

**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](#) - [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

- 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](#) - [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](#) - [E02D 5/46](#) 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

- 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](#) - [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](#) - [E02D 7/24](#) take precedence)}
- E02D 7/04 . . Hand {(-actuated)} pile-drivers
- E02D 7/06 . . Power-driven drivers {(tamperers [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

<b>E02D 15/00</b>	<b>Handling building or like materials for hydraulic engineering or foundations</b> ({soil-shifting <a href="#">E02F</a> ; } conveying or working-up concrete or similar masses in general <a href="#">E04G 21/02</a> )
E02D 15/02	<ul style="list-style-type: none"> <li>Handling of bulk concrete specially for foundation {or hydraulic engineering} purposes {(lining canals <a href="#">E02B 5/02</a>; banks of the bodies of water <a href="#">E02B 3/121</a>)}</li> </ul>
E02D 15/04	<ul style="list-style-type: none"> <li>Placing concrete in mould-pipes, pile tubes, bore-holes or narrow shafts</li> </ul>
E02D 15/06	<ul style="list-style-type: none"> <li>Placing concrete under water {(for surfacing the bottom of bodies of water <a href="#">E02B 3/121</a>)}</li> </ul>
E02D 15/08	<ul style="list-style-type: none"> <li>Sinking workpieces into water or soil {inasmuch as not provided for elsewhere}</li> </ul>
E02D 15/10	<ul style="list-style-type: none"> <li>Placing gravel or light material under water {inasmuch as not provided for elsewhere}</li> </ul>
<b>E02D 17/00</b>	<b>Excavations; Bordering of excavations; Making embankments</b> (soil-shifting apparatus <a href="#">E02F</a> ; earth drilling <a href="#">E21</a> )
E02D 17/02	<ul style="list-style-type: none"> <li>Foundation pits</li> </ul>
E02D 17/04	<ul style="list-style-type: none"> <li>Bordering {surfacing} or stiffening the sides of foundation pits</li> </ul>
E02D 17/06	<ul style="list-style-type: none"> <li>Foundation {trenches} ditches or narrow shafts</li> </ul>
E02D 17/08	<ul style="list-style-type: none"> <li>Bordering or stiffening the sides of ditches {trenches} or narrow shafts for foundations</li> </ul>
E02D 17/083	<ul style="list-style-type: none"> <li>Shoring struts</li> </ul>
E02D 17/086	<ul style="list-style-type: none"> <li>Travelling trench shores</li> </ul>
E02D 17/10	<ul style="list-style-type: none"> <li>Covering trenches for foundations</li> </ul>
E02D 17/12	<ul style="list-style-type: none"> <li>Back-filling of foundation trenches or ditches {(apparatus therefor <a href="#">E02F 5/12</a>, <a href="#">E02F 5/22</a>)}</li> </ul>
E02D 17/13	<ul style="list-style-type: none"> <li>Foundation slots {or slits}; Implements for making these slots {or slits}</li> </ul>
E02D 17/16	<ul style="list-style-type: none"> <li>Loosening of soil or rock, under water (for correcting streams <a href="#">E02B 3/02</a>; by dredgers or excavators <a href="#">E02F</a>)</li> </ul>
E02D 17/18	<ul style="list-style-type: none"> <li>Making embankments, {e.g. dikes, dams} (<a href="#">E02D 17/20</a> takes precedence; {foundations for dams <a href="#">E02D 27/40</a>)}</li> </ul>
E02D 17/20	<ul style="list-style-type: none"> <li>Securing of slopes or inclines {(by soil <a href="#">E02D 3/12</a>; protection against snowslides or avalanches <a href="#">E01F 7/04</a>, <a href="#">E01F 15/00</a>; securing banks or like surfaces facing on bodies of water <a href="#">E02B 3/12</a>)}</li> </ul>
E02D 17/202	<ul style="list-style-type: none"> <li>flexible securing means</li> </ul>
E02D 17/205	<ul style="list-style-type: none"> <li>modular blocks, e.g. pre-fabricated</li> </ul>
E02D 17/207	<ul style="list-style-type: none"> <li>means incorporating sheet piles or piles</li> </ul>
<b>E02D 19/00</b>	<b>Keeping dry foundation sites or other areas in the ground</b> (sheet piles or bulkheads <a href="#">E02D 5/02</a> )
E02D 19/02	<ul style="list-style-type: none"> <li>Restraining of open water</li> </ul>
E02D 19/04	<ul style="list-style-type: none"> <li>coffer-dams {e.g. made of sheet piles (permanent sheet piling boxes <a href="#">E02D 27/30</a>)}</li> </ul>
E02D 19/06	<ul style="list-style-type: none"> <li>Restraining of underground water</li> </ul>
E02D 19/08	<ul style="list-style-type: none"> <li>open ditches arranged below the level of the water</li> </ul>

E02D 19/10	<ul style="list-style-type: none"> <li>by lowering level of ground water {(installation for obtaining or collecting drinking water <a href="#">E03B 3/00</a>)}</li> </ul>
E02D 19/12	<ul style="list-style-type: none"> <li>by damming or interrupting the passage of underground water</li> </ul>
E02D 19/14	<ul style="list-style-type: none"> <li>by freezing the soil (in connection with sinking shafts <a href="#">E21D 1/12</a>)</li> </ul>
E02D 19/16	<ul style="list-style-type: none"> <li>by placing or applying sealing substances {(E02D 19/18 takes precedence); consolidating by placing solidifying or pore-filling pore-filling substances in the soil <a href="#">E02D 3/12</a>; {improving soil by chemical substances <a href="#">C09K 17/00</a>)}</li> </ul>
E02D 19/18	<ul style="list-style-type: none"> <li>by making use of sealing aprons, {e.g. diaphragms made from bituminous or clay material} {(concrete diaphragms <a href="#">E02D 5/18</a>); sealing or joints for {hydraulic} engineering work <a href="#">E02B 3/16</a>}</li> </ul>
E02D 19/185	<ul style="list-style-type: none"> <li>{Joints between sheets constituting the sealing aprons}</li> </ul>
E02D 19/20	<ul style="list-style-type: none"> <li>by displacing the water, e.g. by compressed air {(pneumatic caissons <a href="#">E02D 23/04</a>)}</li> </ul>
E02D 19/22	<ul style="list-style-type: none"> <li>Lining sumps in trenches {or other foundation pits}</li> </ul>
<b>E02D 23/00</b>	<b>Caissons; Construction or placing of caissons</b> (tunnels submerged into or built in open water <a href="#">E02D 29/063</a> ; {moles, piers, quays, breakwaters incorporating caissons <a href="#">E02B 3/06</a> ; foundation formed by caissons <a href="#">E02D 27/18</a> - <a href="#">E02D 27/22</a> ; caisson-like artificial islands <a href="#">E02B 17/00</a> )
E02D 23/02	<ul style="list-style-type: none"> <li>Caissons able to be floated on water and to be lowered into water in situ {(floating caisson foundations <a href="#">E02D 27/06</a>)}</li> </ul>
E02D 23/04	<ul style="list-style-type: none"> <li>Pneumatic caissons {(sinking of same <a href="#">E02D 23/10</a>)}</li> </ul>
E02D 23/06	<ul style="list-style-type: none"> <li>bringing persons or material into or out of compressed air caissons {(air locks in mines <a href="#">E21F 1/14</a>)}</li> </ul>
E02D 23/08	<ul style="list-style-type: none"> <li>Lowering or sinking caissons {(sinking mine shaft <a href="#">E21D 1/00</a>)}</li> </ul>
E02D 23/10	<ul style="list-style-type: none"> <li>Caisson filled with compressed air {(E02D 23/06 takes precedence)}</li> </ul>
E02D 23/12	<ul style="list-style-type: none"> <li>inclined lowering</li> </ul>
E02D 23/14	<ul style="list-style-type: none"> <li>Decreasing the skin friction while lowering</li> </ul>
E02D 23/16	<ul style="list-style-type: none"> <li>Jointing caissons to the foundation soil, specially to uneven foundation soil</li> </ul>
<b>E02D 25/00</b>	<b>Joining caissons, sinkers, or other units to each other under water</b>
<b>E02D 27/00</b>	<b>Foundations as substructures</b>
E02D 27/01	<ul style="list-style-type: none"> <li>Flat foundations</li> </ul>
E02D 27/013	<ul style="list-style-type: none"> <li>{Shuttering specially adapted therefor}</li> </ul>
E02D 27/016	<ul style="list-style-type: none"> <li>{made mainly from prefabricated concrete elements}</li> </ul>
E02D 27/02	<ul style="list-style-type: none"> <li>Flat foundations without substantial excavation (<a href="#">E02D 27/04</a>, <a href="#">E02D 27/08</a> take precedence)</li> </ul>
E02D 27/04	<ul style="list-style-type: none"> <li>in water or on quicksand</li> </ul>
E02D 27/06	<ul style="list-style-type: none"> <li>Floating caisson foundations</li> </ul>
E02D 27/08	<ul style="list-style-type: none"> <li>Reinforcements for flat foundations {(E02D 27/48 takes precedence)}</li> </ul>
E02D 27/10	<ul style="list-style-type: none"> <li>Deep foundations</li> </ul>
E02D 27/12	<ul style="list-style-type: none"> <li>Pile foundations</li> </ul>
E02D 27/14	<ul style="list-style-type: none"> <li>Pile framings, {i.e. piles assembled to form the substructure}</li> </ul>



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 ( <a href="#">equipment for dwelling or working under water B63C 11/00</a> )
E02D 27/26	• Compacting soil locally before forming foundations; Construction of foundation structures by forcing binding substances into gravel fillings ( <a href="#">consolidating foundation soil in general E02D 3/02 - E02D 3/12</a> ; {for piles <a href="#">E02D 5/02</a> , <a href="#">E02D 5/46</a> })
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 <a href="#">E01C 3/00</a> })
E02D 27/34	• • Foundations for sinking or earthquake territories ( <a href="#">building constructions with protection arrangements against earthquakes E04H 9/02</a> )
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 <a href="#">E02B 3/10</a> , <a href="#">E02B 7/04</a> })
E02D 27/42	• • Foundations for poles, masts or chimneys ({sockets or holders for poles or masts per se <a href="#">E04H 12/22</a> })
E02D 27/425	• • • {specially adapted for wind motors masts ( <a href="#">wind motors per se F03D 1/00</a> )}
E02D 27/44	• • Foundations for machines, engines or ordnance ( <a href="#">special lay-out of foundations with respect to machinery to be supported F16M 9/00</a> )
E02D 27/46	• • Foundations for supply conduits or other canals ({bridges for supporting conduits <a href="#">E01D 18/00</a> ; elevated canals <a href="#">E02B 5/005</a> ; penstocks <a href="#">E02B 9/06</a> })
E02D 27/48	• • Foundations inserted underneath existing buildings or constructions ({making a new substructure subsequent to lifting or moving of buildings <a href="#">E04G 23/06</a> })
E02D 27/50	• • Anchored foundations
E02D 27/52	• • Submerged foundations, {i.e. submerged in open water ( <a href="#">E02D 27/12 - E02D 27/24</a> take precedence)}
E02D 27/525	• • • {using elements penetrating the underwater ground (sinking work pieces <a href="#">E02D 15/08</a> , sinking caissons <a href="#">E02D 23/02</a> )}
E02D 29/00	<b>{Independent} underground or underwater structures</b> ( <a href="#">underground tanks B65D 88/76</a> ; hydraulic engineering, e.g. sealings or joints, <a href="#">E02B</a> ; underground garages <a href="#">E04H 6/00</a> ; underground air-raid shelters <a href="#">E04H 9/12</a> ; burial vaults <a href="#">E04H 13/00</a> ); <b>Retaining walls</b>
E02D 29/02	• Retaining or protecting walls ( <a href="#">piers or quay walls E02B 3/06</a> )
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 - 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	<ul style="list-style-type: none"> <li>• {against entry of noxious gases, e.g. Radon}</li> </ul>
E02D 31/02	<ul style="list-style-type: none"> <li>• 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)}</li> </ul>
E02D 31/025	<ul style="list-style-type: none"> <li>• • {Draining membranes, sheets or fabric specially adapted therefor, e.g. with dimples}</li> </ul>
E02D 31/04	<ul style="list-style-type: none"> <li>• • Watertight packings for use under hydraulic pressure {(sealings for hydraulic engineering in general E02B 3/16; for building structures in general E04B 1/66)}</li> </ul>
E02D 31/06	<ul style="list-style-type: none"> <li>• against corrosion by soil or water</li> </ul>
E02D 31/08	<ul style="list-style-type: none"> <li>• 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)}</li> </ul>
E02D 31/10	<ul style="list-style-type: none"> <li>• against soil pressure or hydraulic pressure {(anchored foundations E02D 27/50; joint sealings for use under hydraulic pressure E02D 31/04)}</li> </ul>
E02D 31/12	<ul style="list-style-type: none"> <li>• • against upward hydraulic pressure</li> </ul>
E02D 31/14	<ul style="list-style-type: none"> <li>• • against frost heaves in soil</li> </ul>
<b>E02D 33/00</b>	<b>Testing foundations or foundation structures</b> (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)
<b>E02D 35/00</b>	<b>Straightening, lifting, or lowering of foundation structures or of constructions erected on foundations</b> {(foundations for sinking territories with incorporated means for remedying settlement E02D 27/34; lifting or moving buildings E04G 23/06)}
E02D 35/005	<ul style="list-style-type: none"> <li>• {Lowering or lifting of foundation structures}</li> </ul>
<b>E02D 37/00</b>	<b>Repair of damaged foundations or foundation structures</b> {(renewing piles E02D 5/64; roads E01C 11/005; bridges E01D 22/00; repairing buildings E04G 23/02)}
<b>E02D 2200/00</b>	<b>Geometrical or physical properties</b>
E02D 2200/11	<ul style="list-style-type: none"> <li>• Height being adjustable</li> </ul>
E02D 2200/115	<ul style="list-style-type: none"> <li>• • with separate pieces</li> </ul>
E02D 2200/12	<ul style="list-style-type: none"> <li>• corrugated</li> </ul>
E02D 2200/13	<ul style="list-style-type: none"> <li>• having at least a mesh portion</li> </ul>
E02D 2200/14	<ul style="list-style-type: none"> <li>• resilient or elastic</li> </ul>
E02D 2200/143	<ul style="list-style-type: none"> <li>• • helically or spirally shaped</li> </ul>
E02D 2200/146	<ul style="list-style-type: none"> <li>• • Springs</li> </ul>
E02D 2200/15	<ul style="list-style-type: none"> <li>• including at least a hinge</li> </ul>
E02D 2200/16	<ul style="list-style-type: none"> <li>• Shapes</li> </ul>
E02D 2200/1607	<ul style="list-style-type: none"> <li>• • round, e.g. circle</li> </ul>
E02D 2200/1614	<ul style="list-style-type: none"> <li>• • • made from single element</li> </ul>
E02D 2200/1621	<ul style="list-style-type: none"> <li>• • • made from multiple elements</li> </ul>

- 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