

## E 02 HYDRAULIC ENGINEERING; FOUNDATIONS; SOIL-SHIFTING

## E 02 B HYDRAULIC ENGINEERING (ship-lifting E 02 C; dredging E 02 F)

Subclass Index

METHODS AND EQUIPMENT IN GENERAL.....	1/00, 3/00	DRAINAGE; IRRIGATION; CLEANING OF SURFACE OF OPEN WATER.....	11/00; 13/00; 15/00
ARTIFICIAL WATER CANALS.....	5/00	ARTIFICIAL ISLANDS MOUNTED ON PILES OR LIKE SUPPORTS.....	17/00
BARRAGES OR WEIRS.....	7/00, 8/00		
WATER-POWER PLANTS.....	9/00		

**1/00 Equipment or apparatus for, or methods of, general hydraulic engineering**

1/02 . Hydraulic models

**3/00 Engineering work in connection with control or use of streams, rivers, coasts, or other marine sites (barrages or weirs 7/00); Sealings or joints for engineering work in general**

3/02 . Stream regulation, e.g. breaking up subaqueous rock, cleaning the beds of waterways, directing the water flow (dredging or scraping devices E 02 F)

3/04 . Structures or apparatus for, or methods of, protecting banks, coasts, or harbours (sealings or joints 3/16)

3/06 . . Moles; Piers; Quays; Quay walls; Groynes; Breakwaters

3/08 . . . Structures of loose stones with or without piles (piles E 02 D 5/00)

3/10 . . Dams; Dykes; Sluice ways or other structures for dykes, dams, or the like (making embankments or dams in general E 02 D 17/18)

3/12 . . Revetment of banks, dams, watercourses, or the like (of slopes in general E 02 D 17/20)

3/14 . . . Preformed blocks; Arrangements thereof

3/16 . Sealings or joints (joints for foundation structures E 02 D 29/16; sealing joints not restricted to hydraulic engineering work E 04 B 1/68)

3/18 . Reclamation of land from water (drainage of soil 11/00)

3/20 . Equipment for shipping on coasts, in harbours or on other fixed marine structures, e.g. bollards (tying-up, anchoring B 63 B 21/00, e.g. bollards for shipping 21/06; buoys B 63 B 22/00) [5]

3/24 . . Mooring posts [5]

3/26 . . Fenders (fenders integral with waterborne vessels or specially adapted therefor B 63 B 59/02) [5]

3/28 . . Fender piles [5]

**5/00 Artificial water canals (for water-power plants 9/02; irrigation of soil 13/00)**

5/02 . Making or lining canals

5/04 . Navigable canals

5/06 . . Operating equipment in connection with canals (ship-lifting devices E 02 C)

5/08 . Details, e.g. gates, screens

**7/00 Barrages or weirs; Layout, construction, methods of, or devices for, making same (for protecting banks, coasts, or harbours 3/04; sealings or joints 3/16; handling building or like materials for hydraulic engineering E 02 D 15/00; foundations in general E 02 D 27/00)**

7/02 . Fixed barrages

7/04 . . Dams across valleys

7/06 . . . Earth-fill dams; Rock-fill dams

7/08 . . . Wall dams

7/10 . . . . Gravity dams, i.e. those in which the weight of the structure prevents overturning

7/12 . . . . Arch dams

7/14 . . . . Buttress dams

7/16 . Fixed weirs; Superstructures or flash-boards therefor

7/18 . . Siphon weirs

7/20 . Movable barrages; Lock gates

7/22 . . Stop log dams; Emergency gates

7/24 . . Needle weirs

7/26 . . Vertical-lift gates

7/28 . . . with sliding gates

7/30 . . . with guide wheels or rollers for the gates

7/32 . . . Cylindrical or tubular gates

7/34 . . . Flash-boards for vertical-lift gates

7/36 . . . Elevating mechanisms for vertical-lift gates

7/38 . . Rolling gates

7/40 . . Swinging or turning gates

7/42 . . . Gates of segmental or sector-like shape with horizontal axis

7/44 . . . Hinged-leaf gates

7/46 . . . Gates turning round a horizontal axis arranged midway of the flap

7/48 . . . Roof or double shutter gates

7/50 . . Floating gates

7/52 . . Equipment preventing vibration of gates

7/54 . . Sealings for gates

**8/00 Details of barrages or weirs (cleaning or keeping clear the surface of open water 15/00)**

8/02 . Sediment base gates; Sand sluices; Structures for arresting waterborne material

8/04 . Valves, slides, or the like; Submerged sluice gates

8/06 . Spillways; Devices for dissipation of energy, e.g. for reducing eddies

8/08 . Fish passes; Passages for rafts or boats

## E 02 B, C, D

- 9/00 Water-power plants; Layout, construction or equipment, methods of, or apparatus for, making same** (hydraulic motors [F 03 B](#))
- 9/02 . Water-ways
  - 9/04 . . Free-flow canals or flumes; Intakes (gratings or screens therefor [5/08](#))
  - 9/06 . . Pressure galleries or pressure conduits; Galleries specially adapted to house pressure conduits; Means specially adapted for use therewith, e.g. housings, valves, gates (driving inclined galleries [E 21 D 9/02](#); valves in general [F 16 K](#); conduits in general [F 16 L](#)) [[6](#)]
  - 9/08 . Tide or wave power plants (water-pressure machines, tide or wave motors [F 03 B](#))
- 11/00 Drainage of soil, e.g. for agricultural purposes**
- 11/02 . Drainage-device-laying apparatus, e.g. drainage ploughs
- 13/00 Irrigation ditches, i.e. gravity flow, open channel water distribution systems** (other distribution systems for watering or spraying gardens, fields, sports grounds, or the like [A 01 G 25/00](#)) [[2](#)]
- 13/02 . Closures for irrigation conduits
- 15/00 Cleaning or keeping clear the surface of open water; Apparatus therefor** (construction of ships or other waterborne vessels [B 63 B](#), e.g. vessels specially adapted for collecting pollution from open water [35/32](#); in swimming or splash baths or pools [E 04 H 4/16](#)) [[5](#)]
- 15/02 . from ice [[5](#)]
  - 15/04 . Devices for cleaning or keeping clear the surface of open water from oil or like floating materials by separating or removing these materials (other treatment of water, waste water or sewage [C 02 F](#); materials for treating liquid pollutants, e.g. oil, gasoline, fat, [C 09 K 3/32](#))
  - 15/06 . . Barriers therefor ([15/08](#) takes precedence) [[5](#)]
  - 15/08 . . Devices for reducing the polluted area without removing the material [[5](#)]
  - 15/10 . . Devices for removing the material from the surface [[5](#)]
- 17/00 Artificial islands mounted on piles or like supports, e.g. platforms on raisable legs; Construction methods therefor** (fenders [3/26](#); anchoring floating platforms [B 63 B 21/00](#); floating platforms, e.g. anchored, [B 63 B 35/44](#); independent underwater structures [E 02 D 29/00](#)) [[5](#)]
- 17/02 . placed by lowering the supporting construction to the bottom, e.g. with subsequent fixing thereto
  - 17/04 . Equipment specially adapted for raising, lowering, or immobilising the working platform relative to the supporting construction (platform lifts in general [B 66 F 7/00](#))
  - 17/06 . . for immobilising, e.g. using wedges or clamping rings
  - 17/08 . . for raising or lowering

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## E 02 C SHIP-LIFTING DEVICES OR MECHANISMS

- 1/00 Locks; Shaft locks, i.e. locks of which one front side is formed by a solid wall with an opening in the lower part through which the ships pass** (lock gates [E 02 B 7/20](#))
- 1/02 . with auxiliary basins
  - 1/04 . with floating troughs
  - 1/06 . Devices for filling or emptying locks (in lock gates [E 02 B 7/20](#))
- 1/08 . Arrangements for dissipating the energy of the water (carried by lock gates [E 02 B 8/06](#))
  - 1/10 . Equipment for use in connection with the navigation of ships in locks; Mooring equipment (tying-up, anchoring waterborne vessels [B 63 B 21/00](#); equipment for shipping on coasts, in harbours or on other fixed marine structures [E 02 B 3/20](#))
- 3/00 Inclined-plane ship-lifting mechanisms**
- 5/00 Mechanisms for lifting ships vertically** (salvaging sunken vessels [B 63 C 7/00](#))
- 5/02 . with floating chambers

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## E 02 D FOUNDATIONS; EXCAVATIONS; EMBANKMENTS UNDERGROUND OR UNDERWATER STRUCTURES [[6](#)]

(specially adapted for hydraulic engineering [E 02 B](#));

### Notes

- (1) This subclass covers underground structures made by foundation engineering, i.e. involving disturbance of the ground surface. [[6](#)]
- (2) This subclass does not cover underground spaces, made by underground mining methods only, i.e. not involving disturbance of the ground surface, which are covered by subclass [E 21 D](#). [[6](#)]

**Subclass Index**

INVESTIGATING, IMPROVING OR PRESERVING FOUNDATION SOIL OR ROCK .....	1/00, 3/00
STRUCTURAL ELEMENTS AND TECHNIQUES THEREFOR	
Structural elements.....	5/00
Placing; removing; placing and removing; accessories .....	7/00; 9/00; 11/00; 13/00
HANDLING MATERIALS .....	15/00

EXCAVATIONS, MAKING EMBANKMENTS.....	17/00
KEEPING DRY FOUNDATION SITES .....	19/00
CAISSONS.....	23/00, 25/00
FOUNDATIONS AS SUBSTRUCTURES; UNDERGROUND OR UNDERWATER STRUCTURES, RETAINING WALLS.....	27/00; 29/00
PROTECTING, TESTING, STRAIGHTENING, LIFTING, REPAIRING .....	31/00 to 37/00

- 1/00 Investigation of foundation soil in situ** (investigation involving boring or specially adapted to earth drilling [E 21 B 25/00, 49/00](#); investigating or analysing materials by determining their chemical or physical properties, in general [G 01 N](#), e.g. sampling [1/00](#))
- 1/02 . before construction work
- 1/04 . . Sampling of soil
- 1/06 . . Sampling of ground water
- 1/08 . after finishing the foundation structure
- 3/00 Improving or preserving soil or rock, e.g. preserving permafrost soil** (securing of slopes or inclines [17/20](#); damming or interrupting passage of underground water [19/12](#); improving soil for agricultural purposes [A 01](#); soil stabilisation for road building or like purposes [E 01 C 21/00, 23/10](#); setting rock anchoring bolts [E 21 D](#))
- 3/02 . Improving by compacting ([3/11](#) takes precedence; compacting soil locally before or while forming foundations [27/26, 27/28](#)) [3]
- 3/026 . . by rolling with rollers usable only for or specially adapted for soil compaction, e.g. sheepsfoot rollers (rollers for soil working in agriculture [A 01 B 29/00](#); rollers for road paving, such rollers usable also for compacting soil [E 01 C 19/23](#)) [3]
- 3/032 . . . Trench rollers [3]
- 3/039 . . . Slope rollers [3]
- 3/046 . . by tamping or vibrating, e.g. with auxiliary watering of the soil ([3/026, 3/08](#) take precedence; tamping or vibrating apparatus for working ballast on railways [E 01 B 27/00](#), for consolidating paving materials [E 01 C 19/30](#), for consolidating concrete in general [E 04 G 21/06](#)) [3]
- 3/054 . . . involving penetration of the soil, e.g. vibroflotation [3]
- 3/061 . . . Tampers with directly acting explosion chambers (pile drivers with explosion chambers [7/12](#)) [3]
- 3/068 . . . Vibrating apparatus operating with systems involving reciprocating masses ([3/054, 3/061](#) take precedence) [3]
- 3/074 . . . Vibrating apparatus operating with systems involving rotary unbalanced masses ([3/054](#) takes precedence) [3]
- 3/08 . . by inserting stones or lost bodies, e.g. compaction piles (sand drains for soil compaction [3/10](#); stressing soil while forming foundations [27/28](#))
- 3/10 . . by watering, draining, de-aerating or blasting, e.g. by installing sand or wick drains ([3/11](#) takes precedence; soil-penetrating vibrators with auxiliary watering [3/054](#); drainage of soil in general [E 02 B 11/00](#)) [3]
- 3/11 . by thermal, electrical or electro-chemical means (freezing soil for interrupting passage of underground water [19/14](#)) [3]
- 3/115 . . by freezing [3]
- 3/12 . Consolidating by placing solidifying or pore-filling substances in the soil (making piles [5/46](#); soil-conditioning or soil-stabilising materials [C 09 K 17/00](#))
- 5/00 Bulkheads, piles, or other structural elements specially adapted to foundation engineering** (engineering elements in general [F 16](#))
- 5/02 . Sheet piles or sheet pile bulkheads
- 5/03 . . Prefabricated parts
- 5/04 . . . made of steel
- 5/06 . . . . Fitted piles or other elements specially adapted for closing gaps between two sheet piles or between two walls of sheet piles
- 5/08 . . . . Locking forms; Edge joints; Pile crossings; Branch pieces
- 5/10 . . . . made of concrete or reinforced concrete
- 5/12 . . . . Locking forms; Edge joints; Pile crossings; Branch pieces
- 5/14 . . Sealing joints between adjacent piles (sealing joints not restricted to foundation piles [E 04 B 1/68](#))
- 5/16 . . Auxiliary devices rigidly or detachably arranged on sheet piles for facilitating assembly
- 5/18 . Bulkheads or similar walls made solely of concrete in situ
- 5/20 . Bulkheads or similar walls made of prefabricated parts and concrete, including reinforced concrete, in situ
- 5/22 . Piles (sheet piles [5/02](#))
- 5/24 . . Prefabricated piles
- 5/26 . . . made of timber with or without reinforcement; Means affording protection against spoiling of the wood (cases [5/60](#); impregnating agents [B 27 K 3/16](#)); Self-cleaning of piles placed in water
- 5/28 . . . made of steel
- 5/30 . . . made of concrete or reinforced concrete or made of steel and concrete
- 5/32 . . . with arrangements for setting in position by fluid jets
- 5/34 . . Concrete or concrete-like piles cast in position

## E 02 D

- 5/36 . . . making without use of mould-pipes or other moulds
- 5/38 . . . making by use of mould-pipes or other moulds
- 5/40 . . . . in open water
- 5/42 . . . . by making use of pressure liquid or pressure gas for compacting the concrete
- 5/44 . . . . with enlarged footing or enlargements at the bottom of the pile
- 5/46 . . . making in situ by forcing bonding agents into gravel fillings or the soil (consolidating soil in general 3/12)
- 5/48 . . Piles varying in construction along their length
- 5/50 . . Piles comprising both precast concrete portions and concrete portions cast in situ
- 5/52 . . Piles composed of separable parts, e.g. telescopic tubes
- 5/54 . . Piles with prefabricated supports or anchoring parts; Anchoring piles
- 5/56 . . Screw piles
- 5/58 . . Prestressed concrete piles
- 5/60 . . Piles with protecting cases
- 5/62 . . Compacting the soil at the footing or in a casing by forcing cement or like material through tubes
- 5/64 . . Repairing piles
- 5/66 . Mould-pipes or other moulds
- 5/68 . . for making bulkheads
- 5/70 . . for making sheet piles
- 5/72 . Pile shoes
- 5/74 . Means for anchoring structural elements or bulkheads (anchoring piles 5/54)
- 5/76 . . Anchorings for bulkheads or sections thereof
- 5/80 . . Ground anchors

### 7/00 Methods or apparatus for placing sheet pile bulkheads, piles, mould-pipes, or other moulds (for both placing and removing 11/00)

- 7/02 . Placing by driving
- 7/04 . . Hand pile-drivers
- 7/06 . . Power-driven drivers
- 7/08 . . . Drop drivers with free-falling hammer
- 7/10 . . . with pressure-operated hammer
- 7/12 . . . Drivers with explosion chambers
- 7/14 . . . Components for drivers
- 7/16 . . . . Scaffolds for drivers
- 7/18 . Placing by vibrating
- 7/20 . Placing by pressure or pulling power
- 7/22 . Placing by screwing down
- 7/24 . Placing by using fluid jets
- 7/26 . Placing by using several means simultaneously
- 7/28 . Placing of hollow piles or mould-pipes by means arranged inside the piles or pipes
- 7/30 . . by driving cores

### 9/00 Removing sheet pile bulkheads, piles, mould-pipes, or other moulds (for both placing and removing 11/00)

- 9/02 . by withdrawing
- 9/04 . by cutting-off under water

### 11/00 Methods or apparatus for both placing and removing sheet pile bulkheads, piles, or mould-pipes (features relating to placing only 7/00, to removing only 9/00)

### 13/00 Accessories for placing or removing piles or bulkheads

- 13/02 . specially adapted for placing or removing bulkheads
- 13/04 . Guide devices; Guide frames
- 13/06 . for observation while placing
- 13/08 . Removing obstacles
- 13/10 . Follow-blocks of pile-drivers or like devices

### 15/00 Handling building or like materials for hydraulic engineering or foundations (conveying or working-up concrete or similar masses in general E 04 G 21/02)

- 15/02 . Handling of bulk concrete specially for foundation purposes
- 15/04 . . Placing concrete in mould-pipes, pile tubes, boreholes, or narrow shafts
- 15/06 . . Placing concrete under water
- 15/08 . Sinking workpieces into water or soil
- 15/10 . Placing gravel or like material under water

### 17/00 Excavations; Bordering of excavations; Making embankments (soil shifting apparatus E 02 F; earth drilling E 21)

- 17/02 . Foundation pits
- 17/04 . . Bordering or stiffening the sides of foundation pits
- 17/06 . Foundation ditches or narrow shafts
- 17/08 . . Bordering or stiffening the sides of ditches or narrow shafts for foundations
- 17/10 . . Covering trenches for foundations
- 17/12 . . Back-filling of foundation trenches or ditches
- 17/13 . Foundation slots; Implements for making these slots
- 17/16 . Loosening of soil or rock, under water (for correcting streams E 02 B 3/02; by dredgers or excavators E 02 F)
- 17/18 . Making embankments (17/20 takes precedence)
- 17/20 . Securing of slopes or inclines

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

- 19/02 . Restraining of open water
- 19/04 . . by coffer-dams
- 19/06 . Restraining of underground water
- 19/08 . . by employing open ditches arranged below the level of the water
- 19/10 . . by lowering level of ground water
- 19/12 . . by damming or interrupting the passage of underground water
- 19/14 . . . by freezing the soil (in connection with sinking shafts E 21 D 1/12)
- 19/16 . . . by placing or applying sealing substances (consolidating by placing solidifying or pore-filling substances in the soil 3/12)

- 19/18 . . . by making use of sealing aprons (sealings or joints for engineering work [E 02 B 3/16](#))
- 19/20 . . . by displacing the water, e.g. by compressed air
- 19/22 . Lining sumps in trenches
- 23/00 Caissons; Construction or placing of caissons** (tunnels submerged into or built in open water [29/063](#)) [**6**]
- 23/02 . Caissons able to be floated on water and to be lowered into water in situ
- 23/04 . Pneumatic caissons
- 23/06 . . Bringing persons or material into, or out of, compressed air caissons
- 23/08 . Lowering or sinking caissons
- 23/10 . . Caissons filled with compressed air
- 23/12 . . Inclined lowering
- 23/14 . . Decreasing the skin friction while lowering
- 23/16 . Jointing caissons to the foundation soil, specially to uneven foundation soil
- 25/00 Joining caissons or like sunk units to each other under water**
- 27/00 Foundations as substructures**
- 27/01 . Flat foundations
- 27/02 . . Flat foundations without substantial excavation ([27/04](#), [27/08](#) take precedence)
- 27/04 . . in water or on quicksand
- 27/06 . . . Floating caisson foundations
- 27/08 . . Reinforcements for flat foundations
- 27/10 . Deep foundations
- 27/12 . . Pile foundations
- 27/14 . . . Pile framings
- 27/16 . . . Foundations formed of separate piles
- 27/18 . . Foundations formed by making use of caissons
- 27/20 . . Caisson foundations combined with pile foundations
- 27/22 . . Caisson foundations made by starting from fixed or floating artificial islands by using protective bulkheads
- 27/24 . Foundations constructed by making use of diving-bells (equipment for dwelling or working under water [B 63 C 11/00](#))
- 27/26 . Compacting soil locally before forming foundations; Construction of foundation structures by forcing binding substances into gravel fillings (consolidating foundation soil in general [3/02](#) to [3/12](#))
- 27/28 . Stressing the soil or the foundation structure while forming foundations
- 27/30 . Foundations made with permanent use of sheet pile bulkheads, walls of planks, or sheet piling boxes
- 27/32 . Foundations for special purposes
- 27/34 . . Foundations for sinking or earthquake territories (building constructions with protection arrangements against earthquakes [E 04 H 9/02](#))
- 27/35 . . Foundations formed in frozen ground, e.g. in permafrost soil [**3**]
- 27/36 . . Foundations formed in moors or bogs
- 27/38 . . Foundations for large tanks, e.g. oil tanks
- 27/40 . . Foundations for dams across valleys or for dam constructions
- 27/42 . . Foundations for poles, masts, or chimneys
- 27/44 . . Foundations for machines, engines, or ordnance (special layout of foundations with respect to machinery to be supported [F 16 M 9/00](#))
- 27/46 . . Foundations for supply conduits or other canals
- 27/48 . . Foundations inserted underneath existing buildings or constructions
- 27/50 . . Anchored foundations
- 27/52 . . Submerged foundations
- 29/00 Underground or underwater structures** (underground tanks [B 65 D 88/76](#); hydraulic engineering, e.g. sealings or joints, [E 02 B](#); underground garages [E 04 H 6/00](#); underground air-raid shelters [E 04 H 9/12](#); burial vaults [E 04 H 13/00](#)); **Retaining walls** [**6**]
- 29/02 . Retaining or protecting walls (piers or quay walls [E 02 B 3/06](#))
- 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 [**6**]
- 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 [**6**]
- 29/055 . . . further excavation of the cross-section proceeding underneath an already installed part of the structure, e.g. the roof of a tunnel [**6**]
- 29/063 . Tunnels submerged into, or built in, open water (construction or placing of caissons in general [23/00](#); joining caissons to each other under water, in general [25/00](#)) [**6**]
- 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 [E 01 D 15/14](#)) [**6**]
- 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 [**6**]
- 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 [29/077](#)) [**6**]
- 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 [**6**]
- 29/09 . Constructions or methods of constructing, in water, not otherwise provided for [**6**]
- 29/12 . Manhole shafts; Other inspection or access chambers; Accessories therefor (for underground tanks [B 65 D 90/10](#); for sewerage [E 03 F 5/02](#)) [**6**]
- 29/14 . . Covers for manholes or the like; Frames for covers [**6**]
- 29/16 . Arrangement or construction of joints in foundation structures (sealing joints not restricted to foundation structures [E 04 B 1/68](#))

**E 02 D, F**

- 31/00 Protective arrangements for foundations or foundation structures; Ground foundation measures for protecting the soil or the subsoil water, e.g. preventing or counteracting oil pollution** (spillage retaining means for tanks [B 65 D 90/24](#))
- 31/02 . . . against ground humidity or ground water
- 31/04 . . . Watertight packings for use under hydraulic pressure
- 31/06 . . . against corrosion by soil or water
- 31/08 . . . against transmission of vibrations or movements in the foundation soil
- 31/10 . . . against soil pressure or hydraulic pressure

- 31/12 . . . against upward hydraulic pressure
- 31/14 . . . against frost heaves in soil [3]

**33/00 Testing foundations or foundation structures** (testing methods or apparatus, see the relevant subclasses of class [G 01](#); testing structures or apparatus as regards function, in general, [G 01 M](#); investigating or analysing materials by determining their chemical or physical properties, in general [G 01 N](#))

**35/00 Straightening, lifting, or lowering of foundation structures or of constructions erected on foundations**

**37/00 Repair of damaged foundations or foundation structures**

**E 02 F DREDGING; SOIL-SHIFTING** (winning peat [E 21 C 49/00](#))**Note**

This subclass covers:

- primarily equipment for excavating or loosening earth or for moving loose earth;
- equipment for working similarly on other materials and similar equipment for loading or unloading materials.

**Subclass Index**

GENERAL WORKING METHODS .....	1/00
HAND-OPERATED MACHINES OR APPARATUS FOR GENERAL USE .....	3/02
MECHANICALLY-DRIVEN MACHINES OR APPARATUS FOR GENERAL USE OR THEIR SPECIAL DETAILS .....	3/04

MACHINES FOR SPECIAL PURPOSES OR THEIR SPECIAL DETAILS .....	5/00
EQUIPMENT FOR CONVEYING OR SEPARATING EXCAVATED MATERIAL .....	7/00
GENERAL DETAILS .....	9/00

- 1/00 General working methods with dredgers or soil-shifting machines** (methods for making embankments [E 02 D 17/18](#); methods for mining [E 21 C](#))
- 3/00 Dredgers; Soil-shifting machines** (for special purposes [5/00](#); other machines or apparatus for mining [E 21 C](#); tunnelling [E 21 D](#))
- 3/02 . . . hand-operated
- 3/04 . . . mechanically-driven
- 3/06 . . . with digging screws
- 3/08 . . . with digging elements on an endless chain (conveyers [B 65 G](#))
- 3/10 . . . with tools that only loosen the material
- 3/12 . . . Component parts
- 3/14 . . . Buckets; Chains; Guides for buckets or chains; Drives for chains
- 3/16 . . . Safety or control devices (safety devices in general [F 16 P](#); controlling in general [G 05](#))
- 3/18 . . . with digging wheels turning round an axis
- 3/20 . . . with tools that only loosen the material
- 3/22 . . . Component parts
- 3/24 . . . Digging wheels; Digging elements of wheels; Drives for wheels

- 3/26 . . . Safety or control devices (safety devices in general [F 16 P](#); controlling in general [G 05](#))
- 3/28 . . . with digging tools mounted on a dipper- or bucket-arm, e.g. dippers, buckets [4]
- 3/30 . . . with a dipper-arm pivoted on a cantilever beam
- 3/32 . . . working downwardly and towards the machine, e.g. with backhoes
- 3/34 . . . with bucket-arms directly pivoted on the frames of tractors or self-propelled machines [4]
- 3/342 . . . Buckets emptying overhead ([3/348](#) to [3/358](#) take precedence) [4]
- 3/345 . . . Buckets emptying side-ways ([3/348](#) to [3/358](#) take precedence) [4]
- 3/348 . . . Buckets emptying into a collecting or conveying device [4]
- 3/352 . . . Buckets movable along a fixed guide [4]
- 3/355 . . . Buckets connected to the rear end of a tractor [4]
- 3/358 . . . Bucket-arms pivoted on a turntable being part of a tractor frame [4]
- 3/36 . . . Component parts
- 3/38 . . . Cantilever beams; Dipper-arms; Bucket-arms [4]
- 3/39 . . . with telescopic arms [4]

- 3/40 . . . . Dippers; Buckets [4]
- 3/407 . . . . . with ejecting device [4]
- 3/413 . . . . . with grabbing device (grab equipment for cranes B 66 C) [4]
- 3/42 . . . . Drives for dippers, buckets, dipper-arms or bucket-arms [4]
- 3/43 . . . . . Control of dipper or bucket position; Control of sequence of drive operations [4]
- 3/46 . . with reciprocating digging or scraping elements moved by cables or hoisting ropes [4]
- 3/47 . . . with grab buckets (grab equipment for cranes B 66 C) [4]
- 3/48 . . . Drag-lines
- 3/50 . . . with buckets or other digging elements moved along a rigid guideway
- 3/52 . . . Cableway excavators (cable cranes B 66 C)
- 3/54 . . . Cable scrapers
- 3/56 . . . . with hand-controlled scraper or other digging elements
- 3/58 . . . Component parts
- 3/60 . . . . Buckets, scrapers, or other digging elements
- 3/627 . . Devices to connect beams or arms to a tractor or similar self-propelled machine [4]
- 3/633 . . . Drives therefor [4]
- 3/64 . . Bucket cars, i.e. having scraper bowls [4]
- 3/65 . . . Component parts, e.g. drives, control devices [4]
- 3/76 . . Graders, bulldozers, or the like with scraper plates or ploughshare-like elements (soil working A 01 B); Levelling devices [4]
- 3/78 . . . with rotating digging elements
- 3/80 . . . Component parts
- 3/815 . . . . Blades; Levelling tools [4]
- 3/84 . . . . Drives or control devices therefor
- 3/85 . . . . . Applications of hydraulic or pneumatic systems
- 3/88 . . with arrangements acting by a sucking or forcing effect, e.g. suction dredgers (pumps in general F 04)
- 3/90 . . . Component parts, e.g. drives, control devices
- 3/92 . . . . Digging elements, e.g. suction heads
- 3/94 . . . . Apparatus for separating stones from the dredged material
- 3/96 . . with arrangements for alternate use of different digging elements
- 5/00 Dredgers or soil-shifting machines for special purposes**
- 5/02 . . for digging trenches or ditches (agricultural ploughs for working ridges A 01 B 13/02)
- 5/04 . . with digging screws
- 5/06 . . with digging elements mounted on an endless chain
- 5/08 . . with digging wheels turning round an axis
- 5/10 . . with arrangements for reinforcing trenches or ditches; with arrangements for making or assembling conduits or for laying conduits or cables (laying pipes per se F 16 L 1/00, making pipes in situ 1/038; laying electric cables per se H 02 G 1/06) [6]
- 5/12 . . with equipment for back-filling trenches or ditches (5/10 takes precedence) [3]
- 5/14 . . Component parts for trench excavators, e.g. indicating devices
- 5/16 . Machines for digging other holes in the soil (earth drilling E 21)
- 5/18 . . for horizontal holes
- 5/20 . . for vertical holes
- 5/22 . . for making embankments; for back-filling (in combination with trench excavators 5/12)
- 5/24 . . Depositing dredged material in mounds
- 5/26 . . Combined conveying-bridges and dredgers
- 5/28 . . for cleaning watercourses or other waters
- 5/30 . Auxiliary apparatus, e.g. for thawing, cracking, blowing-up, or other preparatory treatment of the soil
- 5/32 . . Rippers [4]
- 7/00 Equipment for conveying or separating excavated material** (barges adapted for carrying-away material from floating dredgers B 63 B 35/28)
- 7/02 . Conveying equipment mounted on a dredger (conveyers in general B 65 G)
- 7/04 . Loading devices mounted on a dredger (loading devices in general B 65 G)
- 7/06 . Delivery chutes or screening plants mounted on a dredger (separating equipment in general B 03; delivery chutes in general B 65 G)
- 7/10 . Pipe-lines for conveying excavated materials (pipes in general F 16 L; pipe-line systems F 17 D)
- 9/00 Component parts of dredgers or soil-shifting machines, not restricted to one of the kinds covered by groups 3/00 to 7/00** (laying-out or take-up devices for trailing electric cables B 66 C) [3]
- 9/02 . Travelling gear (for motor vehicles B 60 B, G; undercarriages for locomotives or railroad cars B 61 F; track-laying vehicles B 62 D; for cranes B 66 C)
- 9/04 . . Walking gears moving the dredger forward step-by-step
- 9/06 . Floating substructures as supports
- 9/08 . Superstructures; Supports for superstructures
- 9/10 . . Supports for movable superstructures mounted on travelling or walking gears or on other superstructures
- 9/12 . . . Slewing or traversing gears (roller and ball bearings F 16 C)
- 9/14 . Booms; Cable suspensions
- 9/16 . Cabins, platforms, or the like for the driver (for cranes B 66 C 13/54)
- 9/18 . Counterweights

## E 02 F

- 9/20 . Drives; Control devices (gearing in general [F 16 H](#); controlling in general [G 05](#); electric multi-motor drives [H 02 K, P](#))
- 9/22 . . Hydraulic or pneumatic drives
- 9/24 . Safety devices
- 9/26 . Indicating devices
- 9/28 . Small metalwork for digging elements, e.g. teeth