

**CPC****COOPERATIVE PATENT CLASSIFICATION****F16L****PIPES; JOINTS OR FITTINGS FOR PIPES; SUPPORTS FOR PIPES, CABLES OR PROTECTIVE TUBING; MEANS FOR THERMAL INSULATION IN GENERAL****NOTE**

1. In this subclass, the following terms are used with the meanings indicated:
  - "pipe" means a conduit of closed cross-section, which is specially adapted to convey fluids, materials or objects;
  - "hose" means a pipe, as defined above, which has flexibility as an essential characteristic.
2. Attention is drawn to the following places:
  - [A61M 39/00](#) Tube connectors, tube couplings or branch units, specially adapted for medical use
  - [B05B 1/20](#) Perforated pipes
  - {[B60T 17/04](#) Arrangement of piping or air hoses in brake systems}
  - [B63B 35/03](#) Pipe-laying vessels
  - [B64D 39/04](#) Adaptation of hose constructions for refuelling aircraft during flight
  - {[B65G 51/00](#) Conveying articles through pipes or tubes by fluid flow or pressure}
  - {[B65G 53/00](#) Conveying materials in bulk through pipes or tubes}
  - [B67D 7/38](#) Arrangements of hoses in apparatus for transferring liquids, e.g. fuel, from bulk to vehicles or portable containers
  - [E01D 19/10](#) Fastening of pipes or cables to bridges
  - E03B Water supply installations
  - [E03D 11/17](#) Means for connecting water-closet bowls to the flushing pipe
  - [E03D 11/18](#) Siphons for water-closets
  - [E03F 3/04](#) Pipes or fittings specially adapted to sewers
  - [E04D 13/08](#) Down pipes for roof drainage; Clamping means therefor
  - [E04F 17/00](#) Vertical ducts, channels in buildings, e.g. chimneys
  - [E21F 1/04](#) Air ducts for ventilation of mines or tunnels; Connections therefor
  - [E21F 17/02](#) Suspension devices for tubes or the like in mines or tunnels
  - F01N Gas flow silencers or exhaust apparatus for machines or engines
  - {[F16B 7/00](#) Connections of rods or tubes}
  - [F16N 21/00](#) Conduits, junctions for lubrication systems

**F16L**

(continued)

[F17C 3/02](#) Thermal insulation of vessels not under pressure for storing liquefied or solidified gases, e.g. Dewar flask  
 {[F17D](#) Pipe-line systems, pipe-lines}  
[F22B 37/10](#) Water tubes of steam boilers  
[F23J 13/04](#) Joints, connections for chimneys or flues  
[F24H 9/12](#) Connecting circulation pipes to heaters  
[F28F 9/04](#) Arrangements for sealing elements into header boxes or end plates of heat-exchangers  
[G21C 15/22](#) Structural association of coolant tubes with headers or other pipes in nuclear reactors  
[H02G 3/04](#) Protective tubing or conduits for electric cables  
[H02G 3/26](#) Installations of electric cables or lines, or protective tubing on or in walls, ceilings or floors.

**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:

[F16L 3/21](#) covered by [F16L 3/2053](#), [F16L 3/2056](#);  
[F16L 13/013](#) covered by [F16L 13/007](#);  
[F16L 19/03](#) covered by [F16L 19/0212](#);  
[F16L 59/05](#) covered by [F16L 59/021](#).

**F16L 1/00**

**Laying or reclaiming pipes; Repairing or joining pipes on or under water**  
 (soldering or welding [B23K](#); lifting-gear and load-engaging elements [B66](#); hydraulic installations, soil drainage [E02B](#); excavations or underwater constructions [E02D](#); {conduits made of concrete in situ [E02D 29/10](#)}; machines for digging trenches in combination with pipe-assembly [E02F](#); laying sewer pipes [E03F 3/06](#); in earth boreholes or wells [E21B](#); tunnelling [E21D](#); laying electric, or combined optical and electric, cables [H02G](#); making special pipes joint, see the relevant groups for the joints)

- [F16L 1/024](#) . Laying or reclaiming pipes on land, e.g. above the ground ([F16L 1/12](#) takes precedence)
- [F16L 1/0243](#) .. {above ground ([F16L 1/026](#) takes precedence)}
- [F16L 1/0246](#) ... {at a certain height off the ground}
- [F16L 1/026](#) .. in or on a frozen surface
- [F16L 1/028](#) .. in the ground ([F16L 1/026](#) takes precedence)
- [F16L 1/032](#) ... the pipes being continuous ([F16L 1/038](#) takes precedence)
- [F16L 1/036](#) ... the pipes being composed of sections of short length ([F16L 1/038](#) takes precedence)
- [F16L 1/038](#) ... the pipes being made in situ

- F16L 1/06 . . . Accessories therefor, e.g. anchors
- F16L 1/065 . . . {fixed on or to vehicles}
- F16L 1/09 . . . for bringing two tubular members closer to each other
- F16L 1/10 . . . for aligning
- F16L 1/11 . . . for the detection or protection of pipes in the ground
- F16L 1/12 . . . Laying or reclaiming pipes on or under water (buoyant hoses [F16L 11/133](#))
- F16L 1/123 . . . {Devices for the protection of pipes under water (in general [F16L 57/00](#))}
- F16L 1/126 . . . {on or close to the surface}
- F16L 1/14 . . . between the surface and the bottom
- F16L 1/15 . . . vertically
- F16L 1/16 . . . on the bottom
- F16L 1/161 . . . {the pipe being composed of sections of short length}
- F16L 1/163 . . . {by varying the apparent weight of the pipe during the laying operation}
- F16L 1/165 . . . {by towing the pipe on or near the bottom}
- F16L 1/166 . . . {Reclaiming pipes}
- F16L 1/168 . . . {under ice}
- F16L 1/18 . . . the pipes being S- or J-shaped and under tension during laying
- F16L 1/19 . . . . . the pipes being J-shaped
- F16L 1/20 . . . Accessories therefor, e.g. floats, weights, (buoys [B63B 22/00](#))
- F16L 1/201 . . . {Anchor rods}
- F16L 1/202 . . . {fixed on or to vessels}
- F16L 1/203 . . . . . {the pipes being wound spirally prior to laying}
- F16L 1/205 . . . . . {Pipe-laying ships ([F16L 1/225](#), [F16L 1/23](#) and [F16L 1/235](#) take precedence)}
- F16L 1/206 . . . . . {Apparatus for forming or coating the pipes}
- F16L 1/207 . . . . . {Pipe handling apparatus}
- F16L 1/225 . . . Stingers
- F16L 1/23 . . . Pipe tensioning apparatus
- F16L 1/235 . . . Apparatus for controlling the pipe during laying
- F16L 1/24 . . . Floats; Weights {(salvaging sunken vessels or other underwater objects [B63C 7/00](#); floats per se [B63B 22/00](#))}
- F16L 1/26 . . . Repairing or joining pipes on or under water (buoyant hoses [F16L 11/133](#); joints per se [F16L 13/00](#) to [F16L 49/00](#); {Joining pipes to underwater installations [E21B](#)})
- F16L 1/265 . . . {Underwater vehicles moving on the bottom}
  
- F16L 3/00** **Supports for pipes, cables or protective tubing, e.g. hangers, holders, clamps, cleats, clips, brackets (anchors for holding pipes on or under the ground [F16L 1/06](#); {sound-damping supports [F16L 55/035](#); supports for insulated pipes [F16L 59/135](#))}**
- F16L 3/003 . . . {devices for holding the open end of a hose}
- F16L 3/006 . . . {for pipes with a rectangular cross-section}

- F16L 3/01
  - . for supporting or guiding the pipes, cables or protective tubing, between relatively movable points, e.g. movable channels (hauling- or hoisting-chains with arrangements for holding electric cables, hoses or the like [F16G 13/16](#))
- F16L 3/012
  - .. {using reels (cores for coiled material, e.g. reels, in general [B65H 75/00](#))}
- F16L 3/015
  - .. {using articulated- or supple-guiding elements (arrangements for cranes or means for transmitting pneumatic, hydraulic or electric power to movable parts or devices [B66C 13/12](#))}
- F16L 3/02
  - . partly surrounding the pipes, cables or protective tubing ([bands or chains F16L 3/14](#))
- F16L 3/04
  - .. and pressing it against a wall or other support {(staples [F16B 15/00](#))}
- F16L 3/06
  - .. with supports for wires
- F16L 3/08
  - . substantially surrounding the pipe, cable or protective tubing
- F16L 3/085
  - .. {for pipes being in an angled relationship to each other}
- F16L 3/10
  - .. divided, i.e. with two {or more} members engaging the pipe, cable or protective tubing
- F16L 3/1008
  - ... {with two members engaging the pipe, cable or tubing, both being made of thin band material completely surrounding the pipe ([F16L 3/1033](#) takes precedence)}
- F16L 3/1016
  - .... {the members being joined by means of two screws}
- F16L 3/1025
  - .... {the members being joined by quick acting means}
- F16L 3/1033
  - ... {with two members engaging the pipe, cable or tubing, the two members being joined only on one side of the pipe}
- F16L 3/1041
  - .... {and being adapted to accomodate pipes of various diameters}
- F16L 3/105
  - ... {one member carrying a substantially radial tightening element}
- F16L 3/1058
  - ... {one member being flexible or elastic}
- F16L 3/1066
  - ... {with three or more members surrounding the pipe}
- F16L 3/1075
  - ... {with two members, the two members being joined with a hinge on one side and fastened together on the other side}
- F16L 3/1083
  - ... {with two members, the two members being hooked in on one side and fastened together on the other side}
- F16L 3/1091
  - ... {with two members, the two members being fixed to each other with fastening members on each side}
- F16L 3/11
  - ... and hanging from a pendant ([F16L 3/14](#) takes precedence)
- F16L 3/12
  - .. comprising a member substantially surrounding the pipe, cable or protective tubing
- F16L 3/1203
  - ... {with a pair of arms moved automatically to closed position by overcenter spring}
- F16L 3/1207
  - ... {the ends of the member and the fixing elements being placed on both sides of the pipe}
- F16L 3/1211
  - ... {with a substantially-radial tightening or securing member}
- F16L 3/1215
  - ... {the pipe being fixed by rotation of an element}
- F16L 3/1218
  - ... {the pipe being only supported and not fixed}
- F16L 3/1222
  - ... {the member having the form of a closed ring, e.g. used for the function of two adjacent pipe sections}
- F16L 3/1226
  - ... {elongated supports, e.g. to support a curved pipe}
- F16L 3/123
  - ... and extending along the attachment surface

- F16L 3/1233 . . . . {the member being of metal, with or without an other layer of other material}
- F16L 3/1236 . . . . {the member being of a material other than metal}
- F16L 3/127 . . . and extending away from the attachment surface
- F16L 3/13 . . . and engaging it by snap action {(F16L 3/1203 takes precedence)}
- F16L 3/133 . . . and hanging from a pendant (F16L 3/14 takes precedence)
- F16L 3/137 . . . and consisting of a flexible band
- F16L 3/14 . . Hangers in the form of bands or chains
- F16L 3/16 . . with special provision allowing movement of the pipe (F16L 3/01 takes precedence; supporting pipes or cables inside other pipes or sleeves F16L 7/00)
- F16L 3/18 . . allowing movement in axial direction
- F16L 3/20 . . allowing movement in transverse direction
- F16L 3/202 . . . the transverse movement being converted to a rotational movement (F16L 3/215 takes precedence)
- F16L 3/205 . . . having supporting springs
- F16L 3/2053 . . . . {the axis of each spring being parallel with the direction of the movement of the pipe}
- F16L 3/2056 . . . . {the axis of at least one spring being oblique or perpendicular to the direction of the movement of the pipe}
- F16L 3/21 . . . . providing constant supporting spring force
- F16L 3/215 . . . the movement being hydraulically or electrically controlled
- F16L 3/217 . . . . hydraulically
- F16L 3/22 . . specially adapted for supporting a number of parallel pipes at intervals
- F16L 3/221 . . {having brackets connected together by means of a common support}
- F16L 3/222 . . {having single supports directly connected together}
- F16L 3/223 . . each support having one transverse base for supporting the pipes (F16L 3/23, F16L 3/237 take precedence)
- F16L 3/2235 . . . {each pipe being supported by a common element fastened to the base}
- F16L 3/227 . . . each pipe being supported by a separate element fastened to the base
- F16L 3/23 . . for a bundle of pipes or a plurality of pipes placed side by side in contact with each other (F16L 3/237 takes precedence)
- F16L 3/233 . . . by means of a flexible band
- F16L 3/2332 . . . . {having a single plastic locking barb}
- F16L 3/2334 . . . . . {the barb having a plurality of serrations}
- F16L 3/2336 . . . . {having two or more locking barbs (F16L 3/2338 takes precedence)}
- F16L 3/2338 . . . . {having at least one metal locking barb}
- F16L 3/237 . . for two pipes
- F16L 3/24 . . with a special member for attachment to profiled girders
- F16L 3/26 . . specially adapted for supporting the pipes all along their length, e.g. pipe channels or ducts {(channels for electric cables formed by wire H02G 3/0443)}

**F16L 5/00**      **Devices for use where pipes, cables or protective tubing pass through walls or partitions** ({joining pipes to walls [F16L 41/00](#); joining plastic pipes to walls [F16L 47/26](#); passing insulated pipes through walls [F16L 59/121](#); for steam boilers [F22B 37/105](#)}; arrangements for leading electric cables or lines through walls, floors or ceilings [H02G 3/22](#))

F16L 5/02      .    Sealing

**NOTE**

Group [F16L 5/14](#) takes precedence over groups {[F16L 5/022](#), [F16L 5/025](#), [F16L 5/027](#) and} [F16L 5/04](#) to [F16L 5/12](#).

- F16L 5/022      . .    {by welding}
- F16L 5/025      . .    {the pipe being movable ([F16L 5/10](#) takes precedence)}
- F16L 5/027      . .    {by means of a joint of the quick-acting type}
- F16L 5/04       . .    to form a firebreak device
- F16L 5/06       . .    by means of a swivel nut compressing a ring or sleeve
- F16L 5/08       . .    by means of axial screws compressing a ring or sleeve
- F16L 5/10       . .    by using sealing rings or sleeves only
- F16L 5/12       . .    the pipe being cut in two pieces
- F16L 5/14       . .    for double-walled or multi-channel pipes

**F16L 7/00**      **Supporting of pipes or cables inside other pipes or sleeves, e.g. for enabling pipes or cables to be inserted or withdrawn from under road or railways without interruption of traffic** (sleeves for supporting pipes, cables or protective tubing, between relatively movable points [F16L 3/01](#), {fixation devices of optical cables in ducts [G02B 6/508](#), installation of electric cables [H02G 1/08](#)})

F16L 7/02      .    and sealing the pipes or cables inside the other pipes, cables or sleeves

**Pipes**

**F16L 9/00**      **Rigid pipes** {(steam boiler tubes [F22B 37/10](#))}

- F16L 9/003      .    {with a rectangular cross-section (ducting arrangements in air-conditioning or ventilation [F24F 13/02](#))}
- F16L 9/006      .    {specially profiled ([F16L 9/003](#) takes precedence)}
- F16L 9/01       .    of wood ([F16L 9/16](#) to [F16L 9/22](#) take precedence)
- F16L 9/02       .    of metal ([F16L 9/16](#) to [F16L 9/22](#) take precedence; finned pipes [F28F](#))
- F16L 9/04       . .    Reinforced pipes
- F16L 9/042      . . .    {the reinforcement comprising one or more layers of a helically wound cord, wire or strip ([F16L 9/047](#) takes precedence)}
- F16L 9/045      . . . .    {using profiled strips}
- F16L 9/047      . . .    {comprising reinforcement rings}
- F16L 9/06       . .    Corrugated pipes {(flexible [F16L 11/15](#))}

- F16L 9/08
  - of concrete, cement, or asbestos cement, with or without reinforcement ([F16L 9/16](#) to [F16L 9/22](#) take precedence; {shaping clay or other ceramic compositions, slag or mixtures containing cementitious material [B28B](#)})
- F16L 9/085
  - .. {Reinforced pipes}
- F16L 9/10
  - of glass or ceramics, e.g. clay, clay tile, porcelain ([F16L 9/16](#) to [F16L 9/22](#) take precedence)
- F16L 9/105
  - .. {of glass}
- F16L 9/12
  - of plastics with or without reinforcement ([F16L 9/16](#) to [F16L 9/22](#) take precedence)
- F16L 9/121
  - .. {with three layers}
- F16L 9/123
  - .. {with four layers}
- F16L 9/125
  - .. {electrically conducting}
- F16L 9/127
  - .. the walls consisting of a single layer
- F16L 9/128
  - ... Reinforced pipes
- F16L 9/133
  - .. the walls consisting of two layers
- F16L 9/14
  - Compound tubes, i.e. made of materials not wholly covered by any one of the preceding groups ([F16L 9/16](#) to [F16L 9/22](#) take precedence)
- F16L 9/147
  - .. comprising only layers of metal and plastics with or without reinforcement
- F16L 9/153
  - .. comprising only layers of metal and concrete with or without reinforcement
- F16L 9/16
  - wound from sheets or strips, with or without reinforcement ({(making wound paper articles [B31C](#))})
- F16L 9/165
  - .. {of metal}
- F16L 9/17
  - obtained by bending a sheet longitudinally and connecting the edges
- F16L 9/18
  - Double-walled pipes; Multi-channel pipes or pipe assemblies ([joints therefor F16L 39/00](#))
- F16L 9/19
  - .. Multi-channel pipes or pipe assemblies
- F16L 9/20
  - .. Pipe assemblies
- F16L 9/21
  - made of sound-absorbing materials or with sound-absorbing structure
- F16L 9/22
  - Pipes composed of a plurality of segments
- F16L 11/00**
  - Hoses, i.e. flexible pipes** (hose-like supports for pipes, cables or protective tubing, between relatively movable points [F16L 3/01](#); suction-cleaner hoses [A47L 9/24](#))
- F16L 11/005
  - {consisting completely or partially of material other than fibres, plastics or metal}
- F16L 11/02
  - made of fibres or threads, e.g. of textile {which may or may not be impregnated, or provided with an impermeable layer, e.g. fire-hoses}
- F16L 11/04
  - made of rubber or flexible plastics
- F16L 11/042
  - .. {formed by bending a sheet and connecting the edges (covers for the protection of the insulation [F16L 59/10](#); Rigid pipes [F16L 9/17](#))}
- F16L 11/045
  - .. {with four or more layers without reinforcement}
- F16L 2011/047
  - .. {with a diffusion barrier layer}
- F16L 11/06
  - .. with homogeneous wall ([F16L 11/11](#) takes precedence)
- F16L 11/08
  - .. with reinforcements embedded in the wall ([F16L 11/11](#) takes precedence)

F16L 11/081	...	{comprising one or more layers of a helically wound cord or wire (in combination with braided layers <a href="#">F16L 11/088</a> )}
F16L 11/082	....	{two layers}
F16L 11/083	....	{three or more layers}
F16L 11/085	...	{comprising one or more braided layers (in combination with layers of a helically wound core or wire <a href="#">F16L 11/088</a> )}
F16L 11/086	....	{two layers}
F16L 11/087	....	{three or more layers}
F16L 11/088	...	{comprising a combination of one or more layers of a helically wound cord or wire with one or more braided layers}
F16L 11/10	..	with reinforcements not embedded in the wall ( <a href="#">F16L 11/11</a> takes precedence)
F16L 11/11	..	with corrugated wall {( <a href="#">F16L 11/24</a> takes precedence)}
F16L 11/111	...	{with homogeneous wall}
F16L 11/112	...	having reinforcements embedded in the wall
F16L 11/115	...	having reinforcements not embedded in the wall
F16L 11/118	...	having arrangements for particular purposes, e.g. electrically conducting
F16L 11/1185	....	{electrically conducting}
F16L 11/12	..	with arrangements for particular purposes, e.g. specially profiled, with protecting layer, heated, electrically conducting ( <a href="#">F16L 11/11</a> takes precedence)
F16L 11/121	...	{specially profiled cross sections}
F16L 11/122	...	{Hoses provided with integrated fixing means, e.g. hooks}
F16L 11/124	...	{Distinguishing marks for hoses}
F16L 11/125	...	{non-inflammable or heat-resistant hoses}
F16L 11/127	...	electrically conducting
F16L 11/133	...	buoyant
F16L 11/14	.	made of rigid material, e.g. metal or hard plastics
F16L 11/15	..	corrugated ( <a href="#">F16L 11/16</a> takes precedence)
F16L 11/16	..	wound from profiled strips or bands
F16L 11/18	..	Articulated hoses, e.g. composed of a series of rings.
F16L 11/20	.	Double-walled hoses, {i.e. two concentric hoses}
F16L 11/22	.	Multi-channel hoses
F16L 11/24	.	wound from strips or bands ( <a href="#">F16L 11/16</a> takes precedence)
F16L 11/26	.	made of sound-absorbing materials or with sound-absorbing structure

**Pipe joints; Hose nipples** ({hose connections for pneumatic tyre valves [B60C 29/066](#); } special adaptations of pipe joints for use with watercloset bowls [E03D 11/13](#); {for steam boilers [F22B 37/107](#)})

<b>F16L 13/00</b>	<b>Non-disconnectible pipe-joints, e.g. soldered, adhesive or caulked joints</b> (joints for rigid pipes of plastics <a href="#">F16L 47/00</a> ; {non-disconnectible pipe-joints to walls or other pipes, the joined pipe axis being perpendicular to the plane of the wall or to the axis of the other pipe <a href="#">F16L 41/082</a> })
F16L 13/002	. {for pipes having a rectangular cross-section}



- F16L 13/004 . {Shrunk pipe-joints}
- F16L 13/007 . specially adapted for joining pipes of dissimilar materials {(disconnectible joints for pipes of dissimilar materials [F16L 25/0072](#); joints between metal and plastic pipes [F16L 47/24](#))}
- F16L 13/013 . . Accessories therefor
- F16L 13/02 . Welded joints {(arc welding curved planar seams [B23K 9/028](#))}
- F16L 13/0209 . . {Male-female welded joints ([F16L 13/0245](#) and [F16L 13/0254](#) take precedence)}
- F16L 13/0218 . . {having an inner or outer ring ([F16L 13/0245](#) and [F16L 13/0254](#) take precedence)}
- F16L 13/0227 . . . {having an inner ring}
- F16L 13/0236 . . . {having an outer ring}
- F16L 13/0245 . . {with holes in the sleeve or spigot being filled with weld}
- F16L 13/0254 . . {the pipes having an internal or external coating}
- F16L 13/0263 . . . {having an internal coating}
- F16L 13/0272 . . . {having an external coating}
- F16L 13/0281 . . {cold welded (non-electric welding without the application of heat [B23K 20/00](#))}
- F16L 13/029 . . {for concrete pipes}
- F16L 13/04 . . with arrangements for preventing over-stressing
- F16L 13/06 . . . with tension relief of the weld by means of detachable members, e.g. divided tension rings, bolts in flanges
- F16L 13/08 . Soldered joints {(specially adapted for connecting metal hoses to rigid members [F16L 33/26](#); soldering metal [B23K 1/00](#))}
- F16L 13/10 . Adhesive or cemented joints
- F16L 13/103 . . {Adhesive joints (for hoses [F16L 33/34](#))}
- F16L 13/106 . . {Tools}
- F16L 13/11 . . using materials which fill the space between parts of a joint before hardening
- F16L 13/113 . . . {for concrete pipes}
- F16L 13/116 . . . {for socket pipes}
- F16L 13/12 . with a seal made of lead, caulked packing, or the like
- F16L 13/122 . . {for male-female connections ([F16L 13/124](#) and [F16L 13/126](#) take precedence)}
- F16L 13/124 . . {for concrete pipes}
- F16L 13/126 . . {Attachments}
- F16L 13/128 . . {Tools}
- F16L 13/14 . made by plastically deforming the material of the pipe, e.g. by flanging, rolling {(working of metal tubes without essentially removing material [B21D](#))}
- F16L 13/141 . . {by crimping or rolling from the outside}
- F16L 13/142 . . . {with a sealing element inserted into the female part before crimping or rolling}
- F16L 13/143 . . . {with a sealing element placed around the male part before crimping or rolling}
- F16L 2013/145 . . {Tools specially adapted therefor}
- F16L 13/146 . . {by an axially moveable sleeve}
- F16L 13/147 . . {by radially expanding the inner part ([F16L 13/168](#) and [E21B 43/103](#) take precedence)}
- F16L 13/148 . . {specially designed to ensure an intended leakage until correct deformation}

- F16L 13/16 . . the pipe joint consisting of overlapping extremities having mutually co-operating collars
- F16L 13/161 . . . {the pipe or collar being deformed by crimping or rolling}
- F16L 13/163 . . . . {one collar being bent over the other}
- F16L 13/165 . . . {the pipe or collar being deformed by an axially movable sleeve}
- F16L 13/166 . . . {Deformed by radially expanding an inner part ([F16L 13/168](#) takes precedence)}
- F16L 13/168 . . . {for screw threaded pipes ([E21B 43/103](#) takes precedence)}

**F16L 15/00**

**Screw-threaded joints** ({hose connections with parts screwed directly on or into the hose [F16L 33/24](#); joining pipes to wall [F16L 41/00](#)}; casing joints used in deep-drilling [E21B 17/08](#); joints sealed primarily by means other than engagement of screw-threads, see the relevant groups characterised by the sealing arrangements); **Forms of screw-threads for such joints**

- F16L 15/001 . {with conical threads}
- F16L 15/002 . . {with more than one threaded section}
- F16L 15/003 . . {with sealing rings}
- F16L 15/004 . . {with axial sealings having at least one plastically deformable sealing surface (with sealing rings [F16L 15/003](#))}
- F16L 15/005 . {for thin-walled pipes having at least their extremities deformed so as to have the shape of screw-threads}
- F16L 15/006 . {with straight threads}
- F16L 15/007 . . {with more than one threaded section}
- F16L 15/008 . . {with sealing rings}
- F16L 15/009 . . {with axial sealings having at least one plastically deformable sealing surface (with sealing rings [F16L 15/008](#))}
- F16L 15/02 . allowing substantial longitudinal adjustment by use of a long screw-threaded part
- F16L 15/04 . with additional sealings
- F16L 15/06 . characterised by the shape of the screw-thread
- F16L 15/08 . with supplementary elements ([F16L 15/04](#), {[F16L 41/00](#) and [F16L 43/02](#)} take precedence)

**F16L 17/00**

**Joints with packing adapted to sealing by fluid pressure** ({for universal joints with partly spherical engaging surfaces [F16L 27/067](#); joints allowing adjustment or movement only about the axis of one pipe [F16L 27/08](#); joints comprising a flexible connection only [F16L 27/10](#); joints allowing substantial longitudinal adjustment or movement [F16L 27/12](#); for hoses [F16L 33/16](#); couplings of the quick acting type [F16L 37/00](#)}; compensating devices [F16L 51/00](#); sealings tightened by external pressure, inflatable packings [F16J 15/00](#))

- F16L 17/02 . with sealing rings arranged between outer surface of pipe and inner surface of sleeve or socket
- F16L 17/025 . . the sealing rings having radially directed ribs
- F16L 17/03 . . having annular axial lips
- F16L 17/032 . . . the sealing rings having only one lip
- F16L 17/035 . . . the sealing rings having two lips parallel to each other
- F16L 17/04 . . with longitudinally split or divided sleeve

- F16L 17/06
  - with sealing rings arranged between the end surfaces of the pipes or flanges or arranged in recesses in the pipe ends or flanges
- F16L 17/063
  - .. {forming a whole with the pipe or joint (for screw-threaded joint [F16L 15/06](#))}
- F16L 17/067
  - .. Plastics sealing rings
- F16L 17/073
  - ... the sealing rings having two lips parallel to each other
- F16L 17/08
  - .. Metal sealing rings
- F16L 17/10
  - the packing being sealed by the pressure of a fluid other than the fluid in or surrounding the pipe ([expansion-compensation arrangements for pipe-lines F16L 51/00](#))
  
- F16L 19/00**

**Joints in which sealing surfaces are pressed together by means of a member, e.g. a swivel nut, screwed on or into one of the joint parts** ({[screw-threaded joints F16L 15/00](#); [F16L 17/00](#) takes precedence; if using bolts or equivalent connecting means [F16L 23/00](#); {electrically insulating [F16L 25/02](#); adjustable joints, joints allowing movement [F16L 27/00](#); specially adapted for pipes of brittle material [F16L 49/06](#)})
- F16L 19/005
  - {[comprising locking means for the threaded member \(locking of screws or nuts per se \[F16B 39/00\]\(#\)\)](#)}
- F16L 19/02
  - Pipe ends provided with collars or flanges, integral with the pipe or not, pressed together by a screwed member
- F16L 19/0206
  - .. {the collar not being integral with the pipe}
- F16L 19/0212
  - .. {using specially adapted sealing means}
- F16L 19/0218
  - ... {comprising only sealing rings}
- F16L 19/0225
  - ... {without sealing rings}
- F16L 19/0231
  - .. {with specially adapted means for positioning the threaded member behind the collar}
- F16L 19/0237
  - .. {specially adapted for use with attachments, e.g. reduction units, T-pieces, bends or the like ([branch units per se F16L 41/02](#); [bends per se F16L 43/00](#); [pipe units with cleaning aperture per se F16L 45/00](#))}
- F16L 19/0243
  - .. {specially adapted for use with coated pipes}
- F16L 19/025
  - .. the pipe ends having integral collars or flanges
- F16L 19/028
  - ... the collars or flanges being obtained by deformation of the pipe wall
- F16L 19/0283
  - .... {and having a bell-mouthed shape}
- F16L 19/0286
  - .... {and being formed as a flange}
- F16L 19/04
  - using additional rigid rings, sealing directly on at least one pipe end, which is flared either before or during the making of the connection
- F16L 19/041
  - .. {the ring being an insert ([F16L 19/043](#) takes precedence)}
- F16L 19/043
  - .. {with additional sealing means}
- F16L 19/045
  - ... {consisting of cutting edges on one of the connecting parts which penetrate into the wall of the pipe}
- F16L 19/046
  - ... {consisting of a soft ring}
- F16L 19/048
  - .. {specially adapted for use with attachments, e.g. reduction units, T-pieces, bends or the like ([branch units per se F16L 41/02](#); [bends per se F16L 43/00](#); [pipe units with cleaning aperture per se F16L 45/00](#))}
- F16L 19/05
  - .. with a rigid pressure ring between the screwed member and the exterior of the flared pipe end

- F16L 19/055 . . . {the pressure ring being rotatably connected to the threaded member}
- F16L 19/06 . in which radial clamping is obtained by wedging action on non-deformed pipe ends
- F16L 19/061 . . {a pressure ring being arranged between the clamping ring and the threaded member or the connecting member}
- F16L 19/062 . . {specially adapted for use with attachments, e.g. reduction units, T-pieces, bends or the like (branch units per se [F16L 41/02](#); bends per se [F16L 43/00](#); pipe units with cleaning aperture per se [F16L 45/00](#))}
- F16L 19/063 . . {by means of conical threaded surfaces}
- F16L 19/065 . . the wedging action being effected by means of a ring
- F16L 19/0653 . . . {the ring being rotatably connected to one of the connecting parts}
- F16L 19/0656 . . . {integral with one of the connecting parts}
- F16L 19/07 . . adapted for use in socket or sleeve connections
- F16L 19/075 . . specially adapted for spigot-and-socket joints {for pipes of the same diameter}
- F16L 19/08 . with metal rings which bite into the wall of the pipe {([F16L 19/045](#) takes precedence)}
- F16L 19/083 . . {the longitudinal cross-section of the ring not being modified during clamping}
- F16L 19/086 . . . {with additional sealing means}
- F16L 19/10 . . the profile of the ring being altered
- F16L 19/103 . . . {with more than one ring per pipe end being used}
- F16L 19/106 . . . {the ring comprising a shoulder against which the pipe end abuts}
- F16L 19/12 . . . with additional sealing means
- F16L 19/14 . . . the rings being integral with one of the connecting parts
  
- F16L 21/00** **Joints with sleeve or socket** ([F16L 13/00](#), {[F16L 15/00](#)}, [F16L 17/00](#), [F16L 19/00](#), {[F16L 25/0027](#), [F16L 27/00](#), [F16L 37/00](#)} take precedence; {specially adapted to be made of plastics or to be used with pipes made of plastics [F16L 47/06](#); specially adapted for pipes of brittle material [F16L 49/08](#); devices for covering leaks in pipes or hoses [F16L 55/16](#))}
- F16L 21/002 . {Sleeves or nipples for pipes of the same diameter; Reduction pieces (with elastic sealing rings [F16L 21/022](#))}
- F16L 21/005 . . {made of elastic material, e.g. partly or completely surrounded by clamping devices (comprising packing adapted to sealing by fluid pressure [F16L 17/04](#), [F16L 11/20](#); hose clips [F16L 33/02](#))}
- F16L 21/007 . {clamped by a wedging action}
- F16L 21/02 . with elastic sealing rings between pipe and sleeve or between pipe and socket, e.g. with rolling or other prefabricated profiled rings ([F16L 21/06](#), [F16L 21/08](#) take precedence; {sealing ring with radial ribs [F16L 17/025](#); sealing ring with axial lips [F16L 17/03](#); if adjustability is essential [F16L 27/00](#))}
- F16L 21/022 . . {used with sleeves or nipples for pipes of the same diameter, or with reduction pieces ([F16L 21/025](#) takes precedence)}
- F16L 21/025 . . Rolling sealing rings
- F16L 21/03 . . placed in the socket before connection ({[F16L 21/022](#),} [F16L 21/025](#) take precedence)
- F16L 21/035 . . placed around the spigot end before connection ({[F16L 21/022](#),} [F16L 21/025](#) take precedence)

- F16L 21/04
  - .. in which sealing rings are compressed by axially-movable members [{\(for joints using a threaded member F16L 19/07; quick acting couplings F16L 37/00; devices for covering leaks from inside a pipe F16L 55/162\)}](#)
- F16L 21/045
  - ... [{the members passing through the sealing rings}](#)
- F16L 21/05
  - .. comprising a first ring being placed on a male part and a second ring in the sleeve or socket
- F16L 21/06
  - .. with a divided sleeve or ring clamping around the pipe-ends [\(flanged joints F16L 23/00; couplings of the quick-acting type F16L 37/00\)](#)
- F16L 21/065
  - .. [{tightened by tangentially-arranged threaded pins}](#)
- F16L 21/08
  - .. with additional locking means [\({F16L 17/035, F16L 17/04, F16L 21/04}, F16L 21/06 take precedence; {screwed joints F16L 19/08}; couplings of the quick-acting type F16L 37/00\)](#)
- F16L 23/00**

**Flanged joints** [\(F16L 13/00, F16L 17/00, F16L 19/00 take precedence; adjustable joints F16L 27/00; for hoses F16L 33/00; couplings of the quick-acting type F16L 37/00; for double-walled or multi-channel pipes or assemblies F16L 39/00; specially adapted for pipes of brittle material pipe F16L 49/00\)](#)
- F16L 23/003
  - .. [{Auxiliary devices}](#)
- F16L 23/006
  - .. [{Attachments}](#)
- F16L 23/02
  - .. the flanges being connected by members tensioned axially [\(F16L 23/12 takes precedence\)](#)
- F16L 23/024
  - .. characterised by how the flanges are joined to, or from an extension of, the pipes
- F16L 23/026
  - ... by welding
- F16L 23/028
  - ... the flanges being held against a shoulder
- F16L 23/0283
  - .... [{the collar being integral with the pipe}](#)
- F16L 23/0286
  - .... [{the shoulder not being formed from the pipe}](#)
- F16L 23/032
  - .. characterised by the shape or composition of the flanges
- F16L 23/036
  - .. characterised by the tensioning members, e.g. specially adapted bolts or C-clamps
- F16L 23/04
  - .. the flanges being connected by members tensioned in the radial plane [\(F16L 23/12 takes precedence\)](#)
- F16L 23/06
  - .. connected by toggle-action levers [\(quick acting couplings tightened by toggle-action levers F16L 37/20\)](#)
- F16L 23/08
  - .. connection by tangentially arranged pin and nut
- F16L 23/10
  - ... with a pivoting or swinging pin
- F16L 23/12
  - .. specially adapted for particular pipes
- F16L 23/125
  - .. [{with an internal or external coating}](#)
- F16L 23/14
  - .. for rectangular pipes
- F16L 23/16
  - .. characterised by the sealing means
- F16L 23/162
  - .. [{the pipe ends abutting each other}](#)
- F16L 23/165
  - .. [{comprising a viscous mass, e.g. hardenable}](#)
- F16L 23/167
  - .. [{in connection with the appearance or detection of leaks}](#)
- F16L 23/18
  - .. the sealing means being rings
- F16L 23/20
  - ... made exclusively of metal
- F16L 23/22
  - ... made exclusively of a material other than metal

F16L 23/24

- .. specially adapted for unequal expansion of the parts of the joint

**F16L 25/00**

**Constructive types of pipe joints not provided for in groups [F16L 13/00](#) to [F16L 23/00](#) (adjustable joints [F16L 27/00](#); couplings of the quick-acting type [F16L 37/00](#); specially adapted to be made of plastics or to be used with pipes made of plastics [F16L 47/00](#) ) {Details of pipe joints not otherwise provided for, e.g. electrically conducting or insulating means}**

F16L 25/0009

- . {Joints for pipes with a square or rectangular cross-section}

F16L 25/0018

- . {Abutment joints}

F16L 25/0027

- . {Joints for pipes made of reinforced concrete}

F16L 25/0036

- . {Joints for corrugated pipes}

F16L 25/0045

- .. {of the quick-acting type}

F16L 25/0054

- .. {with specially shaped sealing rings}

F16L 25/0063

- .. {with two corrugated pipes being directly connected to each other}

F16L 25/0072

- . {Joints for pipes of dissimilar materials (non-disconnectible joints for pipes of dissimilar materials [F16L 13/007](#); joints between metal and plastic pipes [F16L 47/24](#))}

F16L 25/0081

- . {Pipe joints comprising a liquid or fusible seal}

F16L 25/009

- . {Combination of a quick-acting type coupling and a conventional one}

F16L 25/01

- . specially adapted for realising electrical conduction between the two pipe ends of the joint or between parts thereof (electrically-conductive connections between or with tubular conductors [H01R 4/60](#))

F16L 25/02

- . Electrically insulating joints or couplings ([F16L 47/00](#) takes precedence; insulating bodies in general [H01B](#))

F16L 25/021

- .. {for screw-threaded joints}

F16L 25/023

- .. {for joints in which sealing surfaces are pressed together by means of a member, e.g. a swivel nut, screwed on or into one of the joint parts}

F16L 25/025

- .. {for joints with sleeve or socket}

F16L 25/026

- .. {for flanged joints}

F16L 25/028

- .. {for branching pipes, for joining pipes to walls}

F16L 25/03

- .. in non-disconnectable pipe joints

F16L 25/04

- . comprising a collar or ring having a threaded pin rigid with the pipe-encircling member

F16L 25/06

- . comprising radial locking means

F16L 25/065

- .. {the locking means being actuated by radial screws}

F16L 25/08

- .. in the form of screws, nails or the like

F16L 25/10

- . Sleeveless joints between two pipes, one being introduced into the other

F16L 25/12

- . Joints for pipes being spaced apart axially

F16L 25/14

- . Joints for pipes of different diameters or cross-section

**F16L 27/00**

**Adjustable joints, Joints allowing movement** (of the quick-acting type [F16L 37/50](#); for double-walled or multi-channel pipe assemblies [F16L 39/04](#); {connecting arrangements or other fittings specially adapted to be made of plastics or to be used with pipes made of plastics [F16L 47/00](#); connecting arrangements specially adapted for pipes of brittle material [F16L 49/00](#)})

- F16L 27/02 . Universal joints, i.e. with mechanical connection allowing angular movement or adjustment of the axes of the parts in any direction [{\(articulated hoses made of rigid material F16L 11/18\)}](#)
- F16L 27/023 . . {Universal and rotating joints}
- F16L 27/026 . . {Universal and axially displaceable joints}
- F16L 27/04 . . with partly spherical engaging surfaces [{\(with, between the surfaces, a flexible element which undergoes shear and flexure F16L 27/103\)}](#)
- F16L 27/042 . . . {comprising two pipes normally at right angles to each other}
- F16L 27/044 . . . {specially adapted for tubing between vehicles}
- F16L 27/047 . . . held in place by a screwed member having an internal spherical surface
- F16L 27/053 . . . held in place by bolts passing through flanges
- F16L 27/06 . . . with special sealing means between the engaging surfaces
- F16L 27/067 . . . . the sealing means being actuated by the medium pressure
- F16L 27/073 . . . . one of the co-operating surfaces forming the sealing means
- F16L 27/08 . . Allowing adjustment or movement only about the axis of one pipe [{\(Swivel joints in hose lines for flushing boreholes E21B 21/02\)}](#)
- F16L 27/0804 . . {the fluid passing axially from one joint element to another}
- F16L 27/0808 . . . {the joint elements extending coaxially for some distance from their point of separation}
- F16L 27/0812 . . . . {with slide bearings}
- F16L 27/0816 . . . . . {having radial sealing}
- F16L 27/082 . . . . . {having axial sealing}
- F16L 27/0824 . . . . {with ball or roller bearings}
- F16L 27/0828 . . . . . {having radial bearings [\(connections of quick-acting couplings maintained by balls or rollers under radial pressure F16L 37/22\)](#)}
- F16L 27/0832 . . . . . {having axial bearings}
- F16L 27/0837 . . . {the joint elements being bends}
- F16L 27/0841 . . . . {forming an angle of less than 90 degrees}
- F16L 27/0845 . . . . {forming an angle of 90 degrees}
- F16L 27/0849 . . {the fluid being turned through an angle when passing from one joint element to another}
- F16L 27/0853 . . . {with spherical hinge}
- F16L 27/0857 . . . {with hinge and bellows sealing}
- F16L 27/0861 . . {Arrangements of joints with one another and with pipes or hoses}
- F16L 27/0865 . . . {between vehicles}
- F16L 27/087 . . Joints with radial fluid passages
- F16L 27/093 . . . of the "banjo" type, i.e. pivoting right-angle couplings
- F16L 27/10 . . comprising a flexible connection only, [{e.g. for damping vibrations}](#)
- F16L 27/1004 . . {introduced in exhaust pipes for hot gases}
- F16L 27/1008 . . {comprising a swivel nut or collar engaging the pipe}
- F16L 27/1012 . . {Flanged joints}
- F16L 27/1017 . . {Joints with sleeve or socket}



- F16L 27/1021 . . {comprising an intermediate resilient element, e.g. a ring}
- F16L 27/1025 . . {Abutment joints}
- F16L 27/103 . . in which a flexible element, e.g. a rubber-metal laminate, which undergoes constraints consisting of shear and flexure, is sandwiched between partly curved surfaces
- F16L 27/107 . . the ends of the pipe being interconnected by a flexible sleeve
- F16L 27/108 . . . the sleeve having the form of a bellows with only one corrugation
- F16L 27/1085 . . . {the bellows being externally or internally reinforced}
- F16L 27/11 . . . the sleeve having the form of a bellows with multiple corrugations
- F16L 27/111 . . . the bellows being reinforced
- F16L 27/113 . . the ends of the pipe being interconnected by a rigid sleeve
- F16L 27/1133 . . {the sleeve being longitudinally divided}
- F16L 27/1136 . . {the sleeve comprising a screwed member}
- F16L 27/12 . allowing substantial longitudinal adjustment or movement (by use of screw-thread [F16L 15/02](#))
- F16L 27/125 . . {having axial and rotary movement}
  
- F16L 29/00** **Joints with fluid cut-off means** (quick-acting joints with cut-off means [F16L 37/28](#); {valves, taps or cocks in general [F16K](#)})
- F16L 29/002 . {joints with taps (taps in general [F16K 5/00](#))}
- F16L 29/005 . {joints with cut-off devices which can be perforated (cut-off devices with a breakable closure member in general [F16K 13/04](#))}
- F16L 29/007 . {Joints with cut-off devices controlled separately (takes precedence; operating means for cut-off devices in general [F16K 31/00](#))}
- F16L 29/02 . with a cut-off device in one of the two pipe ends, the cut-off device being automatically opened when the coupling is applied {(screw joints without cut-off devices [F16L 19/00](#))}
- F16L 29/04 . with a cut-off device in each of the two pipe ends, the cut-off devices being automatically opened when the coupling is applied {(screw joints without cut-off devices [F16L 19/00](#))}
  
- F16L 31/00** **Arrangement for connecting hoses to one another or to flexible sleeves** ([F16L 33/00](#) takes precedence)
- F16L 31/02 . for branching hoses
  
- F16L 33/00** **Arrangements for connecting hoses to rigid members** (hand tools for inserting fittings into hoses [B25B 27/10](#)); **Rigid hose connectors, i.e. single members engaging both hoses** {(hoses or hose couplings specially adapted for suction cleaners [A47L 9/24](#))}
- F16L 33/003 . {comprising elements arranged in the hose walls}
- F16L 33/006 . {for hoses of plastics other than artificial rubber}
- F16L 33/01 . adapted for hoses having a multi-layer wall
- F16L 33/02 . Hose-clips {(covering leaks in pipes or hoses [F16L 55/16](#))}
- F16L 33/021 . . {with the ends bent around each other}
- F16L 33/023 . . {fixed by bending one end of the strap}



F16L 33/025	..	tightened by deforming radially extending loops or folds
F16L 33/03	..	Self-locking elastic clips
F16L 33/035	..	fixed by means of teeth or hooks
F16L 33/04	..	tightened by tangentially-arranged threaded pin and nut
F16L 33/06	...	in which the threaded pin is rigid with the hose-encircling member
F16L 33/08	..	in which a worm coacts with a part of the hose-encircling member that is toothed like a worm-wheel
F16L 33/085	...	{with a scroll-type screw}
F16L 33/10	..	with a substantially-radial tightening member
F16L 33/12	..	with a pivoted or swinging tightening or securing member, e.g. toggle lever
F16L 33/14	..	with a taping-bolt, i.e. winding up the end of the hose-encircling member
F16L 33/16	.	with sealing or securing means using fluid pressure
F16L 33/18	.	characterised by the use of additional sealing means
F16L 33/20	.	Undivided rings, sleeves or like members contracted on the hose or expanded in the hose by means of tools; Arrangements using such members
F16L 33/207	..	only a sleeve being contracted on the hose
F16L 33/2071	...	{the sleeve being a separate connecting member}
F16L 33/2073	....	{directly connected to the rigid member}
F16L 33/2075	.....	{by quick acting}
F16L 33/2076	.....	{by plastic deformation}
F16L 33/2078	....	{connected to the rigid member via an intermediate element}
F16L 33/213	..	only a sleeve being expanded inside the hose
F16L 33/22	.	with means not mentioned in the preceding groups for gripping the hose between inner and outer parts
F16L 33/221	..	{the external piece comprising segments hingedly connected to an interior part}
F16L 33/222	..	{the external piece comprising segments pressed against the hose by wedge shaped elements}
F16L 33/223	..	{the sealing surfaces being pressed together by means of a member, e.g. a swivel nut, screwed on or into one of the joint parts}
F16L 33/224	...	{a clamping ring being arranged between the threaded member and the connecting member}
F16L 33/225	..	{a sleeve being movable axially}
F16L 33/226	...	{the sleeve being screwed over the hose}
F16L 33/227	..	{the hose being introduced into or onto the connecting member and automatically locked (F16L 37/084 takes precedence)}
F16L 33/228	..	{a flexible wire being coiled upon the hose}
F16L 33/23	..	the outer parts being segmented, the segments being pressed against the hose by tangentially arranged members
F16L 33/24	.	with parts screwed directly on or into the hose (F16L 33/22 takes precedence)
F16L 33/245	..	{the inner or outer part being moulded in situ}
F16L 33/26	.	specially adapted for hoses of metal
F16L 33/28	.	for hoses with one end terminating in a radial flange or collar

F16L 33/30	<ul style="list-style-type: none"> <li>comprising parts inside the hoses only (<a href="#">F16L 33/24 takes precedence</a>)</li> </ul>
F16L 33/32	<ul style="list-style-type: none"> <li>comprising parts outside the hoses only (<a href="#">F16L 33/24 takes precedence</a>)</li> </ul>
F16L 33/34	<ul style="list-style-type: none"> <li>with bonding obtained by vulcanisation, gluing, melting, or the like</li> </ul>
<b>F16L 35/00</b>	<b>Special arrangements used in connection with end fittings of hoses, e.g. safety or protecting devices</b>
F16L 35/005	<ul style="list-style-type: none"> <li>{Nozzles}</li> </ul>
<b>F16L 37/00</b>	<b>Couplings of the quick-acting type</b> ( <a href="#">radially binding sleeves F16L 17/04</a> , <a href="#">F16L 21/06</a> ; <a href="#">connecting hoses to rigid members F16L 33/00</a> ; <a href="#">connections made automatically when vehicles are brought together B60D, B61G</a> ; <a href="#">specially adapted for lubricating devices F16N 21/00</a> )
F16L 37/002	<ul style="list-style-type: none"> <li>{which can be controlled at a distance}</li> </ul>
F16L 37/004	<ul style="list-style-type: none"> <li>{using magnets}</li> </ul>
F16L 37/006	<ul style="list-style-type: none"> <li>{plug-cocks}</li> </ul>
F16L 37/008	<ul style="list-style-type: none"> <li>{for branching pipes; for joining pipes to walls}</li> </ul>
F16L 37/02	<ul style="list-style-type: none"> <li>in which the connection is maintained only by friction of the parts being joined (<a href="#">F16L 37/22 takes precedence</a>)</li> </ul>
F16L 37/025	<ul style="list-style-type: none"> <li>.. {with an inner elastic part pressed against an outer part by reason of its elasticity}</li> </ul>
F16L 37/04	<ul style="list-style-type: none"> <li>.. with an elastic outer part pressing against an inner part by reason of its elasticity (<a href="#">with locking members F16L 37/08</a>)</li> </ul>
F16L 37/05	<ul style="list-style-type: none"> <li>... tightened by the pressure of a mechanical element</li> </ul>
F16L 37/06	<ul style="list-style-type: none"> <li>... tightened by fluid pressure</li> </ul>
F16L 37/08	<ul style="list-style-type: none"> <li>in which the connection between abutting or axially overlapping ends is maintained by locking members (<a href="#">F16L 37/22 to F16L 37/26 take precedence</a>)</li> </ul>
F16L 37/082	<ul style="list-style-type: none"> <li>.. {using an element which is hinged on one end of the pipe-ends and which is maintained in locked position by a screw tightened against the other pipe-end}</li> </ul>
F16L 37/084	<ul style="list-style-type: none"> <li>.. combined with automatic locking (<a href="#">F16L 37/22 takes precedence</a>)</li> </ul>
F16L 37/0841	<ul style="list-style-type: none"> <li>... {by means of a transversally slidable locking member surrounding the tube}</li> </ul>
F16L 37/0842	<ul style="list-style-type: none"> <li>... {by means of a ring which is split into a plurality of component parts which are held in place by means of a resilient ring member}</li> </ul>
F16L 37/0844	<ul style="list-style-type: none"> <li>... {by means of a ring pivoting so as to lie against the tube}</li> </ul>
F16L 37/0845	<ul style="list-style-type: none"> <li>... {by means of retaining members associated with the packing member}</li> </ul>
F16L 37/0847	<ul style="list-style-type: none"> <li>... {by means of hooks (<a href="#">F16L 37/096</a>, <a href="#">F16L 37/098 take precedence</a>)}</li> </ul>
F16L 37/0848	<ul style="list-style-type: none"> <li>.... {rocking freely}</li> </ul>
F16L 37/086	<ul style="list-style-type: none"> <li>... by means of latching members pushed radially by spring-like elements</li> </ul>
F16L 37/088	<ul style="list-style-type: none"> <li>... by means of a split elastic ring</li> </ul>
F16L 37/091	<ul style="list-style-type: none"> <li>... by means of a ring provided with teeth or fingers</li> </ul>
F16L 37/092	<ul style="list-style-type: none"> <li>... by means of elements wedged between the pipe and the frusto-conical surface of the body of the connector</li> </ul>
F16L 37/0925	<ul style="list-style-type: none"> <li>.... {with rings which bite into the wall of the pipe}</li> </ul>
F16L 37/096	<ul style="list-style-type: none"> <li>... by means of hooks hinged about an axis</li> </ul>
F16L 37/098	<ul style="list-style-type: none"> <li>... by means of flexible hooks</li> </ul>
F16L 37/0982	<ul style="list-style-type: none"> <li>.... {with a separate member for releasing the coupling}</li> </ul>

F16L 37/0985	....	{the flexible hook extending radially inwardly from an outer part and engaging a bead, recess or the like on an inner part ( <a href="#">F16L 37/0982</a> takes precedence)}
F16L 37/0987	.....	{the flexible hook being progressively compressed by axial tensile loads acting on the coupling}
F16L 37/10	..	using a rotary external sleeve or ring on one part
F16L 37/101	...	{in which the coupling is coaxial with the pipe}
F16L 37/103	...	{the connection being maintained by the eccentricity of the two parts of the joint}
F16L 37/105	...	{the rotating sleeve having on its inner surface several axially spaced and circumferentially discontinuous threads which engage with the threads on the male part which are also spaced axially and circumferentially discontinuous}
F16L 37/107	...	Bayonet-type couplings
F16L 37/113	...	the male part having lugs on its periphery penetrating into the corresponding slots provided in the female part
F16L 37/12	..	using hooks, pawls or other movable or insertable locking members {( <a href="#">F16L 37/084</a> takes precedence)}
F16L 37/1205	...	{using hooks hinged about an axis placed behind a flange and which act behind the other flange}
F16L 37/121	...	{using freely rocking hooks ( <a href="#">F16L 37/1215</a> takes precedence)}
F16L 37/1215	...	{using hooks provided with a screw-thread adapted to engage and mesh with an appropriate corresponding part}
F16L 37/122	...	{using hooks tightened by a wedge section}
F16L 37/1225	...	{using a retaining member the extremities of which, e.g. in the form of a U, engage behind a shoulder of both parts}
F16L 37/123	...	{using a retaining member in the form of a wedge}
F16L 37/1235	...	{the connection taking place from inside the pipes}
F16L 37/124	...	using bolts, fixed to a flange, which are able to tilt in slots of another flange, and being maintained there by the tightening of nuts
F16L 37/127	...	using hooks hinged about an axis {( <a href="#">F16L 37/1215</a> takes precedence)}
F16L 37/133	...	using flexible hooks {( <a href="#">F16L 37/1215</a> takes precedence)}
F16L 37/138	...	using an axially movable sleeve
F16L 37/14	...	Joints secured by inserting between mating surfaces an element, e.g. a piece of wire, a pin, a chain
F16L 37/142	....	{where the securing element is inserted tangentially}
F16L 37/144	.....	{the securing element being U-shaped}
F16L 37/146	.....	{the securing element being a rigid pin, screw or the like}
F16L 37/148	.....	{the securing element being flexible ( <a href="#">F16L 37/144</a> takes precedence)}
F16L 37/15	....	the element being a wedge
F16L 37/16	...	Joints tightened by the action of a wedge-shaped hinged hook
F16L 37/18	...	Joints tightened by eccentrics or rotatable cams
F16L 37/20	...	Joints tightened by toggle-action levers
F16L 37/22	.	in which the connection is maintained by means of balls, rollers or helical springs under radial pressure between the parts
F16L 37/23	..	by means of balls

- F16L 37/24 . in which the connection is made by inserting one member axially into the other and rotating it to a limited extent, e.g. with bayonet action
- F16L 37/242 . . {in which the rotation takes place between the eccentric parts}
- F16L 37/244 . . the coupling being co-axial with the pipe
- F16L 37/2445 . . . {in which a male cylindrical element is introduced into a female cylindrical element, each element containing several threads axially spaced and circumferentially discontinuous which engage with each other as a result of the rotation of one of the elements}
- F16L 37/248 . . . Bayonet-type coupling
- F16L 37/252 . . . the male part having lugs on its periphery penetrating in the corresponding slots provided in the female part
- F16L 37/256 . . the coupling not being coaxial with the pipe
- F16L 37/26 . in which the connection is made by transversely moving the parts together, with or without their subsequent rotation
- F16L 37/28 . with fluid cut-off means
- F16L 37/30 . . with fluid cut-off means in each of two pipe-end fittings
- F16L 37/32 . . . at least one of two lift valves being opened automatically when the coupling is applied
- F16L 37/33 . . . . the lift valves being of the ball type
- F16L 37/34 . . . . at least one of the lift valves being of the sleeve type, i.e. a sleeve is telescoped over an inner cylindrical wall
- F16L 37/35 . . . . at least one of the valves having an axial bore
- F16L 37/36 . . . . with two lift valves being actuated to initiate the flow through the coupling after the two coupling parts are locked against withdrawal
- F16L 37/367 . . . with two gate valves or sliding valves
- F16L 37/373 . . . with two taps or cocks
- F16L 37/38 . . with fluid cut-off means in only one of the two pipe-end fittings
- F16L 37/40 . . . with a lift valve being opened automatically when the coupling is applied
- F16L 37/407 . . . . the lift valve being of the ball type
- F16L 37/413 . . . . the lift valve being of the sleeve type, i.e. a sleeve being telescoped over an inner cylindrical wall
- F16L 37/42 . . . . the valve having an axial bore communicating with lateral apertures
- F16L 37/44 . . . with one lift valve being actuated to initiate the flow through the coupling after the two coupling parts are locked against withdrawal
- F16L 37/46 . . . with a gate valve or sliding valve
- F16L 37/47 . . . with a tap or cock
- F16L 37/48 . for fastening a pipe on the end of a tap
- F16L 37/50 . adjustable; allowing movement of the parts joined {(adjustable joints in general [F16L 27/00](#); for double-walled or multi-channel pipes or pipe assemblies [F16L 39/04](#))}
- F16L 37/505 . . {allowing substantial longitudinal adjustment or movement (by means of screw-thread [F16L 15/02](#))}
- F16L 37/52 . . Universal joints, i.e. with a mechanical connection allowing angular movement or adjustment of the axes of the parts in any direction
- F16L 37/53 . . allowing adjustment or movement only about the axis of one pipe

- F16L 37/54 . . . for pipes under pressure which are supported only on one side
- F16L 37/56 . for double-walled or multi-channel pipes {or pipe assemblies}
- F16L 37/565 . . {Concentric pipes}
- F16L 37/58 . the extremities of the two halves of the joint being pressed against each other without being locked in position
- F16L 37/60 . with plug and fixed wall housing
- F16L 37/62 . pneumatically or hydraulically actuated
  
- F16L 39/00** **Joints or fittings for double-walled or multi-channel pipes or pipe assemblies**
- F16L 39/005 . {for concentric pipes}
- F16L 39/02 . for hoses
- F16L 39/04 . allowing adjustment or movement {(in general F16L 27/00; of the multiline swivel type F16L 39/06)}
- F16L 39/06 . of the multiline swivel type, e.g. comprising a plurality of axially mounted modules
  
- F16L 41/00** **Branching pipes; Joining pipes to walls** (F16L 39/00 takes precedence; joints suitable for connecting together pipe-ends see the relevant groups {specially adapted to be made of plastics or to be used with pipes made of plastics F16L 47/26; characterised by couplings of the quick-acting type F16L 37/008; connections not designed for conveying fluid F16B 9/00})
- F16L 41/001 . {the wall being a pipe plate (details or component parts of steam super heaters F22G 3/00; heat exchangers F28)}
- F16L 41/002 . {of concrete, cement or asbestos-cement}
- F16L 41/004 . {Joining to walls at other than 90 degrees (F16L 41/002, F16L 41/008 take precedence)}
- F16L 41/005 . {adjustable and comprising a hollow threaded part in an opening}
- F16L 41/007 . {adjustable and comprising a bend}
- F16L 41/008 . {for connecting a measuring instrument (connecting means for pressure measuring apparatus G01L 19/0007)}
- F16L 41/02 . Branch units, e.g. made in one piece, welded, riveted
- F16L 41/021 . . {T- or cross-pieces (F16L 41/025, F16L 41/026, F16L 41/028 take precedence)}
- F16L 41/023 . . {Y- pieces (F16L 41/025, F16L 41/026, F16L 41/028 take precedence)}
- F16L 41/025 . . {with rectangular cross-section}
- F16L 41/026 . . {with a layer protecting against erosion}
- F16L 41/028 . . {of concrete, cement or asbestos-cement}
- F16L 41/03 . . comprising junction pieces for four or more pipe members
- F16L 41/04 . Tapping pipe walls, i.e. making connections through the walls of pipes while they are carrying fluids; Fittings therefor (apparatus or operations relating to metal-working steps, see the relevant classes for metal-working)
- F16L 41/045 . . {without removal of material (F16L 41/065 takes precedence)}
- F16L 41/06 . . making use of attaching means embracing the pipe
- F16L 41/065 . . . {without removal of material}
- F16L 41/08 . Joining pipes to walls or pipes, the joined pipe axis being perpendicular to the plane of the wall or to the axis of another pipe (F16L 41/02 takes precedence)

- F16L 41/082 . . {Non-disconnectible joints, e.g. soldered, adhesive or caulked joints (non-disconnectible pipe joints in general [F16L 13/00](#))}
- F16L 41/084 . . . {Soldered joints}
- F16L 41/086 . . {fixed with screws}
- F16L 41/088 . . {fixed using an elastic grommet between the extremity of the tube and the wall}
- F16L 41/10 . . the extremity of the pipe being screwed into the wall
- F16L 41/12 . . using attaching means embracing the pipe
- F16L 41/14 . . by screwing an intermediate part against the inside or outside of the wall  
{(F16L 41/086 takes precedence)}
- F16L 41/16 . . the branch pipe comprising fluid cut-off means
- F16L 41/18 . the branch pipe being movable
  
- F16L 43/00** **Bends; Siphons** (with cleaning apertures [F16L 45/00](#); {expansion-compensation arrangements making use of bends [F16L 51/04](#); siphons for water-closets [E03D 11/18](#); siphons in general [F04F 10/00](#))
- F16L 43/001 . {made of metal}
- F16L 43/002 . . {and formed from sheet having a circular passage}
- F16L 43/003 . . {having a rectangular cross-section}
- F16L 43/005 . . {Return bends (coiled tube furnaces for thermal non-catalytic cracking of hydrocarbon oils [C10G 9/20](#))}
- F16L 43/006 . . {telescopic}
- F16L 43/007 . {made of concrete, cement or asbestos-cement}
- F16L 43/008 . {made from plastic material}
- F16L 43/02 . adapted to make use of special securing means
  
- F16L 45/00** **Pipe units with cleaning aperture and closure therefor**
  
- F16L 47/00** **Connecting arrangements or other fittings specially adapted to be made of plastics or to be used with pipes made of plastics** {(rigid pipes of plastics [F16L 9/12](#); connections for hoses of plastics [F16L 33/006](#); bends or siphons [F16L 43/008](#))}
- F16L 47/005 . {the first pipe being joined to the ends of two other pipes placed one inside the other, e.g. gas pipe with protective sheath}
- F16L 47/02 . Welded joints; Adhesive joints {(in general [F16L 13/00](#))}
- F16L 47/03 . . Welded joints with an electrical resistance incorporated in the joint
- F16L 47/04 . with a swivel nut or collar engaging the pipe {(in general [F16L 19/00](#))}
- F16L 47/06 . with sleeve or socket formed by or in the pipe end {(in general [F16L 21/00](#))}
- F16L 47/065 . . {with sealing rings arranged between outer surface of pipe and inner surface of sleeve or socket, the sealing rings being placed previously on the male part}
- F16L 47/08 . . with sealing rings arranged between the outer surface of one pipe end and the inner surface of the sleeve or socket, the sealing rings being placed previously in the sleeve or socket
- F16L 47/10 . . . the sealing rings being maintained in place by additional means
- F16L 47/12 . . with additional locking means
- F16L 47/14 . Flanged joints

- F16L 47/145 .. {for rectangular pipes}
- F16L 47/16 . Screw-threaded joints
- F16L 47/18 . Adjustable joints; Joints allowing movement
- F16L 47/20 . based principally on specific properties of plastics
- F16L 47/22 .. using shrink-down material {(in other than plastic [F16L 13/004](#))}
- F16L 47/24 .. for joints between metal and plastic pipes
- F16L 47/26 . for branching pipes; for joining pipes to walls; Adaptors therefor
- F16L 47/265 .. {Reduction units}
- F16L 47/28 .. Joining pipes to walls or to other pipes, the axis of the joined pipe being perpendicular to the wall or to the axis of the other pipe
- F16L 47/285 ... {with fluid cut-off means in the branching pipe}
- F16L 47/30 ... using attaching means embracing the pipe
- F16L 47/32 .. Branch units, e.g. made in one piece, welded, riveted
- F16L 47/34 .. Tapping pipes, i.e. making connections through walls of pipes while carrying fluids; Fittings therefor
- F16L 47/345 ... {making use of attaching means embracing the pipe}
  
- F16L 49/00** **Connecting arrangements, e.g. joints, specially adapted for pipes of brittle material, e.g. glass, earthenware** {(sleeves, nipples or reduction pieces made of elastic material [F16L 21/005](#))}
- F16L 49/02 . Joints with a sleeve or socket
- F16L 49/04 . Flanged joints
- F16L 49/06 . Joints in which sealing surfaces are pressed together by means of a member, e.g. swivel nut, screwed on, or into, one of the joint parts {(in general [F16L 19/00](#))}
- F16L 49/08 . Adjustable joints; Joints allowing movement {(in general [F16L 27/00](#))}
  
- F16L 51/00** **Expansion-compensation arrangements for pipe-lines** {(hangers or supports for pipes with special provision allowing movement of the pipes [F16L 3/16](#);} telescopic pipes [F16L 27/12](#))}
- F16L 51/005 . {for concrete pipe-lines}
- F16L 51/02 . making use of bellows or an expansible folded or corrugated tube {(rigid corrugated pipes [F16L 9/06](#); corrugated hoses made of rigid material [F16L 11/15](#))}
- F16L 51/021 .. {having a rectangular cross-section}
- F16L 51/022 .. {with a single corrugation}
- F16L 51/023 .. {consisting of flexible rings}
- F16L 51/024 .. {non-metallic (flexible pipe connections [F16L 27/10](#))}
- F16L 51/025 .. {with several corrugations}
- F16L 51/026 .. {with interior reinforcement}
- F16L 51/027 .. {with external reinforcement}
- F16L 51/028 .. {with the expansion or contraction of each corrugation being limited}
- F16L 51/029 .. {consisting of flexible rings}
- F16L 51/03 .. comprising two or more bellows
- F16L 51/035 ... {for cancelling the axial loading resulting from fluid pressure}



F16L 51/04 . making use of bends, e.g. lyre-shaped

## F16L 53/00

**Heating or cooling pipes or pipe systems** (preventing freezing of pipes, thawing frozen pipes [E03B 7/12](#), [E03B 7/14](#); pipe-line systems, pipe-lines [F17D](#))

F16L 53/001 . {Heating of pipes or pipe systems}

F16L 53/002 . . {by means of a hot fluid, e.g. gas, steam or liquid}

F16L 53/004 . . {by electric, magnetic or electromagnetic fields, e.g. using induction, dielectric or microwave heating}

F16L 53/005 . . {by ohmic-resistance heating}

F16L 53/007 . . . {the heating current flowing directly through the pipe to be heated}

F16L 53/008 . . . {using electric heating elements in the form of wires, cables, strips, ribbons or the like}

## F16L 55/00

**Devices or appurtenances for use in, or in connection with, pipes or pipe systems** (the preceding groups and groups [F16L 57/00](#), [F16L 59/00](#) take precedence; repairing or joining pipes on or under water [F16L 1/26](#); nozzles [B05B](#); cleaning of pipes [B08B 9/02](#); {arrangements of draining devices for water main or service pipe systems [E03B 7/08](#);} devices for preventing bursting of water pipes by freezing [E03B 7/10](#); {draining devices for hydrants [E03B 9/14](#);} for domestic plumbing installations [E03C 1/00](#); {steam traps for draining of liquids from enclosures containing gases or vapours [F16T](#)}; arrangements for sealing leaky tubes or conduits of heat-exchangers [F28F 11/00](#))

F16L 55/005 . {Devices restraining ruptured tubes from whipping}

F16L 55/02 . Energy absorbers; Noise absorbers (in valves [F16K 47/00](#); {springs, shock absorbers, means for damping vibration in general [F16F](#)})

F16L 55/027 . . Throttle passages (influencing fluid flow [F15D 1/00](#); control of fluid flow [G05D 7/00](#))

F16L 55/02709 . . . {in the form of perforated plates}

F16L 55/02718 . . . . {placed transversely}

F16L 55/02727 . . . . {placed parallel to the axis of the pipe}

F16L 55/02736 . . . {using transversal baffles defining a tortuous path}

F16L 55/02745 . . . {by passing through a mass of particles or a porous member}

F16L 55/02754 . . . {using a central core throttling the passage}

F16L 55/02763 . . . {using an element with multiple tubes}

F16L 55/02772 . . . {using spirally or helically shaped channels}

F16L 55/02781 . . . {The regulating element being provided with radial outputs}

F16L 55/0279 . . . {The fluid flowing two or more times longitudinally in opposite directions, e.g. using parallel or concentric tubes}

F16L 55/033 . . Noise absorbers ([F16L 55/027](#) takes precedence)

F16L 55/0331 . . . {by inserting an elongated element in the pipe}

F16L 55/0332 . . . {by inserting a body of compressible material in the pipe}

F16L 55/0333 . . . {by means of an active system}

F16L 55/0335 . . . {by means of external rings}

F16L 55/0336 . . . {by means of sound-absorbing materials}

F16L 55/0337 . . . {by means of a flexible connection}



F16L 55/0338	... {by means of a membrane}
F16L 55/035	... in the form of specially adapted hangers or supports
F16L 55/04	. Devices damping pulsations or vibrations in fluids {(F16L 55/02 takes precedence; counter-acting cavitation in pumps F04B 39/00; springs, shock absorbers, means for damping vibration in general F16F; means in valves for absorbing fluid energy F16K 47/00)}
F16L 55/041	.. {specially adapted for preventing vibrations (flexible pipe connections F16L 27/10)}
F16L 55/043	.. {specially adapted for protecting instruments from water hammer or vibrations}
F16L 55/045	.. specially adapted to prevent or minimise the effects of water hammer
F16L 55/05	... Buffers therefor (accumulators F15B 1/04)
F16L 55/052	.... Pneumatic reservoirs
F16L 55/053	..... the gas in the reservoir being separated from the fluid in the pipe
F16L 55/054	..... the reservoir being placed in or around the pipe from which it is separated by a sleeve-shaped membrane
F16L 55/055	... Valves therefor
F16L 55/07	. Arrangement or mounting of devices, e.g. valves, for venting or aerating or draining (arrangement of draining devices in water supply systems E03B 7/08; apparatus for draining F16K, F16T; venting or aerating devices per se F16K 24/00)
F16L 55/09	. Air conditioning, e.g. de-watering, in pneumatic systems (in general F24)
F16L 55/10	. Means for stopping flow from or in pipes or hoses (F16L 29/00, F16L 37/28 take precedence; valves F16K)
F16L 55/1003	.. {by introduction of paste, powder, particles, or the like}
F16L 55/1007	.. {Couplings closed automatically when broken}
F16L 55/1011	.. {Soluble closing devices}
F16L 55/1015	.. {Couplings closed automatically when disengaging force exceeds preselected value (F16L 55/1007 takes precedence)}
F16L 55/1018	.. {Pivoting closing devices}
F16L 55/1022	.. {Fluid cut-off devices automatically actuated}
F16L 55/1026	.. {Fire protection devices (in general A62C)}
F16L 55/103	.. by temporarily freezing liquid sections in the pipe
F16L 55/105	.. Closing devices introduced radially into the pipe or hose
F16L 55/11	.. Plugs {(F16L 55/128 takes precedence)}
F16L 55/1108	... {fixed by screwing or by means of a screw-threaded ring}
F16L 55/1116	... {glued or welded}
F16L 55/1125	... {fixed by rotating a limited amplitude}
F16L 55/1133	... {fixed by means of balls}
F16L 55/1141	... {the plug being made of elastic material}
F16L 55/115	.. Caps {(F16L 55/1286 takes precedence)}
F16L 55/1152	... {fixed by screwing or by means of a screw-threaded ring}
F16L 55/1155	... {fixed by rotating a limited amplitude}
F16L 55/1157	... {using hooks, pawls, or other movable or insertable locking members}

- F16L 55/12           ..     by introducing into the pipe a member expandable in situ ([inflatable cut-off valves F16K 7/10](#))
- F16L 55/124       ...     introduced radially into the pipe or hose
- F16L 55/128       ...     introduced axially into the pipe or hose
- F16L 55/1283      ....     {Plugging pig}
- F16L 55/1286      ....     {The closing device being a cap}
- F16L 55/13       ....     the closure device being a plug fixed by plastic deformation
- F16L 55/132       ....     the closure device being a plug fixed by radially deforming the packing
- F16L 55/134       .....    by means of an inflatable packing
- F16L 55/136       ....     the closure device being a plug fixed by radially expanding or deforming a split ring, hooks or the like
- F16L 55/16       .     Devices for covering leaks in pipes or hoses, e.g. hose-menders
- F16L 55/1604      ..     {by means of a by-pass conduit}
- F16L 55/1608      ..     {by replacement of the damaged part of the pipe}
- F16L 55/1612      ..     {by means of a plug}
- F16L 55/1616      ..     {the material forming the pipe or hose being self-sealing}
- F16L 55/162       ..     from inside the pipe {(F16L 55/1612 takes precedence)}
- F16L 55/163       ...     a ring, a band or a sleeve being pressed against the inner surface of the pipe
- F16L 55/164       ...     a sealing fluid being introduced in the pipe
- F16L 55/1645      ...     a sealing material being introduced inside the pipe by means of a tool moving in the pipe
- F16L 55/16455     ....     {a part of the tool defining, together with the inner wall of the pipe, an enclosed space into which sealing material is injected}
- F16L 55/165       ...     a pipe {or flexible liner} being inserted in the damaged section {(protection against corrosion: [F16L 58/10](#))}
- F16L 55/1651      ....     {the flexible liner being everted}
- F16L 55/1652      ....     {the flexible liner being pulled into the damaged section}
- F16L 55/1653      .....    {and being pressed into contact with the pipe by a tool which moves inside along the pipe}
- F16L 55/1654      .....    {and being inflated}
- F16L 55/1655      ....     {a pipe being formed inside the old pipe by winding strip-material}
- F16L 55/1656      ....     {materials for flexible liners ([hoses in general F16L 11/00](#))}
- F16L 55/1657      ....     {lengths of rigid pipe being inserted ([F16L 55/1658 takes precedence](#))}
- F16L 55/1658      ....     {the old pipe being ruptured prior to insertion of a new pipe}
- F16L 55/168       ..     from outside the pipe
- F16L 55/1683      ...     {by means of a patch which is fixed on the wall of the pipe by means of an adhesive, a weld or the like}
- F16L 55/1686      ...     {by winding a tape}
- F16L 55/17       ...     by means of rings, bands or sleeves pressed against the outside surface of the pipe or hose ([hose-clips for connecting hoses to rigid members F16L 33/02](#))
- F16L 55/1705      ....     {with a substantially radial tightening member}
- F16L 55/171       ....     {the ring or the sleeve being tightened by a wedge section}

- F16L 55/1715 . . . . {the ring or the sleeve being tightened by hooks, pawls, or other movable members (coupling of the quick-acting type [F16L 37/12](#))}
- F16L 55/172 . . . . the ring, band or sleeve being tightened by a tangentially arranged threaded pin and a nut
- F16L 55/1725 . . . . . {in which the threaded pin is rigid with the hose encircling member}
- F16L 55/175 . . . . by using materials which fill a space around the pipe before hardening
- F16L 55/178 . . . . by clamping an outer gasket against a joint with sleeve or socket
- F16L 55/179 . . . specially adapted for bends, branch units, branching pipes or the like; {(Tools [F16L 55/265](#))}
- F16L 55/18 . . . Appliances for use in repairing pipes ([F16L 55/10](#) takes precedence; {pigs or moles [F16L 55/26](#)})
- F16L 55/24 . . . Preventing accumulation of dirt or other matter in the pipes, e.g. by traps, by strainers {(preventing accumulation in pneumatic conveyers [B65G 53/521](#))}
- F16L 55/26 . . . Pigs or moles, i.e. devices movable in a pipe or conduit with or without self-contained propulsion means (tunnel railway systems [B61B 13/10](#); conveying articles through pipes or tubes, e.g. tube mail systems, [B65G 51/00](#))
- F16L 55/265 . . . {specially adapted for work at or near a junction between a main and a lateral pipe}

#### **NOTE**

1. Pigs or moles specially adapted for particular applications are classified in the relevant places for the applications, e.g.
  - stopping flow from or in pipes or hoses [F16L 55/12](#)
  - repairing pipes [F16L 55/18](#)
  - applying liquids or other fluent materials to the inside of tubes [B05C 7/08](#)
  - cleaning pipes or tubes or systems of pipes or tubes [B08B 9/02](#)
  - welding or cutting [B23K 37/02](#)
  - earth drilling [E21B](#)
  - {separating products [F17D 3/08](#);}
  - cleaning chimneys [F23J 3/02](#)
  - cleaning internal or external surfaces of heat-exchange or heat-transfer conduits [F28G](#)
  - measuring, testing [G01](#)
  - inspection of vessels in nuclear reactors [G21C 17/003](#)
  - inspection or maintenance of pipe-lines or tubes in nuclear installations [G21C 17/017](#)
  - installing electric, or combined optical and electric, cables or lines [H02G](#)
2. In groups [F16L 55/26](#) to [F16L 55/48](#), the indexing codes of [F16L 2101/00](#) to [F16L 2101/70](#) are added

- F16L 55/28 . . . Constructional aspects
- F16L 55/30 . . . of the propulsion means, e.g. towed by cables
- F16L 55/32 . . . . being self-contained
- F16L 55/34 . . . . . the pig or mole being moved step by step
- F16L 55/36 . . . . . jet driven
- F16L 55/38 . . . . driven by fluid pressure
- F16L 55/40 . . . of the body
- F16L 55/42 . . . . gelled or degradable

- F16L 55/44 . . . . . expandable
- F16L 55/46 . . . Launching or retrieval of pigs or moles
- F16L 55/48 . . . Indicating the position of the pig or mole in the pipe or conduit
  
- F16L 57/00** **Protection of pipes or objects of similar shape against external or internal damage or wear** ({[protection under water F16L 1/123](#); supporting of pipes inside other pipes or sleeves [F16L 7/00](#); used in connection with end fittings of hoses [F16L 35/00](#); protection thereof during transport [B65D](#), e.g. [B65D 59/00](#); {for steam boilers [F22B 37/107](#)})
- F16L 57/005 . . {[specially adapted for the ends of pipes](#)}
- F16L 57/02 . . against cracking or buckling
- F16L 57/04 . . against fire or other external sources of extreme heat
- F16L 57/06 . . against wear ([F16L 57/04](#) takes precedence)
  
- F16L 58/00** **Protection of pipes or pipe fittings against corrosion or incrustation** (supporting of pipes inside other pipes or sleeves [F16L 7/00](#); compound tubes [F16L 9/14](#); cleaning pipes or tubes [B08B 9/02](#))
- F16L 58/02 . . by means of internal or external coatings ([coatings for thermal insulation F16L 59/00](#); methods or machines for applying coatings see the relevant classes, e.g. [B28B 21/00](#))
- F16L 58/04 . . Coatings characterised by the materials used ([F16L 58/16](#) takes precedence; compositions, see the relevant classes, e.g. [C04B](#))
- F16L 58/06 . . . by cement, concrete, or the like
- F16L 58/08 . . . by metal
- F16L 58/10 . . . by rubber or plastics
- F16L 58/1009 . . . . . {[the coating being placed inside the pipe](#)}
- F16L 58/1018 . . . . . {[the protective layer being fixed by means of anchoring devices](#)}
- F16L 58/1027 . . . . . {[the coating being a sprayed layer](#)}
- F16L 58/1036 . . . . . {[the coating being a preformed pipe \(F16L 58/1027 takes precedence\)](#)}
- F16L 58/1045 . . . . . {[the coating being an extruded or a fused layer](#)}
- F16L 58/1054 . . . . . {[the coating being placed outside the pipe](#)}
- F16L 58/1063 . . . . . {[the coating being a sheet wrapped around the pipe](#)}
- F16L 58/1072 . . . . . {[the coating being a sprayed layer](#)}
- F16L 58/1081 . . . . . {[the coating being a preformed pipe](#)}
- F16L 58/109 . . . . . {[the coating being an extruded layer](#)}
- F16L 58/12 . . . by tar or bitumen
- F16L 58/14 . . . by ceramic or vitreous materials
- F16L 58/16 . . the coating being in the form of a bandage ([apparatus for covering cores by winding B65H 81/00](#))
- F16L 58/18 . . specially adapted for pipe fittings ({[non-disconnectible joints of coated pipes F16L 13/0254](#); screw joints for coated pipes comprising pipes with collars or flanges [F16L 19/0243](#)})
- F16L 58/181 . . {[for non-disconnectible pipe joints \(in general F16L 13/00\)](#)}
- F16L 58/182 . . {[for screw-threaded joints \(in general F16L 15/00\)](#)}

- F16L 58/184 .. {for joints in which sealing surfaces are pressed together by means of a member, e.g. a swivel nut, screwed on or into one of the joint parts (in general [F16L 19/00](#))}
- F16L 58/185 .. {for joints with sleeve or socket (in general [F16L 21/00](#))}
- F16L 58/187 .. {for flanged joints (in general [F16L 23/00](#))}
- F16L 58/188 .. {for branching pipes; for joining pipes to walls (in general [F16L 41/00](#))}
  
- F16L 59/00** **Thermal insulation in general** (heat, sound insulation in buildings [E04B](#); heat insulation of steam engines [F01B 31/08](#); {thermal or acoustic isolation for combustion engines [F02B 77/11](#)}; heat insulation in rotary piston machines [F01C 21/06](#); heat insulation of pumps [F04C 29/04](#); thermal insulation of pressure vessels [F17C 1/12](#); vessels not under pressure, with provision for insulation [F17C 3/02](#))
- F16L 59/02 . Shape or form of insulating materials, with or without coverings integral with the insulating materials (chemical aspects see the relevant classes)
- F16L 59/021 .. {comprising a single piece or sleeve, e.g. split sleeve, two half sleeves}
- F16L 59/022 ... {with a single slit}
- F16L 59/023 .... {with a hinge opposite the slit}
- F16L 59/024 ... {composed of two half sleeves}
- F16L 59/025 ... {with more than two segments}
- F16L 59/026 .. {Mattresses, mats, blankets or the like}
- F16L 59/027 .. {Bands, cords, strips or the like for helically winding around a cylindrical object}
- F16L 59/028 .. {Composition or method of fixing a thermally insulating material}
- F16L 59/029 .. {layered}
- F16L 59/04 . Arrangements using dry fillers, e.g. using slag wool {which is added to the object to be insulated by pouring, spreading, spraying or the like}
- F16L 59/06 . Arrangements using an air layer or vacuum
- F16L 59/065 .. using vacuum ([F16L 59/075](#) takes precedence)
- F16L 59/07 .. the air layer being enclosed by one or more layers of insulation
- F16L 59/075 .. the air layer or the vacuum being delimited by longitudinal channels distributed around the circumference of a tube
- F16L 59/08 . Means for preventing radiation, e.g. with metal foil
- F16L 59/10 . Bandages or covers for the protection of the insulation, e.g. against the influence of the environment or against mechanical damage (integral with the insulation materials [F16L 59/02](#))
- F16L 59/103 .. {Rigid covers for tee pieces}
- F16L 59/106 .. {Flexible covers for flanges, junctions, valves or the like}
- F16L 59/11 .. Rigid covers for elbows
- F16L 59/12 . Arrangements for supporting insulation from the wall or body insulated, e.g. by means of spacers between pipe and heat-insulating material; Arrangements specially adapted for supporting insulated bodies {(pipe supports allowing movement in axial direction [F16L 3/18](#))}
- F16L 59/121 .. {for pipes passing through walls or partitions (in general [F16L 5/00](#))}
- F16L 59/123 .. {Anchoring devices; Fixing arrangements for preventing the relative longitudinal displacement of an inner pipe with respect to an outer pipe, e.g. stress cones}
- F16L 59/125 .. Helical spacers

F16L 59/13	..	Resilient supports
F16L 59/135	..	Hangers or supports specially adapted for insulated pipes
F16L 59/14	.	Arrangements for the insulation of pipes or pipe systems ( <a href="#">F16L 59/02</a> to <a href="#">F16L 59/12</a> take precedence)
F16L 59/141	..	{in which the temperature of the medium is below that of the ambient temperature (rigid pipes of wood <a href="#">F16L 9/006</a> ; vacuum insulation <a href="#">F16L 59/065</a> )}
F16L 59/143	..	{Pre-insulated pipes}
F16L 59/145	..	{providing fire-resistance (in general <a href="#">F16L 57/04</a> )}
F16L 59/147	..	the insulation being located inwardly of the outer surface of the pipe
F16L 59/15	..	for underground pipes
F16L 59/153	..	for flexible pipes
F16L 59/16	..	Arrangements specially adapted to local requirements at flanges, junctions, valves or the like (means in or on valves for heating or cooling <a href="#">F16K 49/00</a> )
F16L 59/161	...	{Housings for valves, tee pieces, or the like}
F16L 59/163	...	{Branch units (in general <a href="#">F16L 41/02</a> ); Insulation forming a whole with branches}
F16L 59/165	...	{Repairing insulated pipes}
F16L 59/166	...	{covering the end of an insulated section}
F16L 59/168	...	{Flexible insulating material or covers for flanges, junctions, valves or the like}
F16L 59/18	...	adapted for joints
F16L 59/181	....	{Joints in which sealing surfaces are pressed together by means of a member, e.g. a swivel nut, screwed on or into one of the joint parts (in general <a href="#">F16L 19/00</a> )}
F16L 59/182	....	{Joints with sleeve or socket (in general <a href="#">F16L 21/00</a> )}
F16L 59/184	....	{Flanged joints (in general <a href="#">F16L 23/00</a> )}
F16L 59/185	....	{Adjustable joints, joints allowing movement (in general <a href="#">F16L 27/00</a> )}
F16L 59/187	....	{Arrangements for connecting hoses to one another, to flexible sleeves or to rigid members (in general <a href="#">F16L 31/00</a> , <a href="#">F16L 33/00</a> )}
F16L 59/188	....	{Couplings of the quick-acting type (in general <a href="#">F16L 37/00</a> )}
F16L 59/20	....	for non-disconnectable joints
F16L 59/21	...	adapted for expansion-compensation devices {(in general <a href="#">F16L 51/00</a> )}
F16L 59/22	...	adapted for bends

## **F16L 2101/00**      **Uses or applications of pigs or moles**

F16L 2101/10	.	Treating the inside of pipes
F16L 2101/12	..	Cleaning
F16L 2101/16	..	Coating by application of fluent materials, e.g. painting
F16L 2101/18	..	Lining other than coating
F16L 2101/20	.	Expelling gases or fluids
F16L 2101/30	.	Inspecting, measuring or testing
F16L 2101/40	.	Separating transported fluids
F16L 2101/50	.	Pulling cables or the like

- F16L 2101/60 . Stopping leaks
- F16L 2101/70 . Drill-well operations

**F16L 2201/00**

**Special arrangements for pipe couplings**

- F16L 2201/10 . Indicators for correct coupling
- F16L 2201/20 . Safety or protective couplings
- F16L 2201/30 . Detecting leaks
- F16L 2201/40 . for special environments
- F16L 2201/44 . . sterile
- F16L 2201/60 . Identification or marking
- F16L 2201/80 . Dust covers