BRITISH STANDARD

BS 1139-2.1:
1991
EN 74:1988
Incorporating
Corrigendum No. 1

Metal scaffolding —

Part 2: Couplers —

Section 2.1 Specification for steel couplers, loose spigots and base-plates for use in working scaffolds and falsework made of steel tubes

This European Standard EN 74 has the status of a British Standard

ICS 91.220

Committees responsible for this British Standard

The European Committee for Standardization, under whose supervision this European Standard was prepared, comprises the national standards organizations of the following Western European countries.

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This British Standard was published under the authority of the Board of BSI and comes into effect on 31 January 1991

First published, as BS 1139, November 1943
Second edition November 1951
Third edition June 1964
Fourth edition, as BS 1139-2, September 1982
Fifth edition, as BS 1139-2.1, January 1991

The following BSI references relate to the work on this standard:
Committee reference CSB/57
Draft for comment 85/15498 DC

ISBN 0 580 18669 5

Amendments issued since publication

Amd. No.	Date of issue	Comments
10294 Corrigendum	October 1998	Indicated by a sideline in the margin

Contents

National foreword

This Section of BS 1139 has been prepared under the direction of the Civil Engineering and Building Structures Standards Policy Committee (CSB/-). Together with BS 1139-2.2:1990, it supersedes BS 1139-2:1982, which is withdrawn.

This Section of BS 1139 is one of a series specifying requirements for the design, construction and testing of equipment for use in scaffolding and other temporary structures. BS 1139-2.1 is identical with EN 74:1988 "*Couplers, loose spigots and base-plates for use in working scaffolds and falsework made of steel tubes; Requirements and test procedures*" published by the European Committee for Standardization (CEN). EN 74 was produced as a result of agreement in CEN Technical Committee TC 53, Scaffolds, falsework and mobile access towers, in which the UK took an active part.

Some significant points about this Section of BS 1139 to which attention is drawn are the following.

a) Other scaffold couplers and fittings commonly in use in the UK are dealt with in BS 1139-2.2.

b) For right-angle and friction type sleeve couplers there are now two load classes. For right-angled couplers, Class A is equivalent to the grade given in BS 1139-2:1982. Class B is 50 % stronger than Class A.

For friction type sleeve couplers, the new Class B is equivalent to the British coupler in the earlier BS 1139-2 and the Class A is 50 % weaker than Class B and is currently not in use in the UK.

Loose spigot pins and sleeve couplers with shear pins are currently not in use in the UK.

c) The minimum permissible base-plate area is now a little smaller.

d) Load bearing parallel couplers are now specified.

e) There is an increased minimum yield strength requirement on all coupler fasteners (typically bolts) together with a restricted torque tightening/wedge range.

f) The philosophy of testing has been changed to verify an individual coupler design and facilitate on-going quality assurance.

g) Additional information is required to be marked on all products.

h) There is limited information on hexagon sizes. The United Kingdom scaffolding industry generally requires hexagons to be between 20.3 mm and 20.8 mm across flats.

BS 1139 is now published in separate Parts and Sections as follows and on publication of Section 2.2, BS 1139-2:1982 will be withdrawn.

— *Part 1: Tubes;*

— *Section 1.1: Specification for steel tube;*

— *Section 1.2: Specification for aluminium tube;*

— *Part 2: Couplers;*

— *Section 2.1: Specification for steel couplers, loose spigots and base-plates for use in working scaffolds and falsework made of steel tubes;*
(Identical with EN 74)

— *Section 2.2: Specification for steel and aluminium couplers, fittings and accessories for use in tubular scaffolding*[1]*;*

— *Part 3: Specification for prefabricated access and working towers;*

— *Part 4: Specification for prefabricated steel splitheads and trestles;*

[1] In preparation: it will cover couplers, fittings and accessories not included in Section 2.1. Additional couplers have not yet been harmonized.

— *Part 5: Specification for materials, dimensions, design loads and safety requirements for service and working scaffolds made of prefabricated elements*[2];
(Technically equivalent to HD 1000)

In examining the text of EN 74 certain printing errors have been noted. These were agreed by CEN/TC 53 at its 1990 London meeting and will be minuted by the CEN/TC 53 Secretariat for future amendment of the standard. They are as follows with the page numbers referring to the EN text.

a) EN cover page. Include Iceland and Luxemburg in the list of countries.

b) Page 2, last paragraph. Include Iceland, Ireland, Luxemburg and Sweden in the list of countries.

c) Page 3, list of figures. At the bottom of the list of figure descriptions replace "Dimensions in mm" by "All linear dimensions shown in the figures are in millimetres".

d) Page 4, footnote 1). The word "coupler" has been omitted and the footnote should read:

> "For the purpose of this European Standard a coupler, spigot or base-plate of a new or old design submitted for the first time to specific tests specified in this standard".

e) Page 18, paragraph 3, line 2. The symbol "⩽" is incorrect and the line should read:

> "$\Delta_4 \geqslant 5{,}0$ mm or if the load $P = L\ (\Delta_4)$ cannot be reached."

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, the EN title page, pages 2 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

[2] In preparation.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 74

June 1988

UDC 69.057.62:69.057.692/693:62-462-034.14:620.17

Key words: Steel tubes, scaffolding, fasteners, pipe fittings, centring pins, supports, equipment specifications, inspection methods, sampling, mechanical tests.

English version

Couplers, loose spigots and base-plates for use in working scaffolds and falsework made of steel tubes; Requirements and test procedures

Raccords, goujons d'assemblage et semelles pour échafaudages de service et d'étaiement en tubes d'acier; Spécifications et méthodes d'essai

Kupplungen, Zentrierbolzen und Fussplatten für Stahlrohr-Arbeitsgerüste und -Tragegerüste; Anforderungen, Prüfungen

This European Standard was accepted by CEN on 27 January 1988. CEN members are bound to comply with the requirements of the CEN/CENELEC Rules which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Central Secretariat or to any CEN member.

This European Standard exists in the official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to CEN Central Secretariat has the same status as the official versions.

CEN members are the national standards organizations of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Ref. No. EN 74:1988 E

Brief history

Since July 1970 CEN/TC 53 "*Components of tubular steel scaffoldings*" has dealt with European standardization within the field of scaffolding in order to abolish trade barriers due to differing safety requirements on building sites. After preliminary vote on the European Standard EN 39 *"Steel tubes for working scaffolds; requirements, tests"* the European Standard pr EN 74 "*Couplers and accessories for working scaffolds made of steel tubes; requirements and test procedures*" was prepared and in autumn 1975 CEN submitted the first draft of this standard to its CEN Members for preliminary vote. At the same time this standard was also adopted as ISO 4054 by ISO/TC 5 *"Metal pipes and fittings"* and in November 1977 it was submitted to the ISO Members for vote. As the ISO Standard was adopted the first edition of ISO 4054 "*Couplers, loose spigots and base-plates for use in working scaffolds made of steel tubes; requirements and test procedure*" was published in April 1980.

During its 19th meeting in Copenhagen in spring 1984 CEN/TC 53 (meanwhile renamed "*Scaffolds, falsework and mobile access towers*") discussed once again the question concerning couplers for working scaffolds as well as for falsework and charged CEN/TC 53/WG 3 with the revision of the first draft pr EN 74. In this connection the higher requirements which are necessary for falsework should also be taken into consideration.

During its 21st plenary meeting in autumn 1986 in Zurich CEN/TC 53 accepted EN 74 as amended by its working group WG 3 and requested the DIN secretariat to send EN 74 out as a European standard by CEN for final voting.

According to the Common CEN/CENELEC Rules, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Norway, Portugal, Spain, Switzerland, United Kingdom.

Contents

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1 Object and field of application

This European Standard specifies the requirements for materials and design, and test procedures and methods, for couplers, loose spigots and base-plates used for connecting steel tubes of 48,3 mm outside diameter and of at least 3,2 mm nominal wall thickness at a minimum in the construction of working scaffolds and falsework required for the construction, maintenance, repair and demolition of buildings and structures.

The requirements and test procedures specified are for the assessment of prototypes[3] of these couplers, loose spigots and base-plates[4].

When no alteration has been made to the design, material or surface treatment of a type of coupler which has been approved as a prototype according to this European Standard, the assessment of subsequent production is made by comparison with the requirements given in this European Standard.

2 References

pr HD 1039:1987, *Steel tubes for falsework and working scaffolds; requirements, tests.*

ISO 752:1982, *Zinc ingots.*

ISO 2859:1974 (and its addendum 1), *Sampling procedures and tables for inspection by attributes*[5].

ISO 3207:1975, *Statistical interpretation of data — Determination of a statistical tolerance interval.*

ISO 3951:1981, *Sampling procedures and charts for inspection by variables for percent defective.*

3 Definitions

For the purpose of this European Standard, the following definitions apply:

3.1
coupler

a component used for connecting two tubes

3.2
right angle coupler (RA)

a coupler used for connecting two tubes crossing at a right angle

class A and class B right angle couplers have the same requirements, except that class B couplers have a higher load capacity, and a minimum requirement for torsional rigidity

3.3
swivel coupler (SW)

a coupler used for connecting two tubes crossing at any angle

3.4
parallel coupler (PA)

a coupler used for connecting two parallel tubes

3.5 sleeve coupler (SF or SS)

a coupler used for joining two tubes located co-axially and whose purpose is to transmit tensile and compressive and bending forces.

Class A and class B sleeve couplers have the same requirements except that class B couplers have a minimum requirement for strength in bending and a higher tensile strength requirement.

There are two basic types of sleeve couplers:

3.5.1 sleeve couplers functioning by friction (SF)

3.5.2 sleeve couplers working with shear pins (SS)

3.6
loose spigot (LS)

an internal component used for aligning tubes co-axially and able to transmit compressive forces

3.7
base-plate (BP)

a rigid plate used for spreading a load over a greater area. If it has a means of vertical adjustment, it is called an “adjustable base-plate”. This type of base-plate is not covered by this European Standard

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[3] For the purpose of this European Standard a spigot or base-plate of a new or old design submitted for the first time to specific tests specified in this standard.

[4] Allowable working loads shall be obtained from other appropriate documents.

[5] At present in revision.

4 Symbols

4.1 Measured values

f	displacement in millimetres in Figure 4
Δ	displacement in millimetres in Figure 6
P	load in kN
L	specified lower limit for a load-bearing capacity or ultimate load in kN
ϕ	angle of rotation in degrees
Δ_1	displacement of the transverse tube under load relative to the basic tube in Figure 3 a) and Figure 3 b), or the relative displacement of two tubes in Figure 8
Δ_2	displacement of the rear of the coupler fixed to the basic tube relative to the basic tube in Figure 3 a), Figure 3 b) and Figure 8
Δ_3	displacement of the transverse tube relative to the basic tube resulting from the play of the swivel joint pin in Figure 3 b)
Δ_4	displacement of the tubes connected by a sleeve coupler relative to the two end reaction points in Figure 7
$P_{max}(\Delta_1)$	maximum load-bearing capacity of the coupler in the displacement range Δ_1 = 0 to 7,0 mm for right angle and swivel couplers or 0 to 2,0 mm in the case of parallel couplers
$P_{max}(\Delta_2)$	maximum load-bearing capacity of the coupler (slipping load) in the displacement range Δ_2 = 0 to 0,5 mm
$L(\Delta_1)$, $L(\Delta_2)$, $L(\Delta)$	specified lower limit for $P_{max}(\Delta_1)$ or $P_{max}(\Delta_2)$ or $P_{max}(\Delta)$ in Table 1, columns 5 and 6
$P = f(\Delta_1)$, $P = f(\Delta_2)$	relationship of load P to displacement Δ_1 or Δ_2 (load-displacement curve)
Subscript j	the running subscript j, found in Δ_j, $P(\Delta_j)$, $L(\Delta_j)$ stands for the figures j = 1, 2,...; thus Δ_j means Δ_1 and Δ_2, etc.

4.2 Statistical values

N	batch size
n_a	size of random sample taken from a batch for inspection by attributes
n_v	size of random sample taken from a batch for inspection by variables
$\bar{x}$	mean load in kN estimated from a series of $\bar{i}$ measurements (measurements of forces) for P_{max}, $i(\Delta_j)$ $$\bar{x} = \frac{1}{n_v} \sum_{i=1}^{n_v} P_{max}, i(\Delta_j)$$
$\bar{x}(\Delta_1)$, $\bar{x}(\Delta_2)$	mean value of a series of measurements for $P_{max}(\Delta_1)$ or $P_{max}(\Delta_2)$
S	standard deviation of force values in kN estimated from a series of i measurements (measurements of forces) $$s = \sqrt{\frac{\sum_{i=1}^{n_v} (P_{max}, i(\Delta_j) - \bar{x})^2}{n_v - 1}}$$
$s(\Delta_1)$, $s(\Delta_2)$	estimate of the standard deviation from a set of measurements of $P_{max}(\Delta_1)$, or $P_{max}(\Delta_2)$
k_s	the coefficient for the one-sided statistical tolerance (unknown standard deviation σ) based on sample size n_v. The interval confidence level $(1 - \alpha)$ is the probability that the statistical tolerance interval will contain at least a proportion q of the population (see ISO 3207). The interval is also a function of the estimate s of the standard deviation $k_s = k_2(n_v, q, 1 - \alpha)$ (k_2 see ISO 3207)
z	test value of a series of measurements for comparison with a specified lower limit: $z = \bar{x} - k_s \cdot S$ in kN
$z(\Delta_1)$, $z(\Delta_2)$	test value of a series of measurements of $P_{max}(\Delta_1)$ or $P_{max}(\Delta_2)$
A_c	acceptance number of a sampling plan for inspection by attributes, the choice of plan depending on the operating characteristic curve (see ISO 2859)
P	the average percent defective of product in batches submitted by the supplier for inspection (see ISO 2859)
d	number of defectives found in a sample
P_a	probability of acceptance of a batch (of size N) in per cent. For a given sampling plan, P_a is a function of the percent defective p in the batch being submitted (see **8.2.3**).

5 Materials and design

5.1 Materials

All components shall be made of appropriate, if possible standardized, material such as forged steel, rolled steel, malleable cast iron, or cast steel. The material shall be free from any impurities and defects which might affect its satisfactory use, and the components shall either be made of corrosion-resistant material or be protected against oxidation and corrosion.

5.2 Design

5.2.1 ***Couplers***

5.2.1.1 Couplers shall be designed and manufactured so that they will firmly fix tubes together even after repeated use.

5.2.1.2 Where a coupler is fixed to a tube with a diameter which is at the lower tolerance limit, the clamping device shall have at least 2,0 mm of travel remaining after tightening. For a wedge coupler, there shall be equivalent unused travel.

5.2.1.3 In normal use, the tube shall not be damaged by the couplers. However, slight local indentations and/or deformations are permitted.

5.2.1.4 The various parts of the coupler shall be firmly attached to each other unless the design precludes this and it is impossible for the coupler under load to remain in position on the tubes without all its parts.

5.2.1.5 Neither the wedge nor the end of the bolt should directly touch the tube in order to tighten the fitting unless the contact of wedge or bolt along the tube is greater than 18 mm in all cases. If necessary a permanently attached spacer shall be incorporated to protect the tube.

5.2.1.6 A coupler which is secured by means of a screw shall be so constructed that it will perform satisfactorily when tightened as follows:

Tightening torque shall be indicated by the manufacturer and preferably shall be between 40 and 80 N·m. For types of couplers where hexagonal nuts are used with ISO threads, the following tightening torques are preferred:

a) width across flats 22 mm: 50 N·m[6)]

b) width across flats 24 mm: 80 N·m.

When tightened with these torques, the maximum stress in screwed components shall not be greater than 70 % of the yield stress of the material.

Couplers secured with a wedge shall be tightened by striking the wedge with a 500 g hammer, until there is a jarring blow.

5.2.1.7 In addition, sleeve couplers shall be such that the tubes are co-axial and shall have a tube centring device which ensures that both ends of the sleeve coupler will grip at least 46 mm of tube either end of the centring device.

5.2.2 ***Loose spigots***

Loose spigots shall extend to a depth of at least 75 mm into the tubes on both sides of the flange. The outside diameter of flanges shall be not greater than 47,8 mm and not less than 47,0 mm. The circumscribing circle of the body shall have a diameter of not greater than 37,5 mm and not less than 35,0 mm, with the exception of cross-shaped bodies, which may have a maximum diameter of 38,7 mm. The flange and spigot axis shall be concentric, and the tolerance on concentricity shall be 1,0 mm.

5.2.3 ***Rigid base-plates***

Each base-plate shall have a circular or square base with an area not less than 150 cm^2. The thickness of the plate shall be at least 5 mm for base areas up to 175 cm^2; if the base area is larger than this, the thickness shall be increased in proportion to the largest dimension of the base area. If the plate is shaped, the rigidity shall be equivalent to that of a flat base-plate.

5.2.3.1 The base-plate shall have a centring device which is so designed that it cannot move a distance greater than 11,0 mm within a bore of 43,0 mm internal diameter (see Figure 1). The centring device shall be at least 50 mm long.

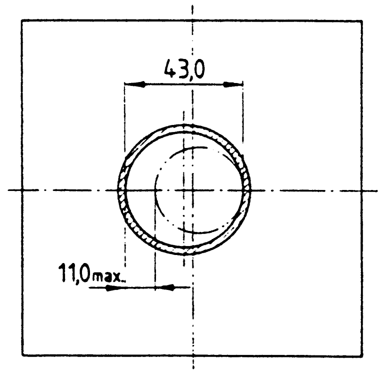


Figure 1 — Maximum clearance between centring device and tube

5.2.3.2 The base-plate including the centring device shall be made from material having a tensile strength of not less than 300 N/mm^2 and a yield stress of not less than 200 N/mm^2.

6) The 22 mm size is not in accordance with ISO 272.

5.3 Data required from the manufacturer for assessment purposes

The manufacturer shall record on drawings the following data for couplers, loose spigots and base-plates:

a) shape;

b) essential dimensions with tolerances;

c) mass with tolerance;

d) material characteristics;

e) surface protection;

f) the required tightening torque in the case of screw couplers;

g) the maximum permissible play of the swivel joints in the case of swivel couplers.

6 Requirements

6.1 Design requirements

6.1.1 All couplers, loose spigots and base-plates shall comply with the relevant items in clause **5**.

6.1.2 The dimensions, mass and material characteristics shall lie within the tolerances specified in the manufacturer's drawings referred to in **5.3**. The surface protection shall be as specified in the manufacturer's drawings.

6.2 Required characteristics for couplers under load (see clause **9**)

The requirements for prototype testing of couplers are listed in Table 1.

6.2.1 ***Assessment without statistical analysis***

Where a coupler (as specified in column 1 of Table 1) is tested using one of the procedures in column 2 and 3, the following limits shall apply in the case of non-statistical assessment:

a) in any test the load-bearing capacity or breaking load in column 4 shall not be less than the lower limit L or $L(\Delta_j)$ in column 5 for class A couplers or column 6 for class B couplers;

b) the appropriate permissible displacement range Δ_j in column 7 shall not be exceeded in any test at the lower limit $L(\Delta_j)$ of the load-bearing capacity specified in column 5 for class A couplers or column 6 for class B couplers.

Column 8 of Table 1 gives the minimum number of tests required.

6.2.2 ***Assessment with statistical analysis***

Prototype couplers are in accordance with this European Standard for their load-bearing capacity $P(\Delta_j)$ if it can be stated with a confidence level of 95 % that at least 90 % of the items in the batch from which the random sample was taken exhibit the same or better load-bearing capacity $P_{max}(\Delta_j)$ than the specified lower limit $L(\Delta_j)$. Examples of assessment procedures which test acceptance to these requirements are indicated in **8.2.4** and **8.2.5**.

Further assessment procedures which may also be applied are to be found in ISO 2859 (and its addendum 1), ISO 3207 and ISO 3951.

6.3 Requirements in the case of design alteration

Where alterations which are likely to degrade performance are made to the design, material or surface treatment of couplers which have already been submitted to a prototype test, a new test shall be made.

7 Sampling for prototype tests

7.1 Sampling shall be carried out by an agreed representative of a competent authority or by an independent organization approved by the competent authority.

7.2 The test pieces required for prototype testing shall be taken at random (see ISO 2859, addendum 1) from a batch of at least 500 couplers obtained from the manufacturer's current production run or from stock.

7.3 The number of test pieces is specified in the description of the appropriate test procedure (see **9.2** to **9.9**). In addition, the number is shown in column 9, Table 1.

7.4 In statistical assessment, it may become necessary, depending on the operating characteristic and assessment procedure chosen, to test more couplers per batch than the minimum number indicated in column 9, Table 1 (see also **8.2**).

8 Assessment methods

8.1 Assessment without statistical analysis

8.1.1 ***Evaluation procedure***

All tests which are marked "non statistical" in column 10 of Table 1 are assessed without statistical analysis.

8.1.2 ***Criteria***

a) All the loads measured in a given test series (for example ultimate load as specified in column 4 of Table 1) are compared with their specified lower limits (column 5 for class A couplers or column 6 for class B couplers, Table 1). No measurement shall be less than its lower limit, in any test.

b) When the displacement values is limited, then this displacement is measured under the load equal to the specified lower limit (column 6, Table 1). No displacement value shall lie outside the permissible displacement range in any test (column 7, Table 1).

8.2 Assessment with statistical analysis

8.2.1 ***Evaluation procedure***

All tests so marked in column 10 of Table 1 shall be statistically assessed.

8.2.2 ***Alternative methods***

The method of inspection by attributes or the method of inspection by variables may be used for statistical acceptance.

In inspection by attributes it is only necessary to check whether or not the displacement Δ_j of the coupler exceeds a specified limiting value when subjected to a load $P = L(\Delta_j)$.

For inspection by variables, the value of the load-bearing capacity $P(\Delta_j)$ of every coupler in the sample is measured and a test quantity $z(\Delta_j)$ is calculated from the set of measurements: this must be greater than the lower limit specified for the load $L(\Delta_j)$ (see Table 4). Inspection by variables is only permitted when the distribution of the test results does not differ significantly from normal, or the actual distribution can be transformed to a normal one.

The testing applicant, for example a manufacturer, is free to choose the method of analysis provided that both methods are applicable.

8.2.3 ***Operating characteristic curve***

NOTE A curve showing, for a given sampling plan, the probability of acceptance of a batch as a function of its actual quality.

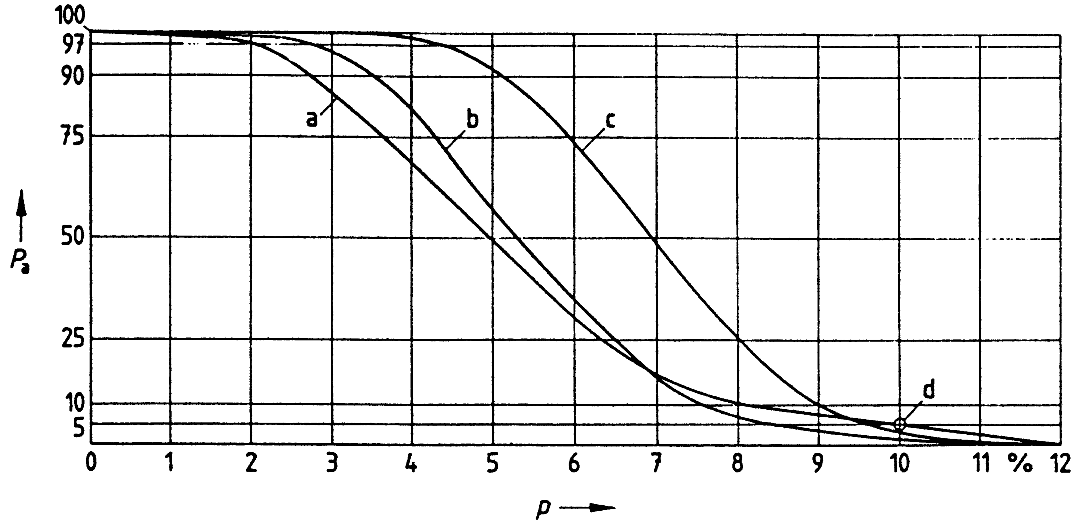
8.2.3.1 Both test methods shall be based on the comparable operating characteristics (see ISO 2859, addendum 1).

8.2.3.2 For use in prototype testing, an operating characteristic which runs through both the following points is recommended (see Figure 2):

p = 2 %; P_a = 97 %

p = 10 %; P_a = 5 %

There are similar operating characteristic curves in the ISO publications previously referred to.



P_a probability of acceptance
p percent defective
a curve as recommended in **8.2.3.2**
b operating characteristic curve associated with sampling plan L, AQL 2,5 in ISO 2859
c operating characteristic curve associated with sampling plan M, AQL 4,0 taken from ISO 2859
d limiting point (p = 10 %; P_a = 5 %) as specified in **6.2.2** and **8.2.3.3**

Figure 2 — Operating characteristics

Table 1 — Summary of requirements for testing the behaviour under load of prototype couplers specified in clauses 8 and 9

Column	1	2	3	4	5	6	7	8	9	10
Line	Type of coupler	Test procedure as in		Qualities investigated	Lower limit of load bearing capacity for couplers		Permissible range of displacement down to lower limit of bearing strength	Minimum number of		Evaluation procedure
		Clause	Figure		Class A	Class B		Tests	Couplers required	
					kN	kN	mm			
1.1	Right-angle coupler	**9.2.2** or **9.2.3**	Figure 3a	Load-bearing capacity relative to Δ_1[a]	$L\ (\Delta_1) = 7{,}0$	$L\ (\Delta_1) = 10{,}0$	$\Delta_1 \leqslant 7{,}0$[e]	$n_a = 88$[c] $n_v = 50$[c]	44 25	by attributes by variables } statistical[d]
1.2	Right-angle coupler	**9.2.2** or **9.2.3**	Figure 3a	Load-bearing capacity relative to Δ_2 (slipping load)[b]	$L\ (\Delta_2) = 10{,}0$	$L\ (\Delta_2) = 15{,}0$	$\Delta_2 \leqslant 0{,}5$[e]	$n_a = 88$[c] $n_v = 50$[c]	44 25	by attributes by variables } statistical[d]
1.3	Right-angle coupler	**9.4**	Figure 3c	Ultimate load	$L = 20{,}0$	$L = 30{,}0$	No specification	10	10	non-statistical
1.4	Right-angle coupler	**9.5**	Figure 4	Rigidity of angle of rotation	No specification	see **9.5.3**	No specification	10	10	non-statistical
2.1	Swivel coupler	**9.3**	Figure 3b	Load-bearing capacity relative to Δ_1[a]	$L\ (\Delta_1) = 6{,}0$	—	$\Delta_1 \leqslant 7{,}0$[e]	$n_a = 88$[c] $n_v = 50$[c]	88 50	by attributes by variables } statistical[d]
2.2	Swivel coupler	**9.3**	Figure 3b	Load-bearing capacity relative to Δ_2 (slipping load)[b]	$L\ (\Delta_2) = 8{,}5$	—	$\Delta_2 \leqslant 0{,}5$[e]	$n_a = 88$[c] $n_v = 50$[c]	88 50	by attributes by variables } statistical[d]
2.3	Swivel coupler	**9.4**	Figure 3c	Ultimate load	$L = 17{,}0$	—	No specification	10	10	non-statistical
3.1	Class A Friction type sleeve coupler	**9.6.2**	Figure 6	Load-bearing capacity with 2 mm slipping distance	$L\ (\Delta) = 3{,}0$	—	$\Delta \leqslant 2{,}0$	25	25	non-statistical
3.2	Class B Friction type sleeve coupler	**9.6.3**	Figure 6	Load-bearing capacity with 2 mm slipping distance	—	$L\ (\Delta) = 6{,}0$	$\Delta \leqslant 2{,}0$	25	25	non-statistical
3.3	Class B Friction type sleeve coupler	**9.7**	Figure 7	Bending load capacity	—	$L\ (\Delta) = 19{,}0$	$\Delta \leqslant 5{,}0$	10	10	non-statistical
4.1	Sleeve coupler with shear pins	**9.8**	Figure 6	Load-bearing capacity with 5 mm slipping distance	$L\ (\Delta) = 20{,}0$	—	$\Delta_4 \leqslant 5{,}0$	10[e]	10	non-statistical
4.2	Sleeve coupler with shear pins	**9.8**	Figure 6	Ultimate load	$L = 50{,}0$	—	No specification	10[e]	10	non-statistical
4.3	Sleeve coupler with shear pins	**9.7**	Figure 7	Bending load capacity	—	see **9.7**	$\Delta_4 \leqslant 5{,}0$	10	10	non-statistical
5.1	Parallel coupler	**9.9**	Figure 8	Load-bearing capacity relative to Δ_1[a]	$L\ (\Delta_1) = 15{,}0$	—	$\Delta_1 \leqslant 2{,}0$[e]	$n_a = 88$[c] $n_v = 50$[c]	176 100	by attributes by variables } statistical[d]
5.2	Parallel coupler	**9.9**	Figure 8	Load-bearing capacity relative to Δ_2 (slipping load)[b]	$L\ (\Delta_2) = 15{,}0$	—	$\Delta_2 \leqslant 0{,}5$[e]	$n_a = 88$[c] $n_v = 50$[c]	176 100	by attributes by variables } statistical[d]
5.3	Parallel coupler	**9.10**	Figure 9	Ultimate load	$L = 20{,}0$	—	No specification	5	5	non-statistical

[a] Corresponds in variable testing to $P_{max}(\Delta_1)$.
[b] Corresponds in variable testing to $P_{max}(\Delta_2)$.
[c] See **7.4**, **8.2.4** or **8.2.5**.
[d] Statistical assessment in **8.2** required (sea also flow diagram, Table 4).
[e] Both these measurements shall always be carried out in a single test.

8.2.3.3 Other operating characteristics, which in accordance with the requirement in **6.2.2** run through the range of points

$p \leqslant 10\ \%$; $P_a = 5\ \%$

and have a steeper curve than the operating characteristic recommended in **8.2.3.2**, may also be used[7)].

For instance the following operating characteristic curves are in accordance with ISO 2859 (see Figure 2):

Code letter L, AQL 2,5 (Table 10 L)

Code letter M, AQL 4,0 (Table 10 M)

8.2.4 ***Sample plan with criterion for attributive test method***

8.2.4.1 The size of the sample n_a and the acceptance number A_c for the attributive test method are listed in Table 2 for the operating characteristics recommended in **8.2.3**.

Table 2 — Examples of sampling plans for inspection by attributes

Operating characteristic	Sample size n_a	Acceptance number A_c
As recommended in **8.2.3.2**	88	4
From ISO 2859		
L, AQL 2,5	200	10
M, AQL 4,0	315	21

8.2.4.2 If the operating characteristic curve recommended in **8.2.3.2** is used, the conditions of test will be satisfied provided, in a sample with $n_a = 88$, the number of defectives, d, does not exceed $A_c = 4$.

That means in general

for $d \leqslant A_c$ the batch is accepted;

for $d > A_c$ the batch is rejected.

8.2.4.3 The procedure of testing by attributes and its interpretation are summarized in the flow diagram given in Table 4.

8.2.5 ***Sample plan with criteria for variable test method***

8.2.5.1 A sample for which the test value $z(\Delta_j)$ is acceptable shall be deemed to conform to a normal distribution if not more than one individual test value $P(\Delta_j)$ out of a sample of 50 such values is less than the lower limit $L(\Delta_j)$.

8.2.5.2 In this normal distribution, unusually high values for the load-bearing capacity $P_{max}(\Delta_j)$ which are greater than the sum of the mean ($\bar{x}$) and three times the standard deviation ($3s$) may be made equal to the value $P_{max}(\Delta_j) = \bar{x} + 3s$.

8.2.5.3 If the curves recommended in **8.2.3** are used, sample sizes n_v and the factor k_s given in Table 3 can be used.

Table 3 — Examples of sampling plans for inspection by variables

Operating characteristic	Sample size n_v	Factor k_s
As recommended in **8.2.3.2**	50	1,65
As curve b in Figure 2	103	1,62
As curve c in Figure 2	170	1,49

8.2.5.4 From the series of measurements $P_{max}(\Delta_1)$, and $P_{max}(\Delta_2)$ (transformed if necessary) using the methods described in ISO 3207 the mean values

$\bar{x}(\Delta_1)$ and $\bar{x}(\Delta_2)$ in kN

and the standard deviations in kN

$s(\Delta_1)$ and $s(\Delta_2)$

are estimated.

The test values (both in kN)

$$z(\Delta_1) = \bar{x}(\Delta_1) - k_s \cdot s(\Delta_1)$$

$$z(\Delta_2) = \bar{x}(\Delta_2) - k_s \cdot s(\Delta_2)$$

are calculated.

8.2.5.5 The test values $z(\Delta_1)$ and $z(\Delta_2)$, transformed back to original units if necessary, are compared with the limit load-bearing capacities $L(\Delta_1)$ and $L(\Delta_2)$.

If $z(\Delta_1) \geqslant L(\Delta_1)$ and $z(\Delta_2) \geqslant L(\Delta_2)$ the prototype is accepted.

If $z(\Delta_1) < L(\Delta_1)$ or $z(\Delta_2) < L(\Delta_2)$ the prototype is rejected.

8.2.5.6 The procedure of testing by variables and its interpretation is summarized in the flow diagram given in Table 4.

9 Load tests for prototype couplers

9.1 General

9.1.1 The prototype tests shall be carried out by a competent authority or an independent organization which is approved by the competent authority.

[7)] It may be that not all operating characteristic curves recommended in **8.2.3** will pass exactly through the point $P_a = 5\ \%$ and $p = 10\ \%$ (i.e. $1 - \alpha = 95\ \%$, $1 - p = 90\ \%$). Consequently they may not correspond directly with the factors n and k_2 in ISO 3207. They will, however, provide comparable protection in terms of the operating characteristics.

With the exception of the torque spanner, all test equipment shall have an accuracy of ± 2 %. The torque spanner shall have an accuracy of ± 5 %.

9.1.2 New hot-dip galvanized scaffold tubes with 3,2 mm wall thickness in accordance with pr HD 1039-1987, e.g. steel tube EN 39-W-3E, shall be used when performing the behaviour-under-load test on couplers. The mass of zinc per unit area shall be not less than 300 g/m^2. The tubes, when tested, shall have a surface condition similar to that of a tube just after galvanizing.

9.1.3 New couplers shall be used for the tests. The couplers, when tested, shall have a surface condition similar to that of a coupler just after manufacture.

9.1.4 The sections of tube shall have at least the lengths indicated in the figures, and for each test series they shall be taken from at least five different tubes. Various tests may be carried out on the same section of tube, provided that they are not carried out in the same zone.

9.1.5 In the behaviour-under-load test for swivel couplers, each coupler shall be used once only. For right angle couplers, each may be used twice, but each half shall be fixed to the basic tube once only. Couplers undamaged in a behaviour-under-load test may be used again for the ultimate load test.

9.1.6 The coupler shall be fixed to the tubes in accordance with the manufacturer's instructions. For couplers with screwed components, the thread of the bolt shall be lubricated before testing and the nut turned once along the full length of the thread by hand to ensure that the thread is usable.

The method of tightening shall be in accordance with **5.2.1.6**. In the case of couplers secured by screwing, the torque shall be applied with a torque spanner.

9.1.7 A pre-load shall be applied before displacement measurements Δ_j are commenced in all load tests in which such measurements are carried out. The zero for all the displacement measurements shall be set under the pre-load. The pre-load is part of the test load.

9.2 Testing of behaviour under load of right angle couplers

9.2.1 *Test layout*

The test layout is shown in Figure 3 a).

The coupler shall be subjected to a uniformly increasing load P. The displacements Δ_j of the coupler are measured at two points:

Δ_1 is the displacement of the transverse tube relative to the basic tube;

Δ_2 is the displacement of the rear of the coupler clamp fixed to the basic tube relative to the basic tube.

The zero for both displacement measurements shall be set under a pre-load of 1,0 kN.

9.2.2 *Test procedure for inspection by attributes*

Minimum number of tests[8]: $n_a = 88$.

Minimum number of couplers: 44.

Acceptance number[8]: $A_c = 4$.

The load P shall be increased up to a value $L(\Delta_2)$.

At $P = L(\Delta_1)$ the displacement Δ_1 shall be measured, and at $P = L(\Delta_2)$ the displacement Δ_2 shall be measured.

If at $P = L(\Delta_1)$ the displacement Δ_1 exceeds 7,0 mm, or if at $P = L(\Delta_2)$ the displacement (Δ_2) exceeds 0,5 mm, or if the load $P = L(\Delta_2)$ is not reached, the coupler fails. For values of $L(\Delta_1)$ and $L(\Delta_2)$ see Table 1, column 5 for class A and column 6 for class B couplers. The number d of failing couplers shall be recorded and compared with acceptance number A_c.

If $d \leqslant A_c$, the prototype is accepted.

If $d > A_c$, it is rejected (see Table 4).

For at least five couplers, the load-displacement curves $P = f(\Delta_1)$ and $P = f(\Delta_2)$ shall be plotted at least up to displacements of $\Delta_1 = 7,0$ mm and $\Delta_2 = 0,5$ mm provided P does not previously exceed a value of 30,0 kN or the coupler yields and fails. The curves shall include at least one measuring point for every 1,0 kN of increase in load.

9.2.3 *Test procedure by the variables method*

Minimum number of tests[9]: $n_v = 50$

Minimum number of couplers: 25

Appropriate coefficient[9]: $k_s = 1,65$

The load shall be increased uniformly at a rate of between 0,3 and 0,4 kN/s until the coupler begins to slip. Thereafter a rate of slip of approximately 2 mm/min should be maintained.

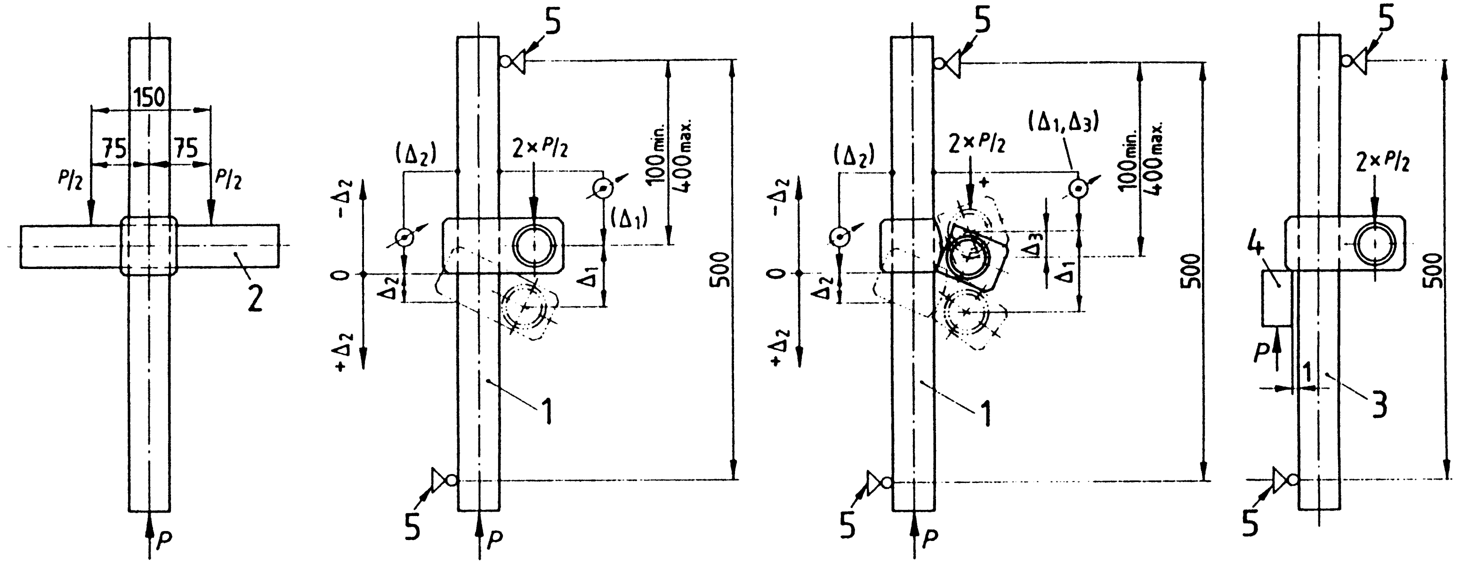
Load-displacement curves $P = f(\Delta_1)$ and $P = f(\Delta_2)$ should be plotted, either:

a) until both the displacement Δ_1 reaches a value of 7,0 mm and the displacement Δ_2 reaches a value of 0,5 mm, or

b) until P reaches a value of 3 times L (Δ_2), or

c) until the load reaches a maximum P_{max} where the load cannot be increased any further.

[8] If the operating characteristic a) is chosen in accordance with **8.2.3.2**, according to **8.2.4**, larger sample sizes may be needed.
[9] If the operating characteristic a) is chosen in accordance with **8.2.3.2**, according to clause **8.2.5**, larger sample sizes may be needed.



Side view of a), b), c) a) b) c)

1 basic tube
2 transverse tube
3 solid rolled bar, machined to 48,3 mm outside diameter with a tolerance of ± 0,5 mm
4 abutment
5 roller bearings used to support the tubes or solid bar

a) to test the behaviour under load of right angle couplers

b) to test the behaviour under load of swivel couplers

c) to determine the ultimate load of right angle and swivel couplers

Figure 3 — Test apparatus

The test laboratory shall record the load at which any visible damage occurs on the coupler, and its nature.

As soon as one of the conditions a) to c) occurs, the test may be stopped.

The following load-bearing capacity values should be taken from the displacement curves for assessment:

$P_{max}(\Delta_1)$ as the maximum load in the displacement range Δ_1 = 0 to 7,0 mm.

$P_{max}(\Delta_2)$ as the maximum load in the displacement range Δ_2 = 0 to 0,5 mm.

The means $\bar{x}(\Delta_1)$ and $\bar{x}(\Delta_2)$, the standard deviations $s(\Delta_1)$ and $s(\Delta_2)$ and the test values

$z(\Delta_1) = \bar{x}(\Delta_1) - k_s \cdot s(\Delta_1)$ and

$z(\Delta_2) = \bar{x}(\Delta_2) - k_s \cdot s(\Delta_2)$

shall be calculated from the measured values $P_{max}(\Delta_1)$ and $P_{max}(\Delta_2)$, and compared with the lower limits of load $L(\Delta_1)$ and $L(\Delta_2)$. For values of $L(\Delta_1)$ and $L(\Delta_2)$ see Table 1, column 5 for Class A and column 6 for Class B couplers.

If $z(\Delta_1) \geqslant L(\Delta_1)$ and $z(\Delta_2) \geqslant L(\Delta_2)$, the prototype is accepted.

If $z(\Delta_1) < L(\Delta_1)$ or $z(\Delta_2) < L(\Delta_2)$, the prototype is rejected (see Table 4).

9.2.4 *Results to be included in the test report*

— Five load-displacement curves.

— All the measured values, namely, in the case of inspection by attributes, all the displacement values Δ_1 at $P = L(\Delta_1)$ and Δ_2 at $P = L(\Delta_2)$, and in the case of inspection by variables, all the measured values $P_{max}(\Delta_1)$ and $P_{max}(\Delta_2)$.

— The method of calculation and the assessment results.

When testing by attributes, record the method and rate of loading.

9.3 Testing of behaviour under load of swivel couplers

The test procedure, the number of tests and the assessment procedures are the same as in the case of right angle couplers, with the following exceptions:

a) the number of couplers to be tested is twice as large, as each coupler can only be used once in the test;

b) the test layout is shown in Figure 3 b);

c) the coupler shall be prevented from twisting;

d) the pre-load of 0,1 kN is applied in the opposite direction to P; the position of the coupler under this pre-load is the starting point for the displacement measurements Δ_1, Δ_2 and Δ_3;

e) after the preliminary load, a load P = 0,1 kN is applied in the direction of the load as shown in Figure 3 b) and the displacement Δ_3 is recorded; then, as when testing right angle couplers, P is uniformly increased, and displacement curves $P = f(\Delta_1)$ and $P = f(\Delta_2)$ are plotted in the case of variable testing (the coupler play Δ_3 is thus included in the displacement Δ_1);

f) Δ_3 shall be indicated in the test report and compared with the data supplied by the manufacturer (see **5.3**);

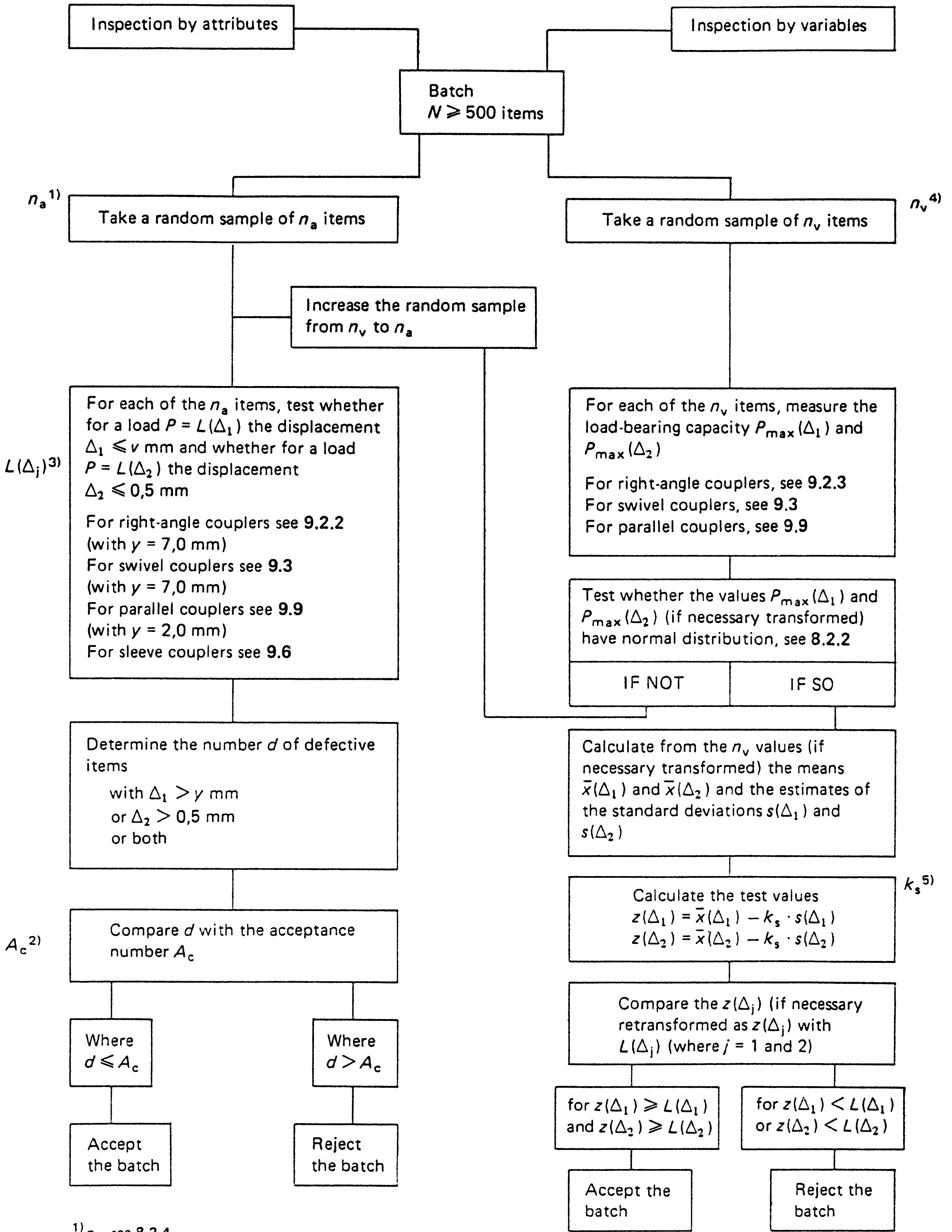
g) for inspection by attributes the load shall be increased without interruption up to a value of P = 8,5 kN, following Δ_3 measurement; Where P = 6,0 kN, Δ_1 shall not exceed the value of 7,0 mm; where P = 8,5 kN, Δ_2 shall not exceed the value of 0,5 mm;

h) for inspection by variables, the test values shall be:

$z(\Delta_1) \geqslant L(\Delta_1)$ = 6,0 kN and

$z(\Delta_2) \geqslant L(\Delta_2)$ = 8,5 kN.

Table 4 — Flow diagram giving instructions for random sampling when testing the behaviour of right angle couplers, swivel couplers, sleeve couplers or parallel couplers by attributes or by variables



1) n_a, see **8.2.4**.
2) A_c, see **8.2.4**.
3) $L(\Delta_j)$, see table 1, columns 5 and 6.
4) n_v, see **8.2.5**.
5) k_s, see **8.2.5**.

9.4 Determination of the ultimate load for right angle and swivel couplers

Number of tests and couplers: 10.

The test layout is shown in Figure 3 c). It corresponds to the layout for the test for behaviour under load, but an additional abutment is provided on the solid bar in order to prevent the coupler from slipping. The abutment shall be located on the side of the solid bar which faces away from the transverse tube and, where necessary, should be adapted to the shape of the coupler. The ultimate load shall be considered to have been reached when the coupler breaks or the load cannot be increased further.

The prototype shall be rejected if one of the measured breaking load values is less than L = 20,0 kN for class A right angle couplers, L = 30,0 kN for class B right angle couplers and L = 17,0 kN for swivel couplers.

9.5 Testing of the torsional rigidity of right angle couplers

9.5.1 ***General***

Number of tests and couplers: 10.

The test layout is shown in Figure 4. The coupler shall be fixed (in accordance with the manufacturer's instruction — see **5.3**) to the middle of the tube and to the middle of the solid bar. The transverse tube shall be more than 2 000 mm long.

The load P shall be applied at a distance of 1 000 mm from the centre of the coupler on the transverse tube. The upward movement f of the unloaded side of the transverse tube, at 1 000 mm from the centre of the coupler, shall be measured.

Under a pre-torque of 20 N·m, which is part of the test torque, the zero is set for measurement of the displacement f.

9.5.2 ***Class A right angle couplers***

The angle of rotation ϕ from the upward movement f of the unloaded side of the transverse tube shall be calculated from the following formula:

$$\phi = \frac{f}{1000} \cdot \frac{180}{\pi}$$

where f is in millimetres and ϕ is in degrees.

The curve showing ϕ plotted against the torque shall be drawn and shall be included in the test report.

The test torque shall be increased in steps of 100 N·m until the angle of rotation is 1° or the torque is 900 N·m. (This torque corresponds to a bending stress of 180 N/mm^2 on the transverse tube.) At each stage of the load, the displacement shall be recorded.

There is no minimum specification for this test.

9.5.3 ***Class B right angle couplers***

Apply the torque in accordance with **9.5.2**, and increase it until ϕ = 2°. Reduce the torque to zero.

The prototype is rejected if for any one of the tested couplers

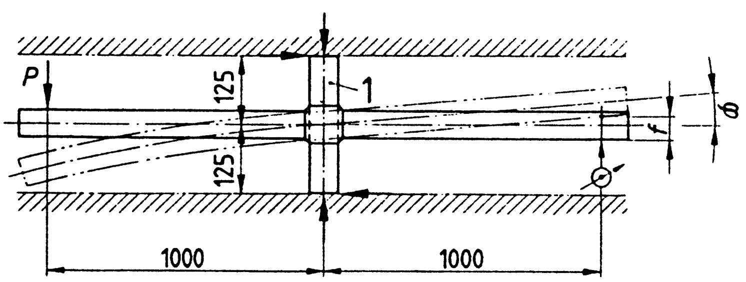
— when ϕ = 1°, $M_{(\phi = 1)}$ < 210 N·m

or

— when ϕ = 2°, $M_{(\phi = 2)}$ < 400 N·m

This is shown in Figure 5.

The curve showing ϕ plotted against the torque shall be included in the test report.



1 = solid bar, machined to 48,3 mm outside diameter with a tolerance of ± 0,5 mm.

Figure 4 — Test apparatus to determine the torsional rigidity of right angle couplers

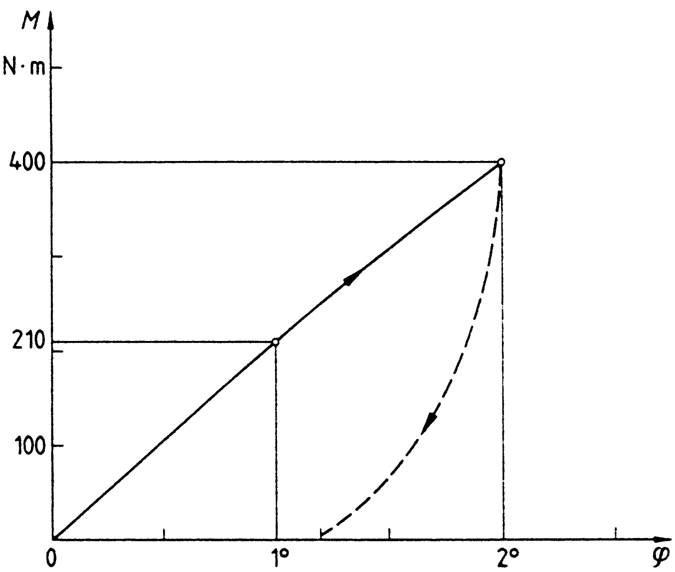


Figure 5 — Angle of rotation ϕ against the torque M for class B right angle couplers

9.6 Tensile tests on friction type sleeve couplers

9.6.1 ***Test layout***

The test layout is shown in Figure 6.

The coupler shall be subjected to an increasing load P.

Δ is the displacement of one tube relative to the other.

The zero for the displacement measurement shall be set under a pre-load of 1,0 kN.

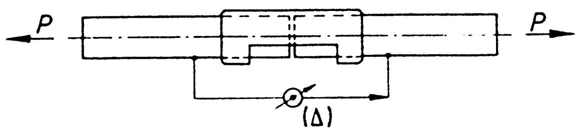


Figure 6 — Test apparatus for tensile testing of sleeve couplers

9.6.2 ***Class A sleeve couplers***

Number of tests and couplers: 25.

The test apparatus is shown in Figure 6.

The axial tensile force P shall be increased up to a value of L = 3,0 kN and the displacement Δ is measured.

The prototype is rejected if one measured displacement value is greater than Δ = 2,0 mm, or if the load L is not reached in any test.

9.6.3 ***Class B sleeve couplers***

9.6.3.1 When testing class B sleeve couplers, only 4,0 mm wall thickness hot-dip galvanized tubes which comply with **9.1.2** shall be used.

For at least five couplers, the load-displacement curves $P = f(\Delta)$ shall be plotted at least up to displacements of Δ = 2,0 mm provided P does not previously exceed a value of 18,0 kN or the coupler does not fail.

The curves shall include at least one measuring point for every 0,6 kN of increase in load.

9.6.3.2 *Tensile test*

Number of tests and couplers: 25.

The test apparatus is shown in Figure 6.

The axial tensile force shall be increased up to a value of L = 6,0 kN and the displacement Δ is measured.

The prototype is rejected if one measured displacement value is greater than Δ = 2,0 mm, or if the load L is not reached in any test.

9.7 Bending load capacity testing of class B sleeve couplers

Both friction type and shear type of class B sleeve couplers shall be subjected to the bending load capacity testing.

Number of tests and couplers: 10.

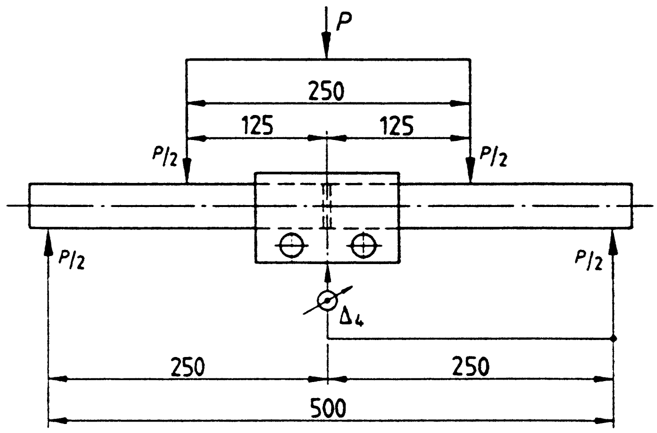


Figure 7 — Test apparatus for bending load capacity testing of class B sleeve couplers

The test layout is shown in Figure 7. The weakest bending axis of the coupler shall be positioned on the underside of the tubes. If necessary, preliminary tests shall be carried out to determine the weakest bending axis of the coupler. These preliminary tests are not part of the prototype tests. Δ_4 is the displacement at the centre relative to the end reaction points. The zero for the displacement measurement shall be set under a pre-load of 1,0 kN.

The load is then increased up to a value of L = 19,0 kN.

The prototype is rejected if one measured deflection [10]$\Delta_4 \leqslant 5{,}0$ mm or if the load $P = L\ (\Delta_4)$ cannot be reached.

For at least five couplers, the displacement Δ_4 shall be plotted on a load-displacement diagram, with at least one measuring point for every 1,0 kN increase in load.

9.8 Tensile testing of sleeve couplers with shear pins

Number of tests and couplers: 10.

The test layout is shown in Figure 6. After setting the displacement zero under a pre-load of 1,0 kN the axial tensile force is increased up to a value of $L\ (\Delta)$ = 20,0 kN, and the displacement Δ is measured.

The prototype is rejected if one measured displacement value is greater than Δ = 5,0 mm.

If $\Delta \leqslant 5{,}0$ mm, the load is increased until fracture and the breaking load is measured.

The prototype is rejected if one measured value for the breaking load is less than L = 50,0 kN.

9.9 Testing of behaviour under load of parallel couplers

The assessment procedure and the number of tests shall be selected in accordance with **9.2**.

The test layout is shown in Figure 8. The displacement zeros are set under a pre-load P = 1,0 kN.

For inspection by attributes the load shall be increased without interruption to a value $P = L\ (\Delta_2)$ = 15,0 kN. Under this load, Δ_1 shall not exceed a value of 2,0 mm and Δ_2 a value of 0,5 mm.

For inspection by variables the load-displacement curves $P = f(\Delta_1)$ and $P = f(\Delta_2)$ shall be plotted. The following load-bearing capacity values shall be determined from them:

$P_{max}(\Delta_1)$ as the maximum load in the displacement range Δ_1 = 0 to 2,0 mm, and

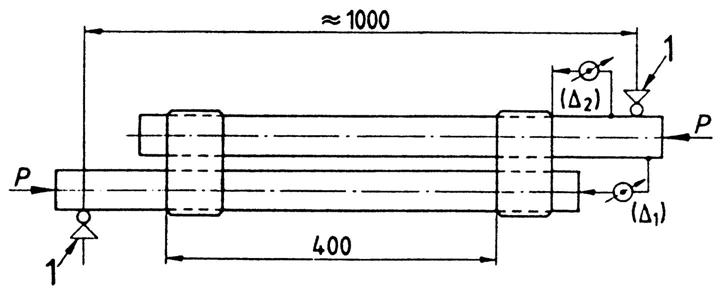
$P_{max}(\Delta_2)$ as the maximum load in the displacement range Δ_2 = 0 to 0,5 mm.

The test values $z(\Delta_1)$ and $z(\Delta_2)$ as specified in **8.2.5** and **9.2.3** shall be calculated from the values of $P_{max}(\Delta_1)$ and $P_{max}(\Delta_2)$. The acceptance criteria for the prototype are:

$z(\Delta_1) \geqslant L(\Delta_1)$ = 15,0 kN and

$z(\Delta_2) \geqslant L(\Delta_2)$ = 15,0 kN.

[10] See national foreword.



1 roller bearings used to support the tubes

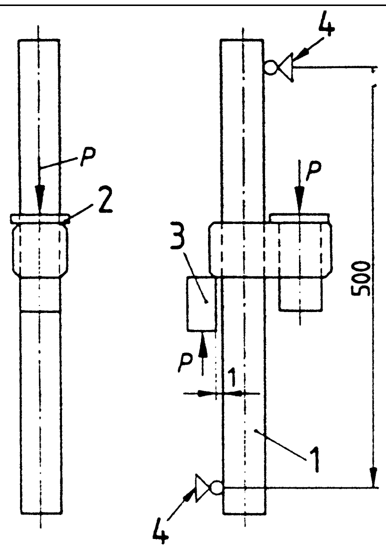
Figure 8 — Test apparatus for investigating the behaviour under load of parallel couplers

9.10 Determination of the ultimate load for parallel couplers

Number of tests and couplers: 5.

The test layout is shown in Figure 9. The abutment is provided on the solid bar in order to prevent the coupler from slipping. The abutment shall be located on the side of the bar away from the short tube, and where necessary should be adapted to the shape of the coupler. The ultimate load shall be considered reached when the coupler breaks or the load cannot be increased further.

The prototype shall be rejected if one of the measured ultimate load values is less than L = 20,0 kN.



1 solid bar, machined to 48,3 mm outside diameter with a tolerance of ± 0,5 mm
2 steel plate fixed to the short tube
3 abutment
4 roller bearings used to support the solid bar

Figure 9 — Test apparatus to determine the ultimate load of parallel couplers

10 Test report and certificates

10.1 Test report

The results of all prototype tests on couplers, loose spigots and base-plates shall be recorded in the test report of the testing laboratory.

The report shall contain: for couplers, loose spigots and base-plates:

a) a confirmation that the shape of the component satisfies all the requirements of clause **5**;

b) the measured dimensions, tolerances and deviations from the theoretical values;

c) the masses measured;

d) the characteristics of the materials found;

e) the type of surface protection;

and, in addition, for couplers:

f) in the case of screw couplers, the value of the tightening torque at which the load tests were carried out;

g) all the measured values and assessment results of the tests carried out in accordance with clause **9**.

10.2 Certificates

10.2.1 Where a certificate of a test laboratory is drawn up, it shall quote the reference number of the test report and shall identify the particular coupler, loose spigot or base-plate by reference to the designation given in clause **3**.

The certificate shall certify that the coupler has been tested and examined in accordance with the appropriate clauses of this European Standard and that it complies with the latter.

10.2.2 At the purchaser's request in the order, the manufacturer shall supply a certificate of compliance stating that the couplers, loose spigots or base-plates comply with the requirements of this European Standard.

11 Designation

Couplers, loose spigots and base-plates shall be designated by the denomination, EN 74, the code designations given in clause **3** and the following symbols:

A or B for the class of coupler, where appropriate, otherwise Z;

M when the production quality control is carried out by the manufacturer and under his responsibility;

C when the production quality control is carried out by virtue of an independent certification system.

Example for a right angle coupler [(RA) see **3.2**] class A with quality control according to an independent certification system (C):

Coupler EN 74 – RA – A – C

12 Marking

Couplers, loose spigots and base-plates shall be legibly marked, by imprinting on pressings or embossing on forgings, with the following marks in one or two lines:

— EN 74

— A or B for the class of coupler, where appropriate

— the year of manufacture (last two figures)

— manufacturer’s name or trade mark

— if appropriate, the sign of the independent certification body.

National appendix A

The United Kingdom participation in the preparation of this European Standard was entrusted by the Civil Engineering and Building Structures Standards Policy Committee (CSB/-) to Technical Committee CSB/57, upon which the following bodies were represented:

Association of Consulting Engineers
Association of Consulting Scientists
British Constructional Steelwork Association Ltd.
British Steel Industry
Building Employers' Confederation
Concrete Society
Construction Health and Safety Group
Construction Industry Training Board
Department of the Environment (Property Services Agency)
Electricity Supply Industry in England and Wales
Engineering Equipment and Materials Users' Association
English Net Manufacturers' Association
Federation of Civil Engineering Contractors
Health and Safety Executive
Institute of Building Control
Institution of Civil Engineers
Institution of Structural Engineers
National Association of Scaffolding Contractors
National Federation of Master Steeplejacks and Lightning Conductor Engineers
Prefabricated Aluminium Scaffolding Manufacturers' Association
Suspended Access Equipment Manufacturers' Association

National appendix B

The British Standards corresponding to the international standards referred to in the text are as follows:

International standard	British Standard
	BS 6001 Sampling procedures for inspection by attributes
ISO 2859-1974	Part 1:1972 Specification for sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection (Technically equivalent)
	BS 2846 Guide to statistical interpretation of data
ISO 3207-1975	Part 3:1975 Determination of a statistical tolerance interval (Identical)
ISO 3951-1981	BS 6002:1979 Specification for sampling procedures and charts for inspection by variables for percent defective (ISO/DIS 3951 Technically equivalent)

The related British Standard to pr HD 1039-1987 is BS 1139-1.1:1990 "Specification for steel tube", which is considered by the Technical Committee to be suitable for cross-reference for the purposes of BS 1139-2.1:1991.

The related British Standard to ISO 752-1982 is BS 3436:1986 "Specification for ingot zinc", which is considered by the Technical Committee to be suitable for cross-reference for the purposes of BS 1139-2.1:1991.

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