INTERNATIONAL STANDARD

ISO 2852

Second edition
1993-06-15

Stainless steel clamp pipe couplings for the food industry

Raccords rapides en acier inoxydable pour l'industrie alimentaire

Reference number
ISO 2852:1993(E)

Contents

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland
Printed in Switzerland

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 2852 was prepared by Technical Committee ISO/TC 5, *Ferrous metal pipes and metallic fittings*, Sub-Committee SC 1, *Steel tubes*.

This second edition cancels and replaces the first edition (ISO 2852:1974), the requirements of which for expanded-type clamp liners, welded-type clamp liners, gaskets and materials for clamp liners have been technically revised.

Annexes A, B and C form an integral part of this International Standard. Annexes D and E are for information only.

INTERNATIONAL STANDARD ISO 2852:1993(E)

Stainless steel clamp pipe couplings for the food industry

1 Scope

This International Standard specifies the dimensions, tolerances, surface roughness, materials, assembling, and hygienic requirements for welded- and expanded-type clamp liners and gaskets in clamp pipe couplings for the food industry. The clamps are not standardized but suitable clearances are specified in annex A.

Clamp liners in clamp couplings for the food industry are intended to be used with stainless steel tubes specified in ISO 2037.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 48:1979, *Vulcanized rubbers — Determination of hardness (Hardness between 30 and 85 IRHD).*

ISO 286-2:1988, *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts.*

ISO 2037:1992, *Stainless steel tubes for the food industry.*

ISO 2604-1:1975, *Steel products for pressure purposes — Quality requirements — Part 1: Forgings.*

ISO 6506:1981, *Metallic materials — Hardness test — Brinell test.*

ISO 6507-1:1982, *Metallic materials — Hardness test — Vickers test — Part 1: HV 5 to HV 100.*

ISO 6508:1986, *Metallic materials — Hardness test — Rockwell test (scales A - B - C - D - E - F - G - H - K).*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 clamp pipe coupling: Coupling with two liners intended for joining pipe ends together by means of a clamp.

3.2 clamp liner: Flanged pipe coupling part, with one conical face to provide means for connecting mating liners.

3.2.1 welded-type clamp liner: Clamp liner intended to be joined to a pipe end by butt welding.

3.2.2 expanded-type clamp liner: Clamp liner intended to be attached to a pipe end by expansion.

3.3 gasket: Ring-shaped pipe coupling part intended to make a hygienic liquid-tight joint between the flanges of two clamp liners.

3.4 clamp: Ring-shaped pipe coupling part with a taper-sided channel section.

4 Symbols

C_1 outside neck diameter of expanded-type liner

C_2 groove diameter and gasket bulge diameter

C_4 inside diameter of gasket

C_5 inside diameter of expanded-type liner

C_6 inside diameter of welded-type liner

C_7 flange diameter

C_{10} outside neck diameter of welded-type liner

E inside diameter of gasket lip

F_2 total length of welded-type liner

F_3 total length of expanded-type liner

K groove depth

L_1 flange thickness

P_1 flange edge radius

P_2 groove edge radius

R_2 flange fillet radius

R_3 groove bottom radius

R_4 gasket fillet radius

R_5 gasket bulge radius

S outside diameter of gasket (without lip)

T_1 gasket web thickness

T_2 gasket lip length

T_4 gasket lip thickness

U gasket bulge thickness

U_1 lock ring groove diameter

U_2 lock ring outside diameter

V gasket compression thickness

Y radial clearance between clamp and flange

Z radial clearance between clamp and neck of expanded-type liner

α flange angle

β groove angle

5 Dimensions and tolerances

5.1 Expanded-type clamp liner

The dimensions, in millimetres, and the tolerance classes (see ISO 286-2) are given in figure 1 and table 1.

5.2 Welded-type clamp liner

The dimensions, in millimetres, and the tolerance classes (see ISO 286-2) are given in figure 2 and table 2.

5.3 Gasket

The dimensions and tolerances, in millimetres, are given in figure 3 and table 3.

6 Assembling

6.1 Welding

Welded-type clamp liners shall be attached to the pipe ends by butt welding.

6.2 Expansion

Expanded-type clamp liners shall be attached to the pipe ends by expanding. A method for carrying out the expansion is described in annex D . This method can be applied to nominal sizes up to and including 76,1 mm.

7 Hygienic requirements

7.1 All surfaces of the coupling in contact with the foodstuff shall be easily accessible for cleaning, either by cleaning in place methods or by manual cleaning when disassembled. Removable parts shall be readily demountable.

7.2 The interior surface of welded-type liners shall be clean and smooth. It shall be free from surface defects and inclusions.

7.3 The gasket shall be made of a material compatible under processing conditions with the material of the fitting, with the foodstuffs and with the cleaning fluids utilized. It shall not, for example, impart an odour or taste to the foodstuff.

8 Surface roughness

The surface roughness of expanded- and welded-type clamp liners, in accordance with the specifications of ISO 468, shall be, for finely finished surfaces, $R_a \leqslant 1\ \mu m$.

9 Materials

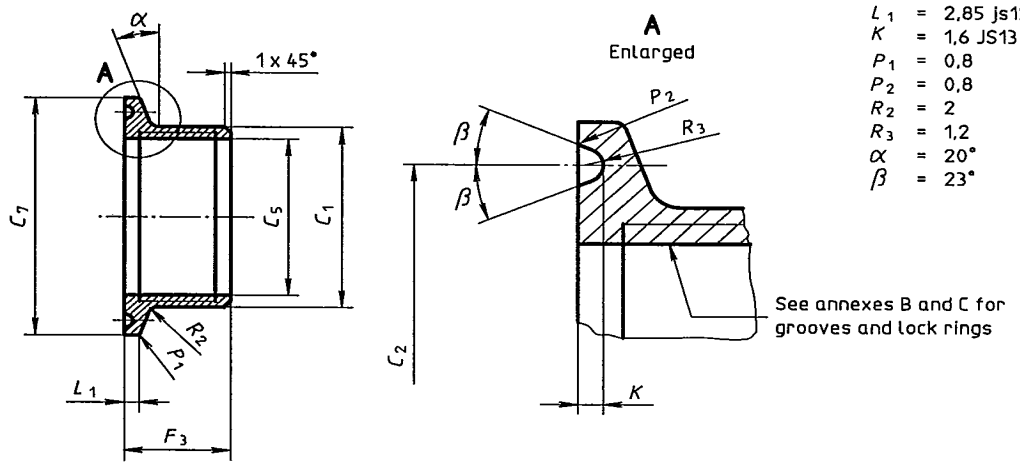
9.1 Clamp liners

Austenitic stainless steel shall be selected from ISO 2604-1.

Generally the steel types F47 and F62 are suitable (similar to the types recommended for tubes in ISO 2037).

9.2 Gaskets

The gaskets shall be of natural or synthetic rubber with a hardness corresponding to 75 IRHD to 85 IRHD in accordance with ISO 48. The material shall meet the hygienic requirements and have a reasonable life expectancy.



L_1 = 2,85 js12
K = 1,6 JS13
P_1 = 0,8
P_2 = 0,8
R_2 = 2
R_3 = 1,2
α = 20°
β = 23°

Figure 1

Table 1

Nominal size	C_5 A10	C_1 js10	C_7 h11	C_2 N11	F_3
12	12	16	34	27,5	16
12,7	12,7	16,7	34	27,5	16
17,2	17,2	21,2	34	27,5	18
21,3	21,3	25,3	34	27,5	20
25	25	29	50,5	43,5	20
33,7	33,7	38,1	50,5	43,5	20
38	38	42,4	50,5	43,5	20
40	40	44,8	64	56,5	20
51	51	55,8	64	56,5	25
63,5	63,5	68,9	77,5	70,5	30
70	70	75,8	91	83,5	30
76,1	76,1	81,9	91	83,5	30

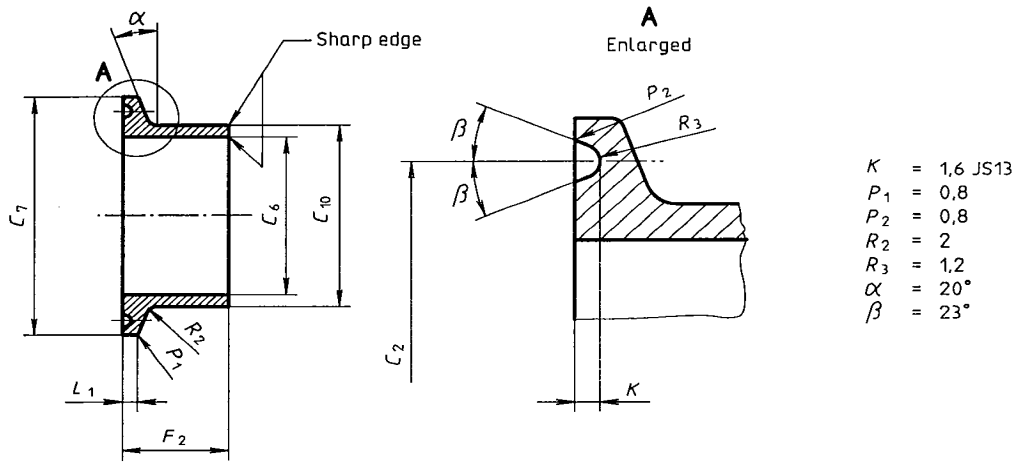
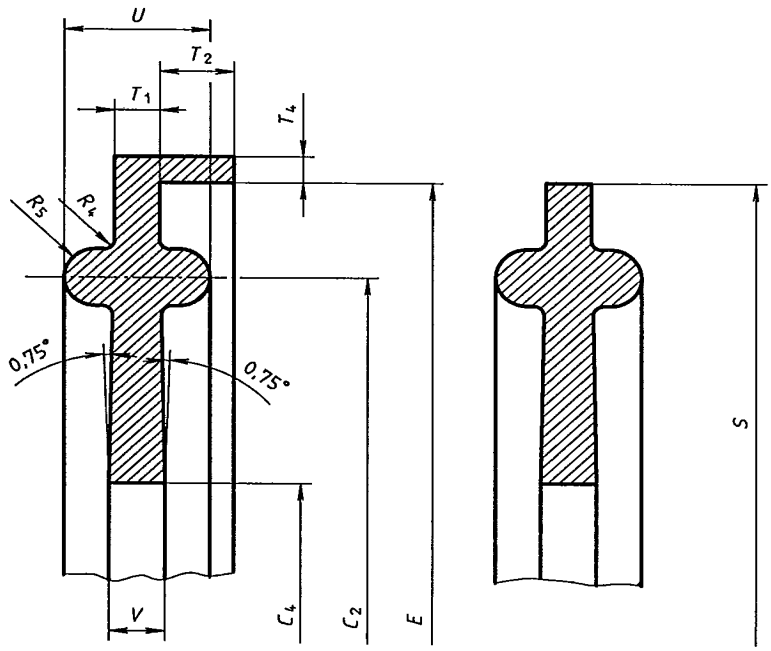


Figure 2

Table 2

Nominal size	C_6 N11	C_{10} h11	C_7 h11	F_2	C_2 N11	L_1 js12
25	22,6	25,6	50,5	21,5	43,5	2,85
33,7	31,3	34,3	50,5	21,5	43,5	2,85
38	35,6	38,6	50,5	21,5	43,5	2,85
40	37,6	40,6	64	21,5	56,5	2,85
51	48,6	51,6	64	21,5	56,5	2,85
63,5	60,3	64,1	77,5	21,5	70,5	2,85
70	66,8	70,6	91	21,5	83,5	2,85
76,1	72,9	76,7	91	21,5	83,5	2,85
88,9	84,9	89,8	106	21,5	97	2,85
101,6	97,6	102,5	119	21,5	110	2,85
114,3	110,3	115,6	130	28	122	2,85
139,7	135,7	141,2	155	28	146	5,6
168,3	163,1	170	183	28	174	5,6
219,1	213,9	221,2	233,5	28	225	5,6



a) Type A

b) Type B

T_4 = 1,1 ± 0,2
U = 5,5 ± 0,2
T_1 = $1{,}7^{+0{,}25}_{0}$
R_4 = 0,4
R_5 = 1,2
V = $2{,}1^{+0{,}25}_{0}$
T_2 = 2,8 ± 0,3

Gasket type A is intended for use when the pipe ends are frequently disconnected.

Figure 3

Table 3

Nominal size	C_4 $^{+0,5}_{0}$	C_2 $^{0}_{-0,5}$	E $^{0}_{-0,5}$	S ± 0,5
12	10,2	27,5	34	
12,7	10,9	27,5	34	
17,2	15,4	27,5	34	
21,3	19,5	27,5	34	
25	22,8	43,5	50,5	
33,7	31,5	43,5	50,5	
38	35,8	43,5	50,5	
40	37,8	56,5	64	
51	48,8	56,5	64	
63,5	60,5	70,5	77,5	
70	67	83,5	91	
76,1	73,1	83,5	91	
88,9	85,1	97	106	
101,6	97,8	110	119	
114,3	110,5	122	130	
139,7	135,9	146	155	
168,3	163,3	174	183	
219,1	214,1	225	233,5	

Annex A
(normative)

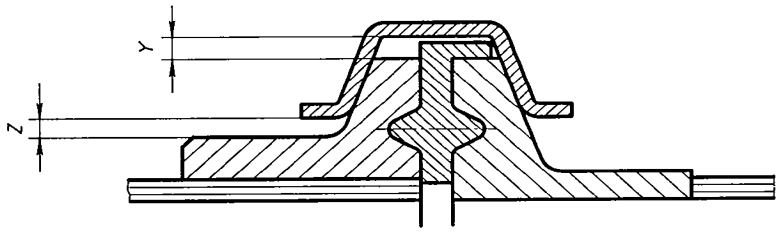
Cross-section of clamp pipe coupling assembly

A.1 Scope

This annex specifies the inside contour of the clamp profile to suit the mating flanges on liners.

A.2 Clearances

See figure A.1.



Y = 1,6 mm min.
Z = 1,6 mm min. for nominal sizes ⩾ 38 mm

Figure A.1

Annex B
(normative)

Grooving for expanded-type clamp liners

B.1 Scope

This annex is applicable to nominal sizes 25 mm up to and including 76,1 mm only. The use of the lock ring is optional for expanded-type liners.

B.2 Design

Expanded-type clamp liners shall be provided internally with some form of grooving to give adequate strength to the joint between liner and pipe end. Figures B.1 and B.2 show the positioning of the grooves.

B.3 Dimensions

The dimensions, in millimetres, and the tolerance classes (see ISO 286-2) are given in figures B.1 and B.2 and table B.1.

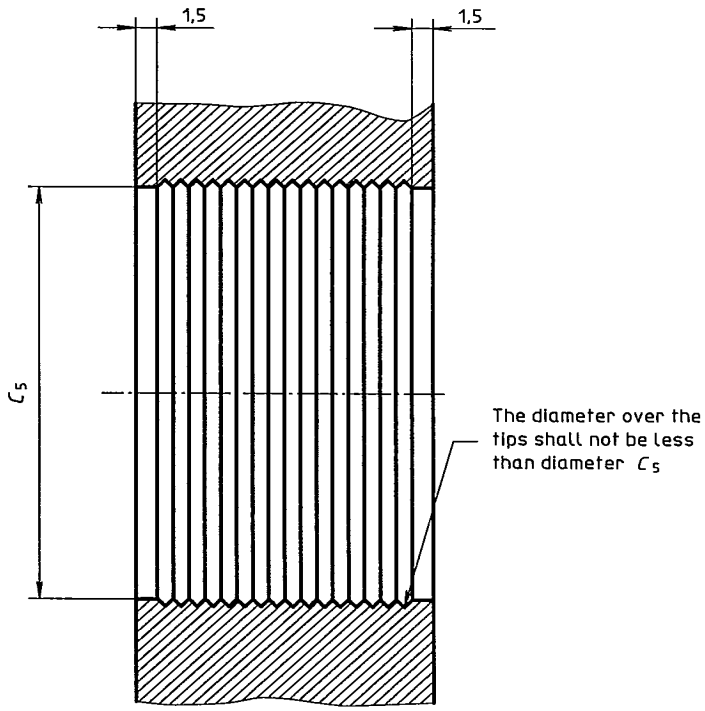


Figure B.1 — Grooving for expanded-type liners without lock ring

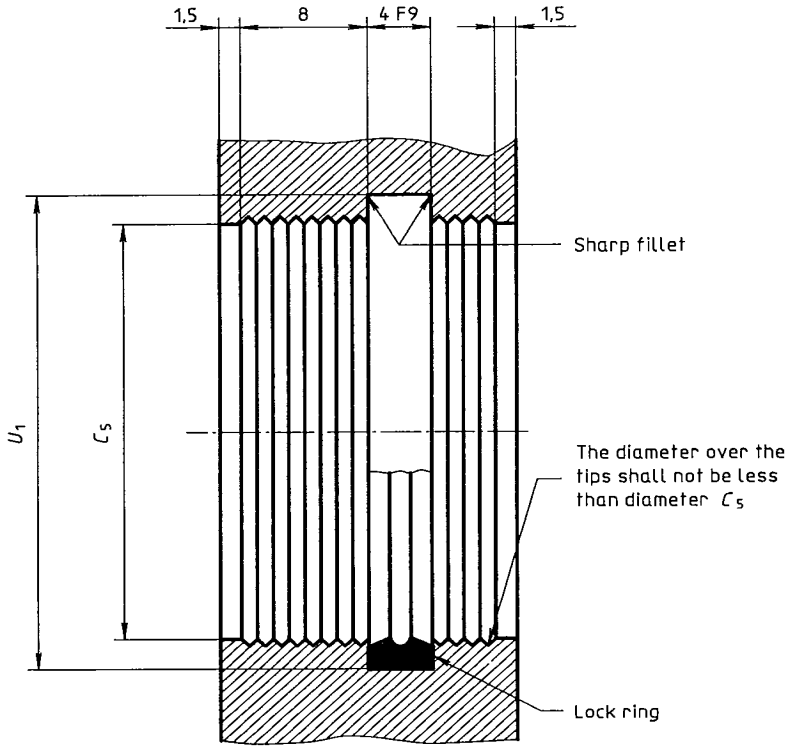


Figure B.2 — Grooving for expanded-type liners with lock ring

Table B.1

Nominal size	Lock ring groove diameter U_1 N12
25	27,25
33,7	35,95
38	40,25
40	42,25
51	53,25
63,5	65,65
70	72,15
76,1	78,25

Annex C
(normative)

Lock rings for expanded-type clamp liners

C.1 Scope

This annex is applicable to lock rings for expanded-type clamp liners.

C.2 Conditions of use

The use of a lock ring is particularly recommended in special cases for nominal sizes 25 mm up to and including 51 mm (for instance under conditions of high pressures, high temperatures or large thermal expansion with long lengths of piping), and for nominal sizes 63,5 mm and larger. The lock ring gives extra safety in the case of poor expansion.

C.3 Dimensions

The dimensions, in millimetres, and the tolerance classes (see ISO 286-2) are given in figure C.1 and table C.1.

C.4 Material

A steel having a hardness shown in table C.2 shall be used.

Table C.1

Nominal size	Lock ring outside diameter U_2
25	27,25
33,7	35,95
38	40,25
40	42,25
51	53,25
63,5	65,65
70	72,15
76,1	78,25

Table C.2

Hardness		Reference standard
Symbol	Value	
HV	450 to 480	ISO 6507-1
HB	425 to 450	ISO 6506
HRC	45,5 to 48	ISO 6508

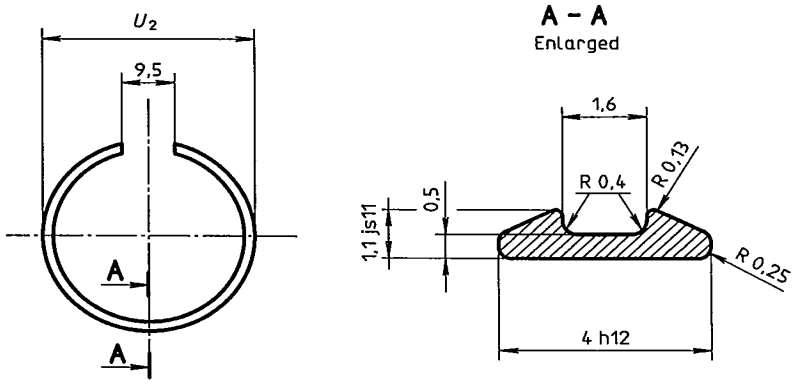


Figure C.1

Annex D
(informative)

Method of expansion with straight pipe

D.1 Scope

This annex specifies a method of expansion for assembling expanded-type clamp liners of nominal sizes 12 mm up to and including 76,1 mm on straight tubes of the dimensions given in ISO 2037.

D.2 Tools

The tools shown in figures D.1 to D.3 are suitable for clamp liners with or without lock ring. The set of tools consists of the following:

a base plate (see figure D.1)

b clamp block (see figure D.1)

c split cutting ring (see figure D.1)

d assembly punch (see figure D.1)

e flange locating ring (see figure D.2)

f expander (see figure D.2)

g facing cutter holder (see figure D.3)

h facing cutter (see figure D.3)

i facing ring (see figure D.3)

j centring pilot (see figure D.3)

The following tools are also required: torque wrench and sockets, levers, hacksaw, spanners for clamp block nuts, file, mallet.

D.3 Procedure

D.3.1 Preparation

Fasten the base plate **a** to the bench. Put a clamp block **b** of the required size on to the base plate with the location for the split cutting ring towards the front (see figure D.1). If long lengths of tubes are to be used, an additional support is required to keep the tube level.

D.3.2 Cutting the tube

When assembling two expanded-type liners on a tube, the length required is the distance between their mating liners less 4 mm, i.e. twice the compression thickness of the gasket.

D.3.2.1 Mark the tube to the length required. Push the tube through the centre hole of the clamp block. Fit the split cutting ring **c** in the clamp block. Place the cutting mark on the tube in line with the face of the cutting ring. Tighten the clamp block (see figure D.1).

NOTE 1 The end of polished tube tends to be tapered. Cut off the tapered portion before marking off the length of the tube.

D.3.2.2 Cut the tube with a hacksaw. File the tube end square against the split cutting ring.

D.3.3 Expansion

D.3.3.1 Release the clamp block, push the tube forward and re-clamp. Place the liner on the end of the tube, the flange facing outwards, and use the assembly punch **d** to drive the liner onto the tube (see figure D.1).

D.3.3.2 Release the clamp block and remove the split cutting ring. Position the liner in the location provided in the clamp block and re-clamp (see figure D.2).

D.3.3.3 Place the flange locating ring **e** over the liner and insert the expander **f** through the ring into the tube (see figure D.2).

NOTE 2 The expander rollers should be slightly oiled.

D.3.3.4 Set the torque wrench in accordance with the manufacturer's instructions. Apply the wrench and rotate the expander in a clockwise direction until the wrench releases.

D.3.3.5 Release the expander by an anti-clockwise rotation.

D.3.3.6 Use the levers to remove the expander and the flange locating ring.

D.3.4 Facing off

D.3.4.1 To face-off the expanded tube, fit the correct size facing cutter **h** and centring pilot **j** to the facing cutter holder **g**. Put the facing ring **i** over the flange of the liner, then insert the pilot of the facing tool into the tube about 10 mm beyond its end. Lock the pilot tight in the core of the tube, bring up the cutter, and adjust the spring pressure to keep the cutter against the edge of the tube. Rotate the cutter and remove the surplus metal. If, for any reason, the cutter is out of square, the facing ring will correct this.

D.3.4.2 Release the centring pilot and withdraw the cutter, holder and attachment as one unit, and remove the facing ring.

D.3.4.3 Release the clamp block and remove the tube-liner assembly.

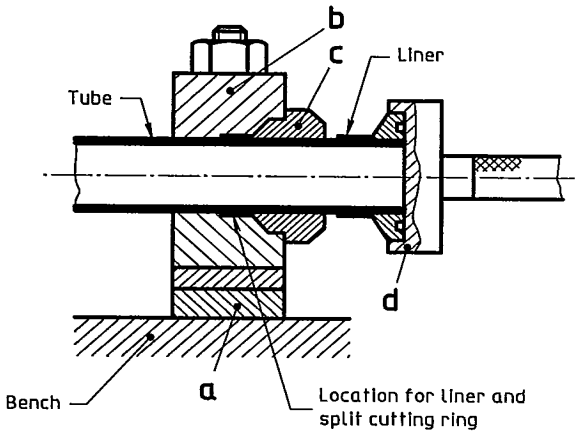


Figure D.1

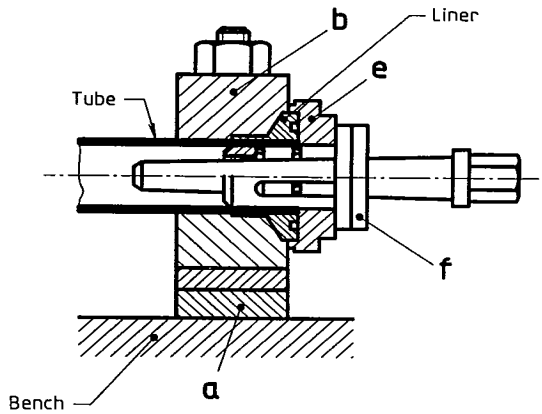


Figure D.2

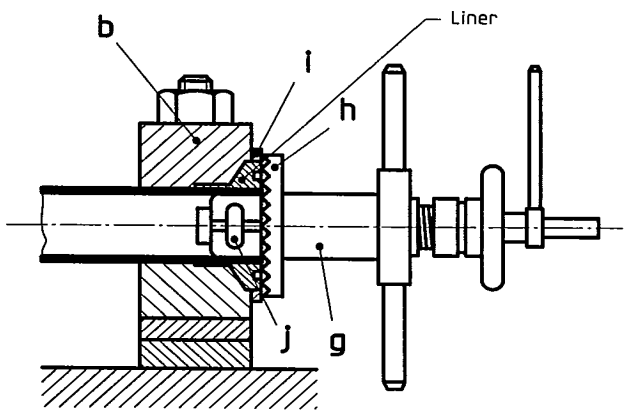


Figure D.3

Annex E
(informative)

Bibliography

[1] ISO 468:1982, *Surface roughness — Parameters, their values and general rules for specifying requirements.*

UDC 621.643.066-034.14

Descriptors: food industry, stainless steels, steel products, steel tubes, pipe fittings, couplings, specifications, dimensions.

Price based on 12 pages