BS EN 13617-4:2012

BSI Standards Publication

Petrol filling stations

Part 4: Safety requirements for construction and performance of swivels for use on metering pumps and dispensers

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National foreword

This British Standard is the UK implementation of EN 13617-4:2012. It supersedes BS EN 13617-4:2004, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PVE/393/4, Metering pumps and dispensers for liquid fuel.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Stations-service - Partie 4: Exigences relatives à la construction et aux performances de sécurité des raccords tournants utilisés sur les distributeurs de carburants

Tankstellen - Teil 4: Sicherheitstechnische Anforderungen an Bau- und Arbeitsweise von Drehgelenken für Zapfsäulen und druckversorgte Zapfsäulen

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Foreword

This document (EN 13617-4:2012) has been prepared by Technical Committee CEN/TC 393 “Equipment for tanks and filling stations”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2012, and conflicting national standards shall be withdrawn at the latest by September 2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13617-4:2004.

According to edition EN 13617-4:2004 the following fundamental changes are given:

— a new note at the end of the scope: ‘Fuels other than of Explosion Group IIA are excluded from this European Standard’ added;

— informative Annex B concerning environmental aspects added.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directives.

For relationship with EU Directives, see informative Annex ZA, which is an integral part of this standard.

The present standard is composed of the following parts:

— *Part 1: Safety requirements for construction and performance of metering pumps, dispensers and remote pumping units*;

— *Part 2: Safety requirements for construction and performance of safe breaks for use on metering pumps and dispensers*;

— *Part 3: Safety requirements for construction and performance of shear valves*;

— *Part 4: Safety requirements for construction and performance of swivels for use on metering pumps and dispensers*.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies safety requirements for the construction and performance of swivels to be fitted to delivery hose assemblies on metering pumps and dispensers installed at filling stations and used to dispense liquid fuels into the tanks of motor vehicles, boats and light aircraft and into portable containers at flow rates up to 200 l min^{-1}. It pays particular attention to electrical, mechanical and hydraulic characteristics of swivels.

The requirements apply to swivels at ambient temperatures from –20 °C to +40 °C with the possibility for an extended temperature range.

This European Standard applies mainly to hazards related to the ignition of liquid fuels being dispensed or their vapour. This European Standard also addresses electrical and mechanical hazards of swivels.

This European Standard is not applicable to swivels for the dispensing of any compressed gas.

NOTE 1 This European Standard does not apply to equipment for use with liquefied petroleum gas (LPG) or liquefied natural gas (LNG) or compressed natural gas (CNG).

NOTE 2 Fuels other than of Explosion Group IIA are excluded from this European Standard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 228, *Automotive fuels — Unleaded petrol – Requirements and test methods*

EN 1127–1, *Explosive atmospheres — Explosion prevention and protection — Part 1: Basic concepts and methodology*

EN 1360, *Rubber and plastic hoses and hose assemblies for measured fuel dispensing systems — Specification*

EN 13012:2001, *Petrol filling stations — Construction and performance of automatic nozzles for use on fuel dispensers*

EN 13463-1:2009 *Non-electrical equipment for use in potentially explosive atmospheres — Part 1: Basic method and requirements*

EN 13483, *Rubber and plastic hoses and hose assemblies with internal vapour recovery for measured fuel dispensing systems — Specification*

prEN 13617–1:2010 *Petrol filling stations — Part 1: Safety requirements for construction and performance of metering pumps, dispensers and remote pumping units*

EN 13617-2:2012, *Petrol filling stations — Part 2: Safety requirements for construction and performance of safe breaks for use on metering pumps and dispensers*

EN 60079-0, *Explosive atmospheres — Part 0: Equipment — General requirements*

EN ISO 228–1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation (ISO 228-1)*

EN ISO 1825, *Rubber hoses and hose assemblies for aircraft ground fuelling and defuelling — Specification (ISO 1825)*

EN ISO 8031:2009, *Rubber and plastics hoses and hose assemblies — Determination of electrical resistance and conductivity (ISO 8031:2009)*

ISO 261, *ISO general-purpose metric screw threads — General plan*

ISO 965–2, *ISO general purpose metric screw threads — Tolerances — Part 2: Limits of sizes for general purpose external and internal screw threads — Medium quality*

ISO 11925–3, *Reaction to fire tests — Ignitability of building products subjected to direct impingement of flame — Part 3: Multi-source test*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13012:2001, prEN 13617–1:2010 and EN 13617–2:2012 and the following apply:

3.1
swivel
device fitted between nozzle and metering pump or dispenser to allow rotational movement

3.2
single plane swivel
swivel with one plane of rotation

3.3
dual plane swivel
swivel with two planes of rotation

4 Explosion protection measures

4.1 Explosion protection measures shall be taken in accordance with EN 1127-1 and Annex B of EN 13617-1:2012.

4.2 The swivel shall be explosion protected and shall be Category 2 in accordance with EN 13463–1. The vapour path of a vapour recovery swivel shall be Category 1 in accordance with EN 13463–1. The swivel shall fulfil the requirements for temperature Class T3 and Group IIA to EN 60079-0 or EN 13463–1.

5 Construction

5.1 General

All electrical and non-electrical equipment and components, intended for use in potentially explosive atmospheres, shall be designed and constructed according to good engineering practice and in conformity with the required categories for Group II equipment to ensure avoidance of any ignition source. To classify the category of the equipment it shall be subjected to an ignition hazard assessment in accordance with 5.2 of EN 13463-1:2009.

Materials used in the construction shall be chemically and dimensionally stable under known service conditions. Materials likely to come into contact with fuels in both liquid and vapour phases shall be resistant to attack by these fuels. Conformity shall be demonstrated by manufacturer's declaration and by the tests detailed in Annex A.

Light alloys when used shall conform to the requirements of 6.4.4.2 of EN 13463–1:2009. If other specifications for explosion protected equipment impose more stringent requirements then the more stringent requirement shall apply.

All components shall be of corrosion resistant material or shall be provided with a corrosion resistant protective coating.

Outside surfaces likely to be handled shall be free of sharp edges.

If protective covers are fitted they shall be constructed so that they allow ventilation and evaporation of fuel even if some shrinkage occurs. They shall not affect the performance of the swivels.

The sealing surfaces of the connection threads shall be designed such that they are suitable for use with an enclosed O-ring or flat gasket.

5.2 Connection threads

Connection threads shall be one of the following styles:

Style 1

Swivels without a vapour recovery path shall use parallel threads in accordance with EN ISO 228–1.

The connection thread dimensions shall be in accordance with Table 1

Table 1 — Thread specifications

Nominal connection size Inch	**Female threads** Maximum thread depth[a] mm	**Male threads** Minimum thread length[b] mm
¾”	12,5	11,0
1”	15,5	14,0
1 ¼”	15,5	17,5
1 ½”	15,5	18,0

[a] The thread depth, measured from the outer fore-part to the metallic inner sealing face.

[b] The stated minimum length only applies if the female thread of the connection fitting includes an inner flat gasket. When no inner flat gasket is used the minimum thread length depends on the tightness requirements of the threaded connection.

Style 2:

Swivels with a vapour recovery path shall use M 34 x 1,5 male outlet threads according to ISO 261 and ISO 965-2.

The total thread length shall be maximum 15,0 mm.

The inlet end shall be machined to a diameter of (35,0 ± 0,05) mm for a length (6,0 ± 0,1) mm.

5.3 Safe breaks

If a swivel has an integral safe break it shall fulfil the requirements of EN 13617–2.

6 Physical properties

The physical properties of the swivel shall conform to the requirements given in Table 2 when tested by the methods indicated.

Table 2 — Physical properties of swivel

Property	Requirement	Test method
Electrical resistance between inlet and outlet when assembled.	$< 10^5\ \Omega$	A.4
Electrostatic properties	6.7 EN 13463-1:2009	EN 13463-1
Fuel compatibility	5.1	A.2 followed by A.6, A.7 and A.5
Endurance	Clause 6 and electrical resistance test $< 10^5\ \Omega$ after endurance test	A.3
Ignitability of composites on the swivel. Ignition source C; Effect time 20 s; Surface flame impingement	The material tested shall not flame	ISO 11925–3
Characteristics of swivel component's and/or covers to prevent dangerous, mechanically generated, sparks (resistance to sparking).	6.4.4.2 EN 13463–1:2009	EN 13463–1

7 Functional requirements

The swivel shall comply with the operational requirements of Table 3 when tested by the indicated methods; and with a frequency of testing as specified in Clause 8 and Table 4.

Table 3 — Operational requirements

Test	Test method	Requirement
Burst test	A.5	No catastrophic damage.
Drop test	A.6	No permanent deformation of the swivel leading to malfunction.
Leak test	A.7	No quantifiable sign of leakage visible to an eye with normal visual acuity.

8 Frequency of testing

Testing shall be performed in accordance with the schedule given in Table 4.

A total of five swivels shall be subjected to the type tests.

One swivel for type test shall be tested according to A.3 followed by functional requirements under Clause 7.

Four swivels for type test shall be pre-conditioned according to A.2. The drop test according to A.6 shall be done immediately after removal from saturated atmosphere and shall be commenced within 30 min of removal from saturated atmosphere, followed by the leak test according to A.7. Then the burst test shall be performed according to A.5.

Production acceptance tests shall be carried out on the first unit produced on a production run, the last unit manufactured on a production run and at least every one hundredth unit during the production run.

Routine tests shall be carried out on each finished swivel.

Table 4 — Tests

Property/requirements	Type test	Production acceptance test	Routine test
Electrical resistance	A.4	A.4	A.4[a]
Ignitability	Manufacturers declaration	—	—
Resistance to sparking	Manufacturers declaration	—	—
Tightness	A.7	A.7	A.7
Burst test	A.5	—	—
Drop test	A.6		—
Endurance	A.3	—	—

[a] Where there is low electrical resistance material from inlet thread, across the swivel to the output then this routine test shall not be required.

9 Information for use

9.1 General

Information for use shall be according to EN 13617-1.

9.2 Marking and instruction

If the size of the swivels is not large enough for the marking, only the name of the manufacturer and the style of the swivel shall be marked. All further details of the marking may be included in the declaration form.

Swivels shall be marked legibly and indelibly during the manufacturing process; where necessary this marking may be made visible for inspection by the easy removal of plastic covers. Marking shall include at least the following information:

— manufacturer's name or identification;

— EN-number;

— the ambient temperature range if it is outside the temperature range of -20 °C to +40 °C;

— style - as defined by this document;

— manufacturer's type indication;

— serial number, batch code or date code with a precision of at least year and quarter;

— direction of flow, if necessary.

In case of extended temperature range this shall be visibly marked.

Instructions shall be provided by the manufacturer for the safe installation, operation and maintenance of the swivel.

Annex A
(normative)

Testing

A.1 General

The following preconditioning exercises shall be undertaken prior to performing the tests given in A.5 and A.6.

The tightness test A.7 shall not be commenced before 30 min after completion of the procedure given in A.2.

Where a test liquid is required it shall be odourless kerosene except where noted.

All pressures are gauge (over pressure) readings.

All tests shall be performed at (20 ± 5) °C unless otherwise stated.

A.2 Fuel compatibility pre-conditioning

A.2.1 To pre-condition materials used in the construction of the swivel in a defined manner.

A.2.2 The preconditioning test liquid shall be unleaded petrol according to EN 228.

A.2.3 The swivel shall be completely filled with the test liquid and shall be maintained in that state for not less than 168 h.

A.2.4 The swivel shall now be drained of the test liquid and within 1 h of draining shall be placed in a closed vessel containing a saturated atmosphere of the test liquid.

A.2.5 At a time (24 ± 2) h from being placed in the saturated atmosphere of the test liquid.

A.3 Endurance

A.3.1 To confirm that the swivel complies with Clause 6 and electrical resistance test according to A.4 after having being subjected to 50.000 cycles of operation as described in A.3.2 through A.3.4.

A.3.2 With the outlet end of one sample of the swivels firmly fitted in a test bench to an adopter allowing rotation and the inlet end secured against rotation and plugged, a test liquid pressure of 350 kPa shall be applied to the outlet end of the swivel.

A.3.3 For swivels with an integrated vapour recovery passage, an appropriate connection shall be made on the test bench. The vapour path through the swivel shall remain separated from the liquid side by means of standard used O-rings.

A.3.4 A pulling force of (89 ± 1) N shall be applied to the inlet end of each plane of rotation of the swivel under an angle of 45° at a distance of 30 mm from the plane of rotation.

A.3.5 The plane of rotation subjected to the cycle test shall be rotated through an arc of 180° at a rate not in excess of 10 cycles per minute.

A.3.6 Rotation of the swivel 180° and than back to the initial position is considered 1 cycle of operation.

A.3.7 After every 250 cycles the swivel shall be flushed with the test liquid for not less than 1 min with not less than 25 l min^{-1}.

A.3.8 For dual plane swivels the test according to A.3.1 to A.3.5 shall be performed for any plane rotation. Both halves of the swivel shall be tested separately, if necessary by using an adapter. If both halves of the swivel are of the same construction, only one half shall be tested.

A.4 Electrical resistance test

A.4.1 To determine the electrical resistance through the body of the swivel.

A.4.2 The electrical resistance shall be measured from the input to the output thread according to Clause 4 of EN ISO 8031:2009.

A.4.3 The resistance shall be measured and recorded in ohms.

A.4.4 This shall be repeated for type test for four other points on the swivel inlet and outlet ends.

A.5 Burst test

A.5.1 To confirm that the swivel is of sufficient strength.

A.5.2 The fully assembled swivels shall be tested with the test liquid at an internal pressure of (1,4) MPa [(14) bar], the pressure shall be maintained for not less than 60 s.

A.5.3 During the 60 s of the applied pressure it shall be observed for leakage and results shall be recorded.

A.5.4 The pressure shall be reduced to 0 Pa [0 bar].

A.6 Drop test

A.6.1 To pre-condition a swivel by simulating the impacts that may occur in use.

A.6.2 The swivel shall be fitted to a 3 m length of hose according to EN 1360, EN ISO 1825 or EN 13483.

A.6.3 With a standard nozzle, according to EN 13012, fitted to the swivel, the hose assembly then shall be pressurised to (350 $\pm$ 10) kPa [(3,5 $\pm$ 0,1) bar with liquid (this may be water).

A.6.4 The nozzle shall be released from a height of 1,0 m and shall be allowed to fall onto a concrete surface.

A.6.5 The release onto the concrete surface shall be repeated four times.

A.6.6 The swivel shall be observed for leakage and the results shall be recorded.

A.7 Leak test

A.7.1 To confirm that the swivel does not leak.

A.7.2 The swivel shall be tested with the test liquid at an internal pressure of (525 $\pm$ 10) kPa, (5,25 $\pm$ 0,1) bar, the pressure shall be maintained for at least 10 s.

A.7.3 The swivel shall be observed for leakage and the results shall be recorded.

A.7.4 Alternatively to this test, for instance a pressure differential test, may be applied provided the results are comparable to those achieved by this test.

Annex B
(informative)

Environmental aspects

B.1 Materials should be selected to optimize product durability and lifetime and consideration should be made to avoiding the selection of rare or hazardous materials.

B.2 Consideration should be made to using recycled or re-used materials, and to the selection of materials which can then be subsequently recycled.

B.3 The possibility of marking components to aid to their sorting for disposal/recycling at end of life should also be reviewed.

B.4 Packaging design should consider using recycled materials, and materials that need little energy for their manufacture and should minimize waste.

B.5 Packaging design should consider subsequent re-use and recycling.

B.6 The size and weight of packaging should be minimized whilst protecting the products to minimize waste through damage.

B.7 Test fluids should be used and disposed of in accordance with manufacturer’s instructions.

Environmental checklist

Environmental Issue	Stages of the life cycle										All stages
	Acquisition		Production		Use			End-of-Life			
	Raw materials and energy	Pre-manu-factured materials & components	Production	Packaging	Use	Maintenance and repair	Use of additional products	Reuse/ Material and Energy Recovery	Incineration without energy recovery	Final disposal	Transportation
Inputs											
Materials	B.1,B.2	B.1,B.2		B.5				B.2,B.3 B.5	B.2,B.3 B.5	B.2,B.3 B.5	
Water											
Energy				B.4							B.6
Land											
Outputs											
Emissions to air			B.7								
Discharges to water											
Discharges to soil											
Waste			B.7							B.2,B.3 B.5,B.6	
Noise, vibration, radiation, heat											
Other relevant aspects											
Risk to the environ-ment from accidents or unintended use											
Customer information											

Comments:

NOTE 1 The stage of packaging refers to the primary packaging of the manufactured product. Secondary or tertiary packaging for transportation, occurring at some or all stages of the life cycle, is included in the stage of transportation.

NOTE 2 Transportation can be dealt with as being a part of all stages (see checklist) or as separate sub-stage. To accommodate specific issues relating to product transportation and packaging, new columns can be included and/or comments can be added.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 94/9/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 94/9/EC.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative Clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 94/9/EC

Essential Requirements of Directive 94/9/EC	Qualifying remarks/Notes	Relevant clause(s) in this European Standard
1.0.1	Principles of integrated explosion safety	5, 6
1.0.2	Design for misuse	5, 6
1.0.3	Special checking and maintenance conditions	8
1.0.4	Surrounding area conditions	1, 6
1.0.5	Marking	9
1.1.1	Materials must not trigger off an explosion	4, 5
1.1.2	No reaction of materials and explosion atmosphere	4
1.1.3	No reduction in protection due to corrosion, wear, etc	4, 5
1.2.1	Regards to technological knowledge	2, 4.1
1.2.2	Intended purpose	4.1
1.2.3	Enclosed structures and prevention of leaks	4, 5, 6
1.2.5	Additional means of protection	4, 6
1.2.7(a)	Physical injury or other harm	5.1
1.2.7(d)	Overloads	A.5
1.3.1	Hazards arising from different ignition sources	4.1, 5
1.3.2	Hazards arising from static electricity	4.1, 5, 6
1.3.3	Hazards arising from stray electric and leakage current	A.4
1.4.2	Mechanical & thermal stress, aggressive substances	4.1, 5, 6

Table ZA.1 (continued)

Essential requirement	Subject	Relevant Clause(s) in the standard
1.5.2	System security in the event of safety device failure	6, 8
1.6.1	Manual override	1
1.6.3	Hazards arising from power failure	6
1.6.4	Hazards arising from connections	4
2.1.1.1	No sources of ignition even in events of rare incidents	4.2
2.1.1.2	Temperature limit can never be exceeded	4.1, 5
2.1.1.3	Opening of parts having possible sources of ignition	4.1, 5
2.2.1.1	No sources of ignition in event of operating faults	4.1, 5

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

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