shafts for foundations
- 17/083 . . . {Shoring struts}
- 17/086 . . . {Travelling trench shores}
- 17/10 . . Covering trenches for foundations

- 17/12 . . Back-filling of foundation trenches or ditches {apparatus therefor [E02F 5/12](#), [E02F 5/22](#)}
- 17/13 . Foundation slots {or slits}; Implements for making these slots {or slits}
- 17/16 . Loosening of soil or rock, under water (for correcting streams [E02B 3/02](#); by dredgers or excavators [E02F](#))
- 17/18 . Making embankments, {e.g. dikes, dams}([E02D 17/20](#) takes precedence; {foundations for dams [E02D 27/40](#)})
- 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](#))}
- 17/202 . . {with flexible securing means}
- 17/205 . . {with modular blocks, e.g. pre-fabricated}
- 17/207 . . {with means incorporating sheet piles or piles}
- 19/00 Keeping dry foundation sites or other areas in the ground (sheet piles or bulkheads [E02D 5/02](#))**
- 19/02 . Restraining of open water
- 19/04 . . by coffer-dams {, e.g. made of sheet piles (permanent sheet piling boxes [E02D 27/30](#))}
- 19/06 . Restraining of underground water
- 19/08 . . by employing open ditches arranged below the level of the water
- 19/10 . . by lowering level of ground water {(installation for obtaining or collecting drinking water [E03B 3/00](#))}
- 19/12 . . by damming or interrupting the passage of underground water
- 19/14 . . . by freezing the soil (in connection with sinking shafts [E21D 1/12](#))
- 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](#)})
- 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](#))
- 19/185 {Joints between sheets constituting the sealing aprons}
- 19/20 . . . by displacing the water, e.g. by compressed air {(pneumatic caissons [E02D 23/04](#))}
- 19/22 . Lining sumps in trenches {or other foundation pits}
- 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](#) - [E02D 27/22](#); caisson-like artificial islands [E02B 17/00](#)})**
- 23/02 . Caissons able to be floated on water and to be lowered into water in situ {(floating caisson foundations [E02D 27/06](#))}
- 23/04 . Pneumatic caissons {(sinking of same [E02D 23/10](#))}
- 23/06 . . Bringing persons or material into or out of compressed air caissons {(air locks in mines [E21F 1/14](#))}
- 23/08 . Lowering or sinking caissons {(sinking mine shaft [E21D 1/00](#))}
- 23/10 . . Caissons filled with compressed air {([E02D 23/06](#) takes precedence)}
- 23/12 . . Inclined lowering
- 23/14 . . Decreasing the skin friction while lowering
- 23/16 . Jointing caissons to the foundation soil, specially to uneven foundation soil
- 25/00 Joining caissons, sinkers, or other units to each other under water**
- 27/00 Foundations as substructures**
- 27/01 . Flat foundations
- 27/013 . . {Shuttering specially adapted therefor}
- 27/016 . . {made mainly from prefabricated concrete elements}
- 27/02 . . Flat foundations without substantial excavation ([E02D 27/04](#), [E02D 27/08](#) take precedence)
- 27/04 . . in water or on quicksand
- 27/06 . . . Floating caisson foundations
- 27/08 . . Reinforcements for flat foundations {([E02D 27/48](#) takes precedence)}
- 27/10 . Deep foundations
- 27/12 . . Pile foundations
- 27/14 . . . Pile framings {, i.e. piles assembled to form the substructure}
- 27/16 . . . Foundations formed of separate piles
- 27/18 . . Foundations formed by making use of caissons
- 27/20 . . Caisson foundations combined with pile foundations
- 27/22 . . Caisson foundations made by starting from fixed or floating artificial islands by using protective bulkheads
- 27/24 . Foundations constructed by making use of diving-bells (equipment for dwelling or working under water [B63C 11/00](#))
- 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](#) - [E02D 3/12](#); {for piles [E02D 5/02](#), [E02D 5/46](#)})
- 27/28 . Stressing the soil or the foundation structure while forming foundations
- 27/30 . Foundations made with permanent use of sheet pile bulkheads, walls of planks, or sheet piling boxes
- 27/32 . Foundations for special purposes {(for paving of roads [E01C 3/00](#))}
- 27/34 . . Foundations for sinking or earthquake territories (building constructions with protection arrangements against earthquakes [E04H 9/02](#))
- 27/35 . . Foundations formed in frozen ground, e.g. in permafrost soil
- 27/36 . . Foundations formed in moors or bogs
- 27/38 . . Foundations for large tanks, e.g. oil tanks
- 27/40 . . Foundations for dams across valleys or for dam constructions {(dams per se [E02B 3/10](#), [E02B 7/04](#))}
- 27/42 . . Foundations for poles, masts or chimneys {(sockets or holders for poles or masts per se [E04H 12/22](#))}
- 27/425 . . . {specially adapted for wind motors masts (wind motors per se [F03D 1/00](#))}

- 27/44 . . Foundations for machines, engines or ordnance (special layout of foundations with respect to machinery to be supported [F16M 9/00](#))
- 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](#)}
- 27/48 . . Foundations inserted underneath existing buildings or constructions {(making a new substructure subsequent to lifting or moving of buildings [E04G 23/06](#))}
- 27/50 . . Anchored foundations
- 27/52 . . Submerged foundations {, i.e. submerged in open water ([E02D 27/12](#) - [E02D 27/24](#) take precedence)}
- 27/525 . . . {using elements penetrating the underwater ground (sinking work pieces [E02D 15/08](#), sinking caissons [E02D 23/02](#))}
- 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**
- 29/02 . Retaining or protecting walls (piers or quay walls [E02B 3/06](#))
- 29/0208 . . {Gabions}
- 29/0216 . . {Cribbing walls}
- 29/0225 . . {comprising retention means in the backfill}
- 29/0233 . . . {the retention means being anchors (details of anchors [E02D 5/80](#))}
- 29/0241 . . . {the retention means being reinforced earth elements}
- 29/025 . . {made up of similar modular elements stacked without mortar}
- 29/0258 . . {characterised by constructional features}
- 29/0266 . . . {made up of preformed elements}
- 29/0275 . . . {cast *in situ*}
- 29/0283 . . . {of mixed type}
- 29/0291 . . . {made up of filled, bag-like elements}
- 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](#))}
- 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
- 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
- 29/055 . . . further excavation of the cross-section proceeding underneath an already installed part of the structure, e.g. the roof of a tunnel
- 29/06 . {Constructions, or methods of constructing, in water ([E02D 15/00](#) takes precedence; submerged foundations [E02D 27/52](#))}
- 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](#))
- 29/067 . . Floating tunnels; Submerged bridge-like tunnels, i.e. tunnels supported by piers or the like above the water-bed (pontoon or floating bridges [E01D 15/14](#))
- 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
- 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](#))
- 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
- 29/08 . {Siphons (for sewerage [E03F 5/20](#); siphon weirs [E02B 7/18](#); siphons in general [F04F 10/00](#))}
- 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](#))}
- 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](#))}
- 29/121 . . {characterised by the connection between shaft elements, e.g. of rings forming said shaft}
- 29/122 . . {Steps or handrails for shafts}
- 29/124 . . {Shaft entirely made of synthetic material}
- 29/125 . . {characterised by the lining of the shaft}
- 29/127 . . {with devices for impeding fall or injuries of persons}
- 29/128 . . {Repairs of manhole shafts}
- 29/14 . . Covers for manholes or the like; Frames for covers {(gully gratings [E03F 5/06](#))}
- 29/1409 . . . {adjustable in height or inclination}
- 29/1418 . . . {with implements to assist in lifting, e.g. counterweights, springs (lifting devices for covers [B66F 19/005](#))}
- 29/1427 . . . {Locking devices (of bayonet type [E02D 29/14](#))}
- 29/1436 . . . {with overflow or explosion control means, e.g. check or relief valves}
- 29/1445 . . . {Tools for positioning or removing cover frames}
- 29/1454 . . . {Non-circular covers, e.g. hexagonal, elliptic}
- 29/1463 . . . {Hinged connection of cover to frame}
- 29/1472 . . . {Cover entirely made of synthetic material}
- 29/1481 . . . {Security devices, e.g. indicating unauthorised opening ([E02D 29/1427](#) takes precedence)}
- 29/149 . . . {Annular gaskets}

29/16	<ul style="list-style-type: none"> Arrangement or construction of joints in foundation structures (for hydraulic engineering E02B 3/16); sealing joints not restricted to foundation structures E04B 1/68) 	2200/143	<ul style="list-style-type: none"> helically or spirally shaped
		2200/146	<ul style="list-style-type: none"> Springs
		2200/15	<ul style="list-style-type: none"> including at least a hinge
		2200/16	<ul style="list-style-type: none"> Shapes
		2200/1607	<ul style="list-style-type: none"> round, e.g. circle
		2200/1614	<ul style="list-style-type: none"> made from single element
		2200/1621	<ul style="list-style-type: none"> made from multiple elements
		2200/1628	<ul style="list-style-type: none"> rectangular
		2200/1635	<ul style="list-style-type: none"> made from single element
		2200/1642	<ul style="list-style-type: none"> made from multiple elements
		2200/165	<ul style="list-style-type: none"> polygonal
		2200/1657	<ul style="list-style-type: none"> made from single element
		2200/1664	<ul style="list-style-type: none"> made from multiple elements
		2200/1671	<ul style="list-style-type: none"> helical or spiral
		2200/1678	<ul style="list-style-type: none"> triangular
		2200/1685	<ul style="list-style-type: none"> cylindrical
		2200/1692	<ul style="list-style-type: none"> conical or convex
		2200/17	<ul style="list-style-type: none"> including an electric conductive element
31/00	Protective arrangements for foundations or foundation structures (protective casings for piles E02D 5/60); Ground foundation measures for protecting the soil or the subsoil water, e.g. preventing or counteracting oil pollution (spillage retaining means for tanks B65D 90/24)	2220/00	Temporary installations or constructions
31/002	<ul style="list-style-type: none"> {Ground foundation measures for protecting the soil or subsoil water, e.g. preventing or counteracting oil pollution (not used, see subgroups and E02D 31/00)} 	2250/00	Production methods
31/004	<ul style="list-style-type: none"> {Sealing liners} 	2250/0007	<ul style="list-style-type: none"> using a mold
31/006	<ul style="list-style-type: none"> {Sealing of existing landfills, e.g. using mining techniques} 	2250/0015	<ul style="list-style-type: none"> using extrusion
31/008	<ul style="list-style-type: none"> {against entry of noxious gases, e.g. Radon} 	2250/0023	<ul style="list-style-type: none"> Cast, i.e. <i>in situ</i> or in a mold or other formwork
31/02	<ul style="list-style-type: none"> against ground humidity or ground water (E02D 31/06 takes precedence; arrangements other than according to E02D 31/04; against hydraulic pressure of groundwater E02D 31/10)} 	2250/003	<ul style="list-style-type: none"> Injection of material
31/025	<ul style="list-style-type: none"> {Draining membranes, sheets or fabric specially adapted therefor, e.g. with dimples} 	2250/0038	<ul style="list-style-type: none"> using an auger, i.e. continuous flight type
31/04	<ul style="list-style-type: none"> Watertight packings for use under hydraulic pressure (sealings for hydraulic engineering in general E02B 3/16; for building structures in general E04B 1/66)} 	2250/0046	<ul style="list-style-type: none"> using prestressing techniques
31/06	<ul style="list-style-type: none"> against corrosion by soil or water 	2250/0053	<ul style="list-style-type: none"> using suction or vacuum techniques
31/08	<ul style="list-style-type: none"> against transmission of vibrations or movements in the foundation soil (E02D 27/34 takes precedence; foundations for machines, engines or ordnance E02D 27/44; for road foundations E01C 3/06)} 	2250/0061	<ul style="list-style-type: none"> for working underwater
31/10	<ul style="list-style-type: none"> against soil pressure or hydraulic pressure (anchored foundations E02D 27/50; joint sealings for use under hydraulic pressure E02D 31/04)} 	2250/0069	<ul style="list-style-type: none"> Welding
31/12	<ul style="list-style-type: none"> against upward hydraulic pressure 	2250/0076	<ul style="list-style-type: none"> Drilling
31/14	<ul style="list-style-type: none"> against frost heaves in soil 	2250/0084	<ul style="list-style-type: none"> using pneumatical means
33/00	Testing foundations or foundation structures (testing methods and apparatus, see the relevant subclasses of class G01 ; testing structures or apparatus as regards function, in general, G01M ; testing or determining chemical or physical properties, in general G01N)	2250/0092	<ul style="list-style-type: none"> using hydraulical means
35/00	Straightening, lifting, or lowering of foundation structures or of constructions erected on foundations (foundations for sinking territories with incorporated means for remedying settlement E02D 27/34 ; lifting or moving buildings E04G 23/06)	2300/00	Materials
35/005	<ul style="list-style-type: none"> {Lowering or lifting of foundation structures} 	2300/0001	<ul style="list-style-type: none"> Rubbers
37/00	Repair of damaged foundations or foundation structures (renewing piles E02D 5/64 ; roads E01C 11/005 ; bridges E01D 22/00 ; repairing buildings E04G 23/02)	2300/0003	<ul style="list-style-type: none"> Car tires
2200/00	Geometrical or physical properties	2300/0004	<ul style="list-style-type: none"> Synthetics
2200/11	<ul style="list-style-type: none"> Height being adjustable 	2300/0006	<ul style="list-style-type: none"> Plastics
2200/115	<ul style="list-style-type: none"> with separate pieces 	2300/0007	<ul style="list-style-type: none"> PVC
2200/12	<ul style="list-style-type: none"> corrugated 	2300/0009	<ul style="list-style-type: none"> PE
2200/13	<ul style="list-style-type: none"> having at least a mesh portion 	2300/001	<ul style="list-style-type: none"> PP
2200/14	<ul style="list-style-type: none"> resilient or elastic 	2300/0012	<ul style="list-style-type: none"> recycled
		2300/0014	<ul style="list-style-type: none"> PU
		2300/0015	<ul style="list-style-type: none"> HDPE
		2300/0017	<ul style="list-style-type: none"> thermoplastic
		2300/0018	<ul style="list-style-type: none"> Cement used as binder
		2300/002	<ul style="list-style-type: none"> Concrete
		2300/0021	<ul style="list-style-type: none"> Mortar
		2300/0023	<ul style="list-style-type: none"> Slurry
		2300/0025	<ul style="list-style-type: none"> Adhesives, i.e. glues
		2300/0026	<ul style="list-style-type: none"> Metals
		2300/0028	<ul style="list-style-type: none"> Copper
		2300/0029	<ul style="list-style-type: none"> Steel; Iron
		2300/0031	<ul style="list-style-type: none"> in cast iron form
		2300/0032	<ul style="list-style-type: none"> in sheet form, i.e. bent or deformed plate-material
		2300/0034	<ul style="list-style-type: none"> in wire form
		2300/0035	<ul style="list-style-type: none"> Aluminium
		2300/0037	<ul style="list-style-type: none"> Clays
		2300/0039	<ul style="list-style-type: none"> mixed with additives
		2300/004	<ul style="list-style-type: none"> Bentonite or bentonite-like

E02D

- 2300/0042 . . . being modified by adding substances
- 2300/0043 . . . with other ingredients
- 2300/0045 . Composites
- 2300/0046 . Foams
- 2300/0048 . . PU
- 2300/005 . . PE
- 2300/0051 . Including fibers
- 2300/0053 . . made from glass
- 2300/0054 . . made from plastic
- 2300/0056 . . . PVC
- 2300/0057 . . . PE
- 2300/0059 . . . PP
- 2300/006 . . . being recycled
- 2300/0062 Shredded car tires
- 2300/0064 . . made from metal
- 2300/0065 . . made from textile
- 2300/0067 . . made from cellulose
- 2300/0068 . . made from carbon
- 2300/007 . Resins including glasfibers
- 2300/0071 . Wood
- 2300/0073 . Explosives
- 2300/0075 . Textiles
- 2300/0076 . . non-woven
- 2300/0078 . . woven
- 2300/0079 . Granulates
- 2300/0081 . Ceramics
- 2300/0082 . Cellulose
- 2300/0084 . Geogrids
- 2300/0085 . Geotextiles
- 2300/0087 . . woven
- 2300/0089 . . non-woven
- 2300/009 . . with multi-layer structure
- 2300/0092 . . . including a liquid tight layer
- 2300/0093 including bentonite
- 2300/0095 including a plastic membrane
- 2300/0096 . . with external friction enhancement features
- 2300/0098 . Bitumen

2450/00 Gaskets

- 2450/10 . Membranes
- 2450/101 . . permeable
- 2450/102 . . . for liquids
- 2450/103 . . . for gases
- 2450/105 . . impermeable
- 2450/106 . . . for liquids
- 2450/107 . . . for gases
- 2450/108 . . multi-layered

2600/00 Miscellaneous

- 2600/10 . comprising sensor means
- 2600/20 . comprising details of connection between elements
- 2600/30 . comprising anchoring details
- 2600/40 . comprising stabilising elements