



HIGH-STRENGTH STRUCTURAL  
BOLTING ASSEMBLIES  
FOR PRELOADING  
**BS EN 14399-5:2015**  
**PLAIN WASHERS**



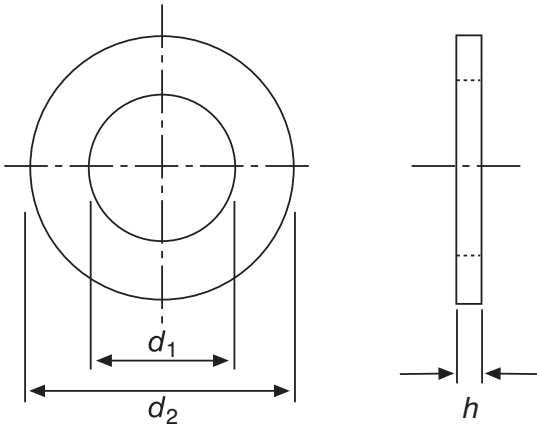
EN14399-1  
Cert No:  
0038/CPR/4006773/B



**BAPP**

Group of Companies

# Dimensions



| Nominal size<br>$d$ (nominal thread<br>diameter of associated bolt) |      | 12    | (14) <sup>a</sup> | 16    | (18) <sup>a</sup> | 20    | 22    | 24    | 27    | 30    | 36    |
|---|------|-------|-------------------|-------|-------------------|-------|-------|-------|-------|-------|-------|
| $d_1$   | min. | 13    | 15                | 17    | 19                | 21    | 23    | 25    | 28    | 31    | 37    |
|   | max. | 13,27 | 15,27             | 17,27 | 19,33             | 21,33 | 23,33 | 25,33 | 28,52 | 31,62 | 37,62 |
| $d_2$   | min. | 23,48 | 27,48             | 29,48 | 33,38             | 36,38 | 38,38 | 43,38 | 49,00 | 54,80 | 64,80 |
|   | max. | 24    | 28                | 30    | 34                | 37    | 39    | 44    | 50    | 56    | 66    |
| $h$   | nom. | 3     | 3                 | 4     | 4                 | 4     | 4     | 4     | 5     | 5     | 6     |
|   | min. | 2,7   | 2,7               | 3,7   | 3,7               | 3,7   | 3,7   | 3,7   | 4,4   | 4,4   | 5,4   |
|   | max. | 3,3   | 3,3               | 4,3   | 4,3               | 4,3   | 4,3   | 4,3   | 5,6   | 5,6   | 6,6   |

<sup>a</sup> Sizes in brackets are non-preferred sizes.

For coated washers, the above dimensions apply prior to coating. For use with BS EN 14399-10 HRD nuts, a washer with a larger value of  $d_2$  and marked HD may be supplied by agreement between customer and manufacturer.

## Specifications & Reference Standards

|  |                    |   |
|--|--------------------|---|
| <b>Material</b>  |                    | Steel   |
| <b>General requirements</b>  |                    | BS EN 14399-1 and BS EN 14399-2   |
| <b>Mechanical properties</b>   | Hardness range     | 300 HV to 370 HV  |
| <b>Tolerances</b>  | Product grade      | A   |
|  | European Standard  | BS EN ISO 4759-3  |
| <b>Finish - Coating<sup>a</sup></b>  | Uncoated           | as processed <sup>b</sup>   |
|  | Hot dip galvanized | BS EN ISO 10684   |
|  | Others             | to be agreed <sup>c</sup>   |
| <b>Workmanship</b>   |                    | Parts shall be uniform and free of irregularities or detrimental defects. No protruding burrs shall appear on the washer. |
| <b>Acceptability</b>   |                    | For acceptance procedure, see BS EN ISO 3269.   |
| <sup>a</sup> Attention is drawn to the need to consider the risk of hydrogen embrittlement when selecting an appropriate surface treatment process (e.g. cleaning and coating), see relevant coating standards.                            |                    |   |
| <sup>b</sup> "As processed" means the normal finish resulting from heat treatment with a residual coating of light oil.  |                    |   |
| <sup>c</sup> Other coatings may be negotiated between the purchaser and the manufacturer provided they do not impair the mechanical properties or the functional characteristics. Coatings of cadmium or cadmium alloys are not permitted. |                    |   |

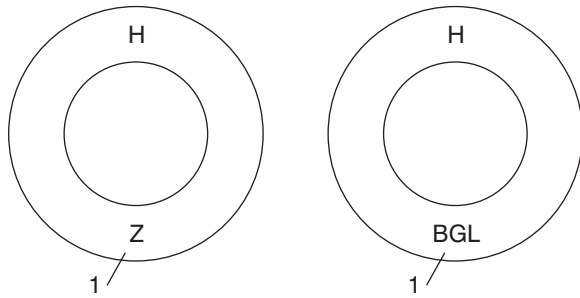
# Marking

Hardened and tempered plain washers shall be marked with at least the manufacturer's trade (identification) mark and letter H.

The manufacturer may decide to mark washers with HR or HV (instead of H marking) when they are supplied as component of bolting assemblies of system HR or HV respectively.

The marking shall be indented on one of the bearing faces.

The marking of washers with enlarged outer diameter shall be HD.



## Key

1 identification mark of the manufacturer of the assembly

# 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.

BS EN 14399-1, High-strength structural bolting assemblies for preloading - Part 1: General requirements

BS EN 14399-2, High-strength structural bolting assemblies for preloading - Part 2: Suitability for preloading

BS EN ISO 3269, Fasteners - Acceptance inspection (ISO 3269)

BS EN ISO 4759-3, Tolerances for fasteners - Part 3: Plain washers for bolts, screws and nuts - Products grades A and C (ISO 4759-3)

BS EN ISO 10684, Fasteners - Hot dip galvanized coatings (ISO 10684)

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