

CEB STANDARD 064-1:1999

Specification

For

GALVANISED STEEL BOLTS AND NUTS/WASHERS



CEYLON ELECTRICITY BOARD

SRI LANKA

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CEB Standard 064 - 1 : 1999

CEYLON ELECTRICITY BOARD

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SPECIFICATION FOR GALVANIZED STEEL BOLTS AND NUTS / WASHERS

1.0 SCOPE

This specification covers the general requirements of manufacture and testing of Galvanized Steel Bolts, Nuts and Washers for use in the overhead power distribution lines.

2.0 APPLICABLE STANDARDS

The items and components supplied shall be in accordance with the standard specified below or later editions and/or amendments thereof.

- | | | | |
|----|--|---|---|
| a) | ISO 898 Part - 1 - 1988 Part - 2 - 1992 | - | Mechanical properties of fasteners Bolts, screws and studs. Nuts with specified proof load values - Coarse thread |
| b) | ISO 261 - 1981 ISO 965 Part - 2 - 1980 | - | ISO general purpose Metric Screw Threads- Selected sizes for screws, bolts and nuts. General purposes metric screw threads Tolerance - Limits of sizes for general purpose bolts and nut threads. |
| c) | ISO 887 - 1983 | - | Plain Washers for metric bolts screws and nuts. |
| d) | ISO 4759 - 1991 | - | Tolerance for fasteners and washers. |
| e) | BS 729 - 1971 | - | Hot Dip Galvanized Coatings on Iron and Steel Articles. |

3.0 BASIC FEATURES

3.1 General

The galvanized steel bolts and nuts shall be of the hexagonal heads type as per ISO 898 Part 1&2 and the screwed threads shall comply with ISO 261. The mechanical properties of the bolts and nuts shall comply with ISO 898 and shall be hot dip galvanized conforming to BS 729.



3.2 Material

The steel used for the manufacture of the bolts and nuts shall be such that the mechanical properties of the finished products shall not be less than that of Property Class 5.6 as stipulated in Table 3 of ISO 898-1.

3.3 Hexagonal Head

The hexagonal head of the bolt shall be formed by cold forging and the required marking shall also be formed (embossed) during the forging operation.

3.4 Screw Threads

The bolts shall be provided with rolled threads and the form of thread, diameters and associated pitches shall be in accordance with ISO 262.

3.5 Nuts

The height and width across flats of the hexagonal nuts shall be as stipulated for Style 1 in Table A.3 of ISO 898-2. The property class shall be marked as per ISO 898-2

3.6 Chamfering and Facing

i) Head of Bolts

The hexagon bolt heads shall be chamfered at an angle of approximately 30 degrees on the upper faces. The diameter of the ring formed by the chamfer on the upper face of the bolt shall not be smaller than 90% of the minimum across flat dimension.

ii) Ends of Bolts

The thread rolling operation shall provide the necessary chamfer to the end of the bolt, and the end shall be reasonably square with the centre line of the shank.

iii) Nuts

The nuts shall be chamfered at an angle of approximately 30° on one face and they shall be machined on both faces.

3.7 Diameter of Shank of Bolts

The diameter of the un-threaded portion of the shank of Bolts shall be in accordance with the standard specified and it shall be round and uniform.



3.8 Length of Bolts and thread length

The nominal length and the thread length of various sizes of bolts shall be as given below;

| | Bolt Diameter | Bolt Length | Thread Length |
|----|---------------|-------------|---------------|
| a) | 12mm | 90mm | 25mm |
| b) | 12mm | 120mm | 75mm |
| c) | 16mm | 50mm | 25mm |
| d) | 16mm | 120mm | 25mm |
| e) | 16mm | 180mm | 75mm |
| f) | 16mm | 200mm | 75mm |
| g) | 16mm | 230mm | 75mm |
| h) | 16mm | 250mm | 75mm |
| i) | 16mm | 280mm | 75mm |
| j) | 16mm | 300mm | 25mm |
| k) | 16mm | 360mm | 25mm |

3.9 Plain Washers

The washers shall be of the flat round type and shall be in accordance with ISO 887 1983 and hot dip galvanized as per BS 729. The thickness shall not be less than 3.0mm and the diameter shall not be less than 45mm with a centre hole to allow M12 / M16 Bolt (as per schedule of prices) to pass through.

3.10 Spring Washers

The spring washers shall be of single coil, rectangular cross section conforming to BS. 4464 and shall be hot dip galvanized as per BS 729. The Thickness shall not be less than 3.3mm and the diameter shall be 30mm with a centre hole to allow M12 / M16 Bolt (as per schedule of prices) to pass through.

3.11 Dimensions and Tolerances

The dimensional tolerances of the bolts, nuts, screw threads and washers shall be in accordance with ISO 965 - 1980, 262-2 and 4759 1991.

3.12 Galvanizing

The bolts, nuts and washers shall be hot dip galvanized to comply with BS 729 after all machining operations are completed.

Threads of bolts shall be spun galvanized and the threads of the nuts shall be oiled. The weight and thickness of zinc coating on the plain surfaces shall not be less than 610gm per square metre and 0.086mm respectively. The threaded portion shall have a minimum coating of weight not less than 305 gm of zinc per square metre.



Preparation of galvanizing and the galvanizing itself shall not adversely affect the mechanical properties of the coated material.

To prevent the formation of white rust, all items shall be treated with sodium dichromate after galvanizing and stored under well ventilated conditions. Sheradising or other process shall not be used.

3.13 Finish

The bolts & nuts and washers shall be free from blister, scale, rust and other defects before galvanizing. The bolts, nuts and washers shall be smooth, clean, uniform throughout without any burrs / sharp edges and free from defects after galvanizing. Washers shall be free from spelter after galvanizing.

The nuts shall be finger tight on bolts and will be rejected if they are excessively loose or tight fit. Bolts with threads re-died after galvanizing will also be rejected.

4.0 QUALITY ASSURANCE

The manufacturer shall have obtained Quality Assurance Certification conforming to ISO 9002 for the manufacture of galvanized bolts and nuts / washers. Bidders shall furnish documentary evidence to prove this with the offer.

5.0 ADDITIONAL REQUIREMENTS

5.1 Marking

The following marking shall be embossed on the bolt head (top) during head forging operation and galvanizing shall not obliterate the marking.

- a) Manufacturer's identification marks
- b) The letters CEB
- c) Property Class as per Table 3 of ISO 898 - 1

The diameter of the bolt as per ISO 261

The property class of the nuts shall be marked as per ISO 898 - 2



5.2 Packing

Each size of bolts with nuts / washers shall be packed separately in a polythene lined wooden boxes. Minimum number of bolts with nuts in a box shall be 100 and that of washers shall be 500. Each box shall be clearly marked with the following information.

- a) Name of Manufacturer and Country of manufacture
- b) Size of Bolt with Nut / Washer
- c) Quantity
- d) Gross Weight.

6.0 INFORMATION TO BE PROVIDED WITH THE OFFER

The following particulars shall be furnished with the offer.

- a) Constructional features such as;
 - i) Grade of steel used for;
 - 1) Bolts
 - 2) Nuts
 - 3) Washers
 - ii) Method of forming the;
 - 1) Hexagonal head
 - 2) Threads
 - 3) Markings.
 - iii) Method of galvanizing the
 - 1) Bolts
 - 2) Nuts
 - 3) Washers.
- b) Particulars of Plants and Equipment available such as;
 - i) Name of the equipment.
 - ii) Type of operation to be performed by the equipment.
 - iii) Production rate (Number of components per hour).
 - iv) Number of equipment available.
- c) Dimensional drawings of Bolts, Nuts and Washers
- d) Completed Schedule of Particulars, Annex - A
- e) Certificate of Quality Assurance as per ISO 9002



- f) Certificate of Type tests conforming to the relevant ISO specified on the following for each size;
- i) Tensile Strength
 - ii) Vickers hardness
 - iii) Brinell hardness
 - iv) Rockwell hardness
 - v) Lower yield stress
 - vi) Stress under proofing load S_p/R_{el}
N/mm²
 - vii) Elongation after fracture
 - viii) Impact strength
 - ix) Head soundness

Test Certificates of the Type Tests performed shall conform to the standards specified

The test certificates shall clearly identify the item concerned showing the Manufacturer's identity, types number and basic technical parameters and shall be issued by a **Recognized Independent Testing Authority** acceptable to the purchaser.

Failure to furnish the above particulars will result in the offer being rejected

7.0 SAMPLES

Two non-returnable samples of each size of bolts & nuts, flat washers and spring washers offered shall accompany the Bid to facilitate analysis and evaluation. While analyzing samples, the purchaser reserves the right to check dimensions, inspect workmanship, and perform tests as prescribed in relevant standards specified.

8.0 INSPECTION AND TESTING

8.1 Inspection

The selected Bidder shall make necessary arrangements for inspection by an Engineer appointed by the Purchaser and to carry out in his presence necessary Sample/Acceptance tests of the bolts, nuts and washers offered in compliance with the standard specified at the place of manufacture.

8.2 Testing (Sample/Acceptance)

The following Sample / Acceptance test as per ISO 898 shall be witnessed by the Engineer for bolts, nuts and washers.

- i) Dimensional Check
- ii) Ultimate Tensile Strength
- iii) Elongation after fracture
- iv) Galvanizing Test



8.3 Sampling

The bolts & nuts/ washers packed as per Clause 5.2 shall be stored in such a manner to carry out sampling.

One bolt out of every 500 bolts of each size shall be selected randomly to carry out the acceptance tests as per Clause 8.2.

9.0 ANNEXURE

A - Schedule of Particulars - To be filled By the Bidder



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ANNEX - A

SCHEDULE OF PARTICULARS
(To be filled by the Bidder for each size)

| | | | |
|----|---------------------------------|-----------------------------------|--------|
| 1) | Name of Manufacturer | | - |
| 2) | Country of origin | | - |
| 3) | Applicable Standard | | |
| | i) Bolts | | - |
| | ii) Nuts | | - |
| | iii) Flat Washers | | - |
| | iv) Spring Washers | | - |
| 4) | Bolts | | |
| | i) Property Class | | - |
| | ii) Tensile Strength | Nominal Minimum | - - |
| | iii) Vickers hardness | Minimum Maximum | - - |
| | iv) Brinell hardness | Minimum Maximum | - - |
| | v) Rockwell hardness | Minimum Maximum | - - |
| | vi) Lower yield stress | Nominal | - |
| | vii) Stress under proofing load | S_p/R_{el} N/mm ² | - - |
| | viii) Elongation after Fracture | Minimum | - |
| | ix) Impact strength | Minimum | - |
| | x) Head soundness | | - |
| 5) | Nut | | |
| | i) Height of nut | | - |
| | ii) Width across flats | | - |
| | iii) Property Class | | - |



| | | | |
|-------|---|-----------------------------------|--------|
| vi) | Vickers hardness | Minimum Maximum | - - |
| vii) | Brinell hardness | Minimum Maximum | - - |
| viii) | Rockwell hardness | Minimum Maximum | - - |
| ix) | Lower yield stress | Nominal | - |
| x) | Stress under Proofing load | S_p/R_{el} N/mm ² | - |
| xi) | Impact strength | Minimum | - |
| 6) | Constructional features | | |
| | i) Method of forming the hexagonal head. | | - |
| | ii) Method of forming the threads. | | - |
| | iii) Method of galvanizing | | - |
| | a) Galvanizing coating thickness on plain surface | | - |
| | Bolt | | - |
| | Nut | | - |
| | Plain Washer | | - |
| | Spring washer | | - |
| | b) Galvanizing coating weight on plain surface | | - |
| | Bolt | | - |
| | Nut | | - |
| | Plain Washer | | - |
| | Spring washer | | - |
| | iv) Method of marking | | - |
| 7) | Particulars of Plants and Equipment available at the place of manufacture (attach separate sheet) | | |
| | i) Name of the equipment. | | - |
| | ii) Type of operation to be performed by the equipment. | | - |
| | iii) Production rate (Number of components per hour). | | - |
| | iv) Number of equipment available. | | - |
| 8) | Particulars of testing equipment available at the place of manufacture (attach separate sheet) | | - |



J. F. J.

- 9) Whether the relevant dimensional drawings are provided for;
- | | | | | |
|------|----------------|--|--------|---|
| i) | Bolts & Nuts | | yes/no | - |
| ii) | Flat Washers | | yes/no | - |
| iii) | Spring Washers | | yes/no | - |
- 10) Whether the Type Test certificates for the following are provided from recognized independent testing authority
- | | | | | |
|-------|----------------------------|-----------------------------------|--------|---|
| i) | Tensile Strength | | yes/no | - |
| ii) | Vickers hardness | | yes/no | - |
| iii) | Brinell hardness | | yes/no | - |
| iv) | Rockwell hardness | | yes/no | - |
| v) | Lower yield stress | | yes/no | - |
| vi) | Stress under proofing load | S_p/R_{el} N/mm ² | yes/no | - |
| vii) | Elongation after fracture | | yes/no | - |
| viii) | Impact strength | | yes/no | - |
| ix) | Head soundness | | Yes/No | - |
- 11) Whether the specified samples (Ref Clause 7.0) furnished Yes/No -
- 12) Whether the manufacturer will carryout Acceptance / Sample test as per clause 8.3 at the place of manufacture during inspection. Yes/No -
- 13) Packing details -
- 14) Marking details -

SEAL AND SIGNATURE OF THE MANUFACTURER

DATE.....

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APPROVAL OF CEB STANDARDS

CEB Standard No. : *CEB Standard 064-1 : 1999*

Title of the Standard : *Specification for Galvanized Steel Bolts & Nuts/Washers*


Date of Approval : *April 1999*


This is to certify that the above Standard has been recommended by us for adoption in the CEB



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A M Tissera Chairman Specification Committee


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CEB Standard 064 - 1 : 1999 - Specification for Galvanized Steel Bolts & Nuts/Washers is approved for adoption in the CEB.


General Manager,
Ceylon Electricity Board.

Date : 06.05.1999