

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 [E01C 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 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 (pontoon 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](#))}
- E02D 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](#))}**
- 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 [E02D 31/00](#))}
- 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 {([E02D 31/06](#) takes precedence; arrangements other than according to [E02D 31/04](#); against hydraulic pressure of groundwater [E02D 31/10](#))}
- 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 E02B 3/16 ; for building structures in general E04B 1/66)}
E02D 31/06	. against corrosion by soil or water
E02D 31/08	. 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)}
E02D 31/10	. against soil pressure or hydraulic pressure {(anchored foundations E02D 27/50 ; joint sealings for use under hydraulic pressure E02D 31/04)}
E02D 31/12	.. against upward hydraulic pressure
E02D 31/14	.. against frost heaves in soil
E02D 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)
E02D 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)}
E02D 35/005	. { Lowering or lifting of foundation structures}
E02D 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)}
E02D 2200/00	Geometrical or physical properties
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		{Gaskets}
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

E02D 2600/00

Miscellaneous

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