

**ECLA****EUROPEAN CLASSIFICATION****E02D**

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

**[N: WARNING]**

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

[E02D29/09](#) covered by [E02D29/06](#)  
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**E02D1/00**

**Investigation of foundation soil in situ** (investigation involving boring or specially adapted to earth drilling [E21B25/00](#), [E21B49/00](#); investigating or analysing materials by determining their chemical or physical properties, in general [G01N](#), e.g. sampling [G01N1/00](#))

[E02D1/02](#)

- before construction work

[E02D1/02B](#)

- • [N: by investigating mechanical properties of the soil ([E02D1/02C](#) takes precedence)]

[E02D1/02B2](#)

- • • [N: combined with sampling]

[E02D1/02C](#)

- • [N: by investigating properties relating to fluids in the soil, e.g. pore-water pressure, permeability (sampling of groundwater [E02D1/06](#))]

[E02D1/04](#)

- • Sampling of soil [N: ([E02D1/02B2](#) takes precedence)]

[E02D1/06](#)

- • Sampling of ground water

[E02D1/08](#)

- after finishing the foundation structure [N: (testing of piles [E02D33/00](#))]

**E02D3/00**

**Improving or preserving soil or rock, e.g. preserving permafrost soil** (securing of slopes or inclines [E02D17/20](#); damming or interrupting passage of underground water [E02D19/12](#); improving soil for agricultural purposes [A01](#); soil stabilisation for road building or like purposes [E01C21/00](#), [E01C23/10](#); setting rock anchoring bolts [E21D](#))

[E02D3/00B](#)

- [N: Soil-conditioning by mixing with fibrous materials, filaments, open mesh or the like]

[E02D3/02](#)

- Improving by compacting ([E02D3/11](#) takes precedence; compacting soil locally before or while forming foundations [E02D27/26](#), [E02D27/28](#))

[E02D3/026](#)

- • by rolling with rollers usable only for or specially adapted for soil compaction, e.g. sheepfoot rollers (rollers for soil working in agriculture [A01B29/00](#); rollers for road paving, such rollers usable also for compacting soil [E01C19/23](#))

[E02D3/026B](#)

- • • [N: Wheels specially adapted therefor; Cleats for said wheels] [N1204]

[E02D3/032](#)

- • • Trench rollers

[E02D3/039](#)

- • • Slope rollers

[E02D3/046](#)

- • by tamping or vibrating, e.g. with auxiliary watering of the soil ([E02D3/026](#), [E02D3/08](#) take precedence; generating or transmitting mechanical vibrations for performing mechanical work in general [B06B](#); tamping or vibrating apparatus for working ballast or railways [E01B27/00](#), for consolidating paving materials [E01C19/30](#), for consolidating concrete in general [E04G21/06](#))

- E02D3/054 . . . involving penetration of the soil, e.g. vibroflotation
- E02D3/061 . . . Tampers with directly acting explosion chambers ([pile drivers with explosion chambers E02D7/12](#))
- E02D3/068 . . . Vibrating apparatus operating with systems involving reciprocating masses ([E02D3/054](#), [E02D3/061](#) take precedence)
- E02D3/074 . . . Vibrating apparatus operating with systems involving rotary unbalanced masses ([E02D3/054](#) takes precedence)
- E02D3/08 . . by inserting stones or lost bodies, e.g. compaction piles ([sand drains for soil compaction E02D3/10](#); [stressing soil while forming foundations E02D27/28](#))
- E02D3/10 . . by watering, draining, de-aerating or blasting, e.g. by installing sand or wick drains ([E02D3/11](#) takes precedence; [soil-penetrating vibrators with auxiliary watering E02D3/054](#); [drainage of soil in general E02B11/00](#))
- E02D3/10B . . . [N: [by installing wick drains or sand bags](#)]
- E02D3/10C . . . [N: [by forming sand drains containing only loose aggregates \(sand piles E02D3/08\)](#)]
- E02D3/11 . by thermal, electrical or electro-chemical means ([freezing soil for interrupting passage of underground water E02D19/14](#))
- E02D3/115 . . by freezing
- E02D3/12 . Consolidating by placing solidifying or pore-filling substances in the soil ([making piles E02D5/46](#); [soil-conditioning or soil-stabilising materials C09K17/00](#); [consolidation of ground around boreholes or wells E21B33/138B](#), [E21B43/02B](#))
- E02D3/12B . . [N: [and compacting the soil \(E02D3/12C takes precedence\)](#)]
- E02D3/12C . . [N: [and mixing by rotating blades](#)]
- E02D5/00 Bulkheads, piles, or other structural elements specially adapted to foundation engineering ([engineering elements in general F16](#))**
- E02D5/02 . Sheet piles or sheet pile bulkheads [N: [\(foundations made with sheet pile bulkheads E02D27/30; cofferdams E02D19/04\)](#)]
- E02D5/03 . . Prefabricated parts [N: [e.g. composite sheet piles](#)]
- E02D5/04 . . . made of steel
- E02D5/06 . . . . Fitted piles or other elements specially adapted for closing gaps between two sheet piles or between two walls of sheet piles
- E02D5/08 . . . . Locking forms; Edge joints; Pile crossings; Branch pieces
- E02D5/10 . . . made of concrete or reinforced concrete [N: [\(moulds therefor E02D5/70\)](#)]
- E02D5/10B . . . . [N: [of prestressed concrete \(E02D5/12 takes precedence\)](#)]
- E02D5/12 . . . . Locking forms; Edge joints; Pile crossings; Branch pieces
- E02D5/14 . . Sealing joints between adjacent [N: [sheet](#)] piles ([sealing joints not restricted to foundation piles E04B1/68](#))
- E02D5/16 . . Auxiliary devices rigidly or detachably arranged on sheet piles for facilitating assembly [N: [\(as parts of driving or pulling apparatus E02D7/00, E02D13/00\)](#)]
- E02D5/18 . Bulkheads or similar walls made solely of concrete in situ [N: [\(moulds therefor E02D5/68; making foundation slots E02D17/13; sealing diaphragms other than those made of concrete E02D19/18\)](#)]
- E02D5/18B . . [N: [using formworks to separate sections](#)] [N9411]

- E02D5/18C . . [N: with flexible joint members between sections (joints in foundation structures [E02D29/16](#); flexible joints in hydraulic engineering [E02B3/16](#), in building [E04B1/68](#))] [N9411]
  - E02D5/18D . . [N: the bulkheads or walls being made continuously, e.g. excavating and constructing bulkheads or walls in the same process, without joints] [N9411]
  - E02D5/20 . Bulkheads or similar walls made of prefabricated parts and concrete, including reinforced concrete, in situ
  - E02D5/22 . Piles (sheet piles, [N: i.e. elements shaped to mutually lock or mate] [E02D5/02](#); [N: pile shoes [E02D5/72](#); foundations on piles [E02D27/12](#), [E02D27/20](#)])
  - E02D5/22A . . [N: Details of top sections of foundation piles([E02D5/54](#) takes precedence)] [N1204]
  - E02D5/22B . . [N: Protecting piles (piles with protecting cases [E02D5/60](#))]
  - E02D5/24 . . Prefabricated piles
- [N: **Note**  
Documents covered both by [E02D5/26](#) to [E02D5/32](#) and by one or several of the groups [E02D5/48](#) to [E02D5/64](#) are classified in all relevant groups unless specific priority rules to the contrary are given  
]
- E02D5/26 . . . made of timber with or without reinforcement; Means affording protection against spoiling of the wood (cases [E02D5/60](#); impregnating agents [B27K3/16](#)); Self-cleaning of piles placed in water
  - E02D5/28 . . . made of steel [N: or other metals ([E02D5/52](#) takes precedence)]
  - E02D5/28B . . . . [N: tubular, e.g. prefabricated from sheet pile elements (sheet pile boxes [E02D27/30](#); concrete piles with metal casings [E02D5/30](#))]
  - E02D5/30 . . . made of concrete or reinforced concrete or made of steel and concrete [N: ([E02D5/50](#) takes precedence; assembled from segments [E02D5/52B](#); prestressed concrete [E02D5/58](#))]
  - E02D5/32 . . . with arrangements for setting [N: or assisting in setting] in position by fluid jets [N: (placing piers by using fluid jets in general [E02D7/24](#))]
  - E02D5/34 . . Concrete or concrete-like piles cast in position; [N: Apparatus for making same ([E02D5/50](#) takes precedence; moulds [E02D5/66B](#); placing, removing moulds [E02D7/00](#) to [E02D11/00](#); placing the concrete [E02D15/04](#))]
  - E02D5/36 . . . making without use of mouldpipes or other moulds
- [N: **Note**  
Documents covered both by [E02D5/34](#) to [E02D5/46](#) and by one or several of the groups [E02D5/48](#) to [E02D5/64](#) are classified in all relevant groups unless specific priority rules to the contrary are given  
]
- E02D5/38 . . . making by use of mould-pipes or other moulds
  - E02D5/38B . . . . [N: with removal of the outer mould-pipes (documents also covered by one or several of the groups [E02D5/40](#) to [E02D5/44](#) are classified in all the relevant groups)]
  - E02D5/40 . . . . in open water
  - E02D5/42 . . . . by making use of pressure liquid or pressure gas for compacting the concrete
  - E02D5/44 . . . . with enlarged footing or enlargements at the bottom of the pile
  - E02D5/44B . . . . . [N: by application of pyrotechniques]

- E02D5/46 . . . making in situ by forcing bonding agents into gravel fillings or the soil  
(consolidating soil in general [E02D3/12](#))
- E02D5/48 . . Piles varying in construction along their length, [N: i.e. along the body between head and shoe, e.g. made of different materials along their length ([E02D5/50](#), [E02D5/52](#) take precedence)]
- E02D5/50 . . Piles comprising both precast concrete portions and concrete portions cast in situ [N: ([E02D5/52B](#) takes precedence)]
- E02D5/52 . . Piles composed of separable parts, e.g. telescopic tubes [N: Piles composed of segments]
- E02D5/52B . . . [N: composed of segments]
- E02D5/52B1 . . . . [N: Connection means between pile segments] [N1204]
- E02D5/54 . . Piles with prefabricated supports or anchoring parts; Anchoring piles [N: ([E02D5/44](#) takes precedence; ground anchors [E02D5/80](#); anchored foundations [E02D27/50](#))]
- E02D5/56 . . Screw piles [N: (placing piles by screwing down [E02D7/22](#))]
- E02D5/58 . . Prestressed concrete piles [N: (segmental piles [E02D5/52B](#))]
- E02D5/60 . . Piles with protecting cases
- E02D5/62 . . Compacting the soil at the footing or in [N: or along] a casing by forcing cement or like material through tubes
- E02D5/64 . . Repairing piles
  
- E02D5/66 . Mould-pipes or other moulds [N: (for plant use [B28B](#))]
- E02D5/66B . . [N: for making piles]
- E02D5/68 . . for making bulkheads or elements thereof
- E02D5/70 . . for making sheet piles [N: not used]
  
- E02D5/72 . Pile shoes
  
- E02D5/74 . Means for anchoring structural elements or bulkheads (anchoring piles [E02D5/54](#); [N: anchored foundations [E02D27/50](#)])
- E02D5/76 . . Anchoring for bulkheads or sections thereof [N: in as much as specially adapted therefor]
- E02D5/76B . . . [N: removable]
- E02D5/80 . . Ground anchors [N: (for galleries, tunnels or shafts [E21D21/00](#))]
- E02D5/80B . . . [N: driven by screwing]
- E02D5/80C . . . [N: with pivotable anchoring members]
- E02D5/80D . . . [N: with deformable anchoring members]
- E02D5/80E . . . [N: involving use of explosives]
- E02D5/80F . . . [N: anchored by using exclusively a bonding material]
  
- E02D7/00** **Methods or apparatus for placing sheet pile bulkheads, piles, mouldpipes, or other moulds (for both placing and removing [E02D11/00](#); [N: accessories for coupling driver to piles or the like [E02D13/10](#); for trees or other plants [A01G17/16](#); placing posts [E04H17/26](#)]) [C9610]**
  
- E02D7/02 . Placing by driving [N: ([E02D7/18](#) to [E02D7/24](#) take precedence)]
- E02D7/04 . . Hand [N: (-actuated)] pile-drivers
- E02D7/06 . . Power-driven drivers [N: (tamperers [E02D3/061](#))] [C9610]

- E02D7/08 . . . Drop drivers with free-falling hammer [N: (E02D7/10 takes precedence)]
- E02D7/10 . . . with pressure-actuated hammer, [N: i.e. the pressure fluid acting directly on the hammer structure (E02D7/12 takes precedence; vibrating drivers E02D7/18)]
- E02D7/12 . . . Drivers with explosion chambers [C9610]
- E02D7/12B . . . . [N: Diesel drivers]
- E02D7/14 . . . Components for drivers [N: inasmuch as not specially for a specific driver construction]
- E02D7/16 . . . . Scaffolds [N: or supports] for drivers [N: (guide frames for the elements to be driven per se E02D13/04; supports of the artificial island type E02B17/00)] [C9610]
- E02D7/16B . . . . . [N: of variable length, e.g. foldable or telescopic] [N1204]
- E02D7/18 . Placing by vibrating [N: (vibrators for soil compacting E02D3/046)] [C9810]
- E02D7/20 . Placing by pressure or pulling power
- E02D7/22 . Placing by screwing down [N: (screw piles per se E02D5/56)]
- E02D7/24 . Placing by using fluid jets [N: (prefabricated concrete piles with arrangements therefor E02D5/32)]
- E02D7/26 . Placing by using several means simultaneously
- E02D7/28 . Placing of hollow pipes or mould pipes by means arranged inside the piles or pipes [N: (E02D13/08 takes precedence)]
- E02D7/30 . . by driving cores
- E02D9/00** **Removing sheet piles bulkheads, piles, mould-pipes or other moulds** [N: or parts thereof] (for both placing and removing E02D11/00)
- E02D9/00B . [N: removing the top of placed piles of sheet piles (E02D9/04 takes precedence)]
- E02D9/02 . by withdrawing
- E02D9/04 . by cutting-off under water
- E02D11/00** **Methods or apparatus** [N: specially adapted] for both placing and removing sheet pile bulkheads, piles, or mould-pipes (features relating to placing only E02D7/00, to removing only E02D9/00; [N: placing apparatus which without special provisions, can be operated to remove, e.g. vibrating drivers E02D7/00])
- E02D13/00** **Accessories for placing or removing piles or bulkheads**, [N: e.g. noise attenuating chambers]
- E02D13/00A . [N: Sound absorbing accessories in piling] [N1204]
- E02D13/02 . specially adapted for placing or removing bulkheads
- E02D13/04 . Guide devices; Guide frames [N: (as parts of the driver scaffold E02D7/16)] [C9411]

- E02D13/06 . for observation while placing
  - E02D13/08 . Removing obstacles
  - E02D13/10 . Follow-blocks of pile-drivers or like devices
- [N: **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 ]
- E02D15/00 Handling building or like materials for hydraulic engineering or foundations** ([N: soil-shifting [E02F](#);] conveying or working-up concrete or similar masses in general [E04G21/02](#)) [C9411]
- E02D15/02 . Handling of bulk concrete specially for foundation [N: or hydraulic engineering] purposes [N: (lining canals [E02B5/02](#); banks of the bodies of water [E02B3/12B](#))] [C9411]
  - E02D15/04 . . Placing concrete in mould-pipes, pile tubes, bore-holes or narrow shafts [C9411]
  - E02D15/06 . . Placing concrete under water [N: (for surfacing the bottom of bodies of water [E02B3/12B](#))] [C9411]
  - E02D15/08 . Sinking workpieces into water or soil [N: inasmuch as not provided for elsewhere]
  - E02D15/10 . Placing gravel or light material under water [N: inasmuch as not provided for elsewhere]
- E02D17/00 Excavations; Bordering of excavations; Making embankments** (soil-shifting apparatus [E02F](#); earth drilling [E21](#))
- E02D17/02 . Foundation pits
  - E02D17/04 . . Bordering [N: surfacing] or stiffening the sides of foundation pits
  - E02D17/06 . Foundation [N: trenches] ditches or narrow shafts
  - E02D17/08 . . Bordering or stiffening the sides of ditches [N: trenches] or narrow shafts for foundations
  - E02D17/08B . . . [N: Shoring struts]
  - E02D17/08C . . . [N: Travelling trench shores]
  - E02D17/10 . . Covering trenches for foundations
  - E02D17/12 . . Back-filling of foundation trenches or ditches [N: (apparatus therefor [E02F5/12](#), [E02F5/22](#))] [C9411]
  - E02D17/13 . Foundation slots [N: or slits]; Implements for making these slots [N: or slits] [C9411]
  - E02D17/16 . Loosening of soil or rock, under water (for correcting streams [E02B3/02](#); by dredgers or excavators [E02F](#))
  - E02D17/18 . Making embankments, [N: e.g. dikes, dams] ([E02D17/20](#) takes precedence; [N: foundations for dams [E02D27/40](#)]) [C9411]
  - E02D17/20 . Securing of slopes or inclines [N: (by soil [E02D3/12](#); protection against snowslides or

- avalanches [E01F7/04](#), [E01F15/00](#); securing banks or like surfaces facing on bodies of water [E02B3/12](#)) [C9411]
- E02D17/20B . . [N: with flexible securing means] [N9411]
- E02D17/20C . . [N: with modular blocks, e.g. pre-fabricated] [N9411]
- E02D17/20D . . [N: with means incorporating sheet piles or piles] [N9411]
- E02D19/00** **Keeping dry foundation sites or other areas in the ground** (sheet piles or bulkheads [E02D5/02](#))
- E02D19/02 . Restraining of open water
- E02D19/04 . . by coffer-dams [N: ,e.g. made of sheet piles (permanent sheet piling boxes [E02D27/30](#))] [C9411]
- E02D19/06 . Restraining of underground water
- E02D19/08 . . by employing open ditches arranged below the level of the water
- E02D19/10 . . by lowering level of ground water [N: (installation for obtaining or collecting drinking water [E03B3/00](#))] [C9411]
- E02D19/12 . . by damming or interrupting the passage of underground water
- E02D19/14 . . . by freezing the soil (in connection with sinking shafts [E21D1/12](#)) [C9411]
- E02D19/16 . . . by placing or applying sealing substances ([N: [E02D19/18](#) takes precedence]; consolidating by placing solidifying or pore-filling pore-filling substances in the soil [E02D3/12](#); [N: improving soil by chemical substances [C09K17/00](#)])
- E02D19/18 . . . by making use of sealing aprons, [N: e.g. diaphragms made from bituminous or clay material] ([N: concrete diaphragms [E02D5/18](#); sealing or joints for [N: hydraulic] engineering work [E02B3/16](#)) [C9411]
- E02D19/18B . . . . [N: Joints between sheets constituting the sealing aprons]
- E02D19/20 . . . by displacing the water, e.g. by compressed air [N: (pneumatic caissons [E02D23/04](#))] [C9411]
- E02D19/22 . Lining sumps in trenches [N: or other foundation pits]
- E02D23/00** **Caissons; Construction or placing of caissons** (tunnels submerged into or built in open water [E02D29/063](#); [N: moles, piers, quays, breakwaters incorporating caissons [E02B3/06](#); foundation formed by caissons [E02D27/18](#) to [E02D27/22](#); caisson-like artificial islands [E02B17/00](#)]) [C9601]
- E02D23/02 . Caissons able to be floated on water and to be lowered into water in situ [N: (floating caisson foundations [E02D27/06](#))] [C9411]
- E02D23/04 . Pneumatic caissons [N: (sinking of same [E02D23/10](#))] [C9411]
- E02D23/06 . . bringing persons or material into or out of compressed air caissons [N: (air locks in mines [E21F1/14](#))] [C9411]
- E02D23/08 . Lowering or sinking caissons [N: (sinking mine shaft [E21D1/00](#))] [C9411]
- E02D23/10 . . Caisson filled with compressed air [N: ([E02D23/06](#) takes precedence)] [C9411]
- E02D23/12 . . inclined lowering
- E02D23/14 . . Decreasing the skin friction while lowering
- E02D23/16 . Jointing caissons to the foundation soil, specially to uneven foundation soil



## **E02D25/00      Joining caissons, sinkers, or other units to each other under water**

## **E02D27/00      Foundations as substructures**

- E02D27/01      . Flat foundations
- E02D27/01B      . . [N: Shuttering specially adapted therefor] [N1204]
- E02D27/01C      . . [N: made mainly from prefabricated concrete elements] [N1204]
- E02D27/02      . . Flat foundations without substantial excavation ([E02D27/04](#), [E02D27/08](#) take precedence)
- E02D27/04      . . in water or on quicksand
- E02D27/06      . . . Floating caisson foundations
- E02D27/08      . . Reinforcements for flat foundations [N: [E02D27/48](#) takes precedence]
- E02D27/10      . Deep foundations
- E02D27/12      . . Pile foundations
- E02D27/14      . . . Pile framings, [N: i.e. piles assembled to form the substructure]
- E02D27/16      . . . Foundations formed of separate piles
- E02D27/18      . . Foundations formed by making use of caissons
- E02D27/20      . . Caisson foundations combined with pile foundations
- E02D27/22      . . Caisson foundations made by starting from fixed or floating artificial islands by using protective bulkheads
- E02D27/24      . Foundations constructed by making use of diving-bells ([equipment for dwelling or working under water B63C11/00](#))
- E02D27/26      . Compacting soil locally before forming foundations; Construction of foundation structures by forcing binding substances into gravel fillings ([consolidating foundation soil in general E02D3/02 to E02D3/12](#); [N: for piles [E02D5/02](#), [E02D5/46](#)])
- E02D27/28      . Stressing the soil or the foundation structure while forming foundations
- E02D27/30      . Foundations made with permanent use of sheet pile bulkheads, walls of planks, or sheet piling boxes
- E02D27/32      . Foundations for special purposes [N: ([for paving of roads E01C3/00](#))]
- E02D27/34      . . Foundations for sinking or earthquake territories ([building constructions with protection arrangements against earthquakes E04H9/02](#))
- E02D27/35      . . Foundations formed in frozen ground, e.g. in permafrost soil
- E02D27/36      . . Foundations formed in moors or bogs
- E02D27/38      . . Foundations for large tanks, e.g. oil tanks
- E02D27/40      . . Foundations for dams across valleys or for dam constructions [N: ([dams per se E02B3/10](#), [E02B7/04](#))]
- E02D27/42      . . Foundations for poles, masts or chimneys [N: ([sockets or holders for poles or masts per se E04H12/22](#))]
- E02D27/42B      . . . [N: specially adapted for wind motors masts (wind motors per se F03D1/00)] [N1204]



- E02D27/44 . . Foundations for machines, engines or ordnance (special lay-out of foundations with respect to machinery to be supported [F16M9/00](#))
- E02D27/46 . . Foundations for supply conduits or other canals [N: (bridges for supporting conduits [E01D18/00](#); elevated canals [E02B5/00B](#); penstocks [E02B9/06](#))] [C9810]
- E02D27/48 . . Foundations inserted underneath existing buildings or constructions [N: (making a new substructure subsequent to lifting or moving of buildings [E04G23/06](#))]
- E02D27/50 . . Anchored foundations
- E02D27/52 . . Submerged foundations, [N: i.e. submerged in open water ([E02D27/12](#) to [E02D27/24](#) take precedence)]
- E02D27/52B . . . [N: using elements penetrating the underwater ground (sinking work pieces [E02D15/08](#), sinking caissons [E02D23/02](#))] [N1204]
  
- E02D29/00** [N: Independent] **underground or underwater structures** (underground tanks [B65D88/76](#); hydraulic engineering, e.g. sealings or joints, [E02B](#); underground garages [E04H6/00](#); underground air-raid shelters [E04H9/12](#); burial vaults [E04H13/00](#)); **Retaining walls** [C9605]
  
- E02D29/02 . Retaining or protecting walls (piers or quay walls [E02B3/06](#))
- E02D29/02B . . [N: Gabions]
- E02D29/02C . . [N: Cribbing walls]
- E02D29/02D . . [N: comprising retention means in the backfill] [C9605]
- E02D29/02D1 . . . [N: the retention means being anchors (details of anchors [E02D5/80](#))] [N9605]
- E02D29/02D2 . . . [N: the retention means being reinforced earth elements] [N9605]
- E02D29/02E . . [N: made up of similar modular elements stacked without mortar] [C9605]
- E02D29/02F . . [N: not used, see subgroups ([E02D29/02B](#) to [E02D29/02E](#) take precedence)] [N9605]
- E02D29/02F1 . . . [N: made up of preformed elements] [N9605]
- E02D29/02F2 . . . [N: cast in situ] [N9605]
- E02D29/02F3 . . . [N: of mixed type] [N9605]
- E02D29/02F4 . . . [N: made up of filled, bag-like elements] [N9605]
  
- E02D29/04 . [N: IPC5] Making large underground spaces, e.g. for underground plants, [N: e.g. stations of underground railways]; Construction or layout thereof ([E02D29/10](#) takes precedence; [N: water-supply or sewerage plants [E03](#)]; layout of water power plants [E02B9/00](#); making large underground chambers by underground methods only [E21D13/00](#))
  
- E02D29/045 . 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 [N9601]
- E02D29/05 . . at least part of the cross-section being constructed in an open excavation or from the ground surface, e.g. assembled in a trench [N9601]
- E02D29/055 . . . further excavation of the cross-section proceeding underneath an already installed part of the structure, e.g. the roof of a tunnel [N9601]
  
- E02D29/06 . [N: IPC5] Constructions, or methods of constructing, in water [N: ([E02D15/00](#) takes precedence; submerged foundations [E02D27/52](#))]
  
- E02D29/063 . Tunnels submerged into, or built in, open water (construction or placing of caissons in general [E02D23/00](#); joining caissons to each other under water, in general

- ) [N9601]
- E02D29/067 . . Floating tunnels; Submerged bridge-like tunnels, i.e. tunnels supported by piers or the like above the water-bed ([pontoons or floating bridges E01D15/14](#)) [N9601]
- E02D29/07 . . 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 [N9601]
- E02D29/073 . . 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 E02D29/077](#)) [N9601]
- E02D29/077 . . 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 [N9601]
- E02D29/08 . [N: IPC5] Siphons ([for sewerage E03F5/20](#); [siphon weirs E02B7/18](#); [N: siphons in general [F04F10/00](#)])
- E02D29/10 . [N: IPC5] Tunnels or galleries specially adapted to house conduits, e.g. oil pipe-lines, sewer pipes ([for pressure water conduits E02B9/06](#); [N: for cables [H02G9/02](#); layout of tunnels or galleries in general [E21D9/14](#); road kerbs with housings for pipes or the like [E01C11/22B2](#)]); Making conduits in situ, e.g. of concrete ([combined with digging of trenches or ditches E02F5/10](#); [N: making or lining tunnels or galleries [E21D](#); constructing tunnels or galleries in open excavations [E02D29/045](#); in open water [E02D29/063](#)]); Casings, [N: i.e. manhole shafts, access or inspection chambers] or coverings of boreholes or narrow wells ([wells for drinking water E03B3/08](#); boreholes or wells formed by deep drilling [E21B](#); shafts [E21D](#)) [[C9601](#)]
- E02D29/12 . Manhole shafts; Other inspection or access chambers; Accessories therefor ([for underground tanks B65D90/10](#); [for sewerage E03F5/02](#); [N: climbing irons or ladders [E06C9/00](#)])
- E02D29/12C . . [N: characterised by the connection between shaft elements, e.g. of rings forming said shaft] [[N1204](#)]
- E02D29/12D . . [N: Steps or handrails for shafts] [[N1204](#)]
- E02D29/12E . . [N: Shaft entirely made of synthetic material] [[N1204](#)]
- E02D29/12F . . [N: characterised by the lining of the shaft] [[N1204](#)]
- E02D29/12G . . [N: with devices for impeding fall or injuries of persons] [[N1204](#)]
- E02D29/12H . . [N: Repairs of manhole shafts] [[N1204](#)]
- E02D29/14 . . Covers for manholes or the like; Frames for covers [N: ([gully gratings E03F5/06](#))]
- E02D29/14B . . . [N: adjustable in height or inclination]
- E02D29/14C . . . [N: with implements to assist in lifting, e.g. counterweights, springs ([lifting devices for covers B66F19/00B](#))]
- E02D29/14D . . . [N: Locking devices ([of bayonet type E02D29/14](#))]
- E02D29/14E . . . [N: with overflow or explosion control means, e.g. check or relief valves]
- E02D29/14F . . . [N: Tools for positioning or removing cover frames]
- E02D29/14G . . . [N: Non-circular covers, e.g. hexagonal, elliptic] [[N1204](#)]
- E02D29/14H . . . [N: Hinged connection of cover to frame] [[N1204](#)]
- E02D29/14K . . . [N: Cover entirely made of synthetic material] [[N1204](#)]
- E02D29/14L . . . [N: Security devices, e.g. indicating unauthorised opening (E02D29/14D takes precedence)] [[N1204](#)]
- E02D29/14M . . . [N: Annular gaskets] [[N1204](#)]
- E02D29/16 . Arrangement or construction of joints in foundation structures ([N: for hydraulic

engineering [E02B3/16](#)]; sealing joints not restricted to foundation structures [E04B1/68](#))

- E02D31/00**      **Protective arrangements for foundations or foundation structures** [N: (protective casings for piles [E02D5/60](#)); Ground foundation measures for protecting the soil or the subsoil water, e.g. preventing or counteracting oil pollution (spillage retaining means for tanks [B65D90/24](#))
- E02D31/00B**      . [N: Ground foundation measures for protecting the soil or subsoil water, e.g. preventing or counteracting oil pollution (not used, see subgroups and [E02D31/00](#))]
- E02D31/00B2**      . . [N: Sealing liners]
- E02D31/00B4**      . . [N: Sealing of existing landfills, e.g. using mining techniques]
- E02D31/00C**      . [N: against entry of noxious gases, e.g. Radon]
- E02D31/02**      . against ground humidity or ground water [N: ([E02D31/06](#) takes precedence; arrangements other than according to [E02D31/04](#); against hydraulic pressure of groundwater [E02D31/10](#))]
- E02D31/02B**      . . [N: Draining membranes, sheets or fabric specially adapted therefor, e.g. with dimples] [N1204]
- E02D31/04**      . . Watertight packings for use under hydraulic pressure [N: (sealings for hydraulic engineering in general [E02B3/16](#); for building structures in general [E04B1/66](#))]
- E02D31/06**      . against corrosion by soil or water
- E02D31/08**      . against transmission of vibrations or movements in the foundation soil [N: ([E02D27/34](#) takes precedence; foundations for machines, engines or ordnance [E02D27/44](#); for road foundations [E01C3/06](#))] [C9610]
- E02D31/10**      . against soil pressure or hydraulic pressure [N: (anchored foundations [E02D27/50](#); joint sealings for use under hydraulic pressure [E02D31/04](#))]
- E02D31/12**      . . against upward hydraulic pressure
- E02D31/14**      . . against frost heaves in soil
- E02D33/00**      **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](#))
- E02D35/00**      **Straightening, lifting, or lowering of foundation structures or of constructions erected on foundations** [N: (foundations for sinking territories with incorporated means for remedying settlement [E02D27/34](#); lifting or moving buildings [E04G23/06](#))]
- E02D35/00B**      . [N: Lowering or lifting of foundation structures] [N1204]
- E02D37/00**      **Repair of damaged foundations or foundation structures** [N: (renewing piles [E02D5/64](#); roads [E01C11/00B](#); bridges [E01D22/00](#); repairing buildings [E04G23/02](#))] [C9810]