

Summary Comparison for PRE-LOADING (HSFG) Fasteners (BS EN 14399 and BS 4395)



The Fastener specialists to the Construction Industry

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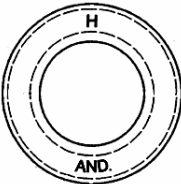

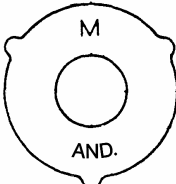


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1. Introduction

BS 4395 (Specification for high strength friction grip bolts and associated nuts and washers for structural engineering) has been replaced by BS EN 14399 (High strength structural bolting assemblies for preloading). BS 4395 has three parts and BS EN 14399 has six parts (with a further three parts to be released) –

Standard	Description	Markings BS EN 14399 8.8 HR	Standard	Description	Markings BS 4395 PT1
BS EN 14399 PT 1	General requirements		BS 4395 PT 1	General Grade	
BS EN 14399 PT 2	Suitability test for preloading		BS 4395 PT 2	Higher grade bolts and nuts and general grade washers	
BS EN 14399 PT 3	System HR. Hexagon bolt and nut assemblies		BS 4395 PT 3	Higher grade bolts (waisted shank), nuts and general grade washers	
BS EN 14399 PT 4	System HV. Hexagon bolt and nut assemblies				
BS EN 14399 PT 5	Plain washers				
BS EN 14399 PT 6	Plain chamfered washers				
pr EN 14399 PT 7	System HR. Countersunk head bolt and nut assemblies				
pr EN 14399 PT 8	System HV. Hexagon fit bolt and nut assemblies				
pr EN 14399 PT 9	System HR or HV – Bolt and nut assemblies with direct tension indicators				

We at Andrews Fasteners believe that where previously products were ordered to BS 4395 Part One (Bolt, Nut and Hard Flat Washer) they should now be ordered to BS EN 14399 Part Three (HR 8.8) for the Bolts and Nuts and BS EN 14399 Part Six for the washer.

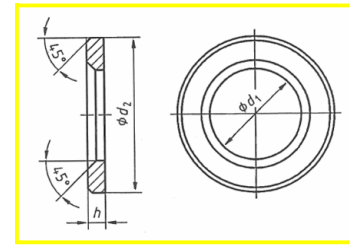
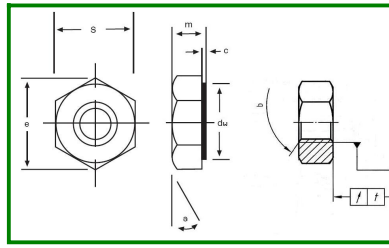
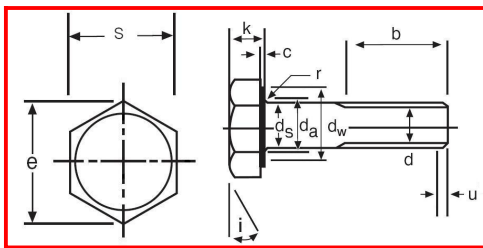
The following pages outline the differences between the two different series of standards in terms of dimensions and mechanical properties in relation to BS 4395 Part One and BS EN 14399 Parts 3 and 6.

This is only a summary covering the most popular diameters, for more comprehensive information please refer to our DETAILED COMPARISON which is available via our website www.andrewsfasteners.co.uk.

If further information is required then please contact our technical department at Andrews or look at the DETAILED COMPARISON document on our website.

The specification BS EN 14399 is shown on a BLUE background in a WHITE font and for BS 4395 PT1 on a GREY background in a BLACK font -

BS EN 14399	BS 4395-1:1969	ALL FIGURES ARE IN MILLIMETRES
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Additional Note for the Bolt drawing -
i BS EN 14399 15° to 30° BS 4395 PT1 approx 30°

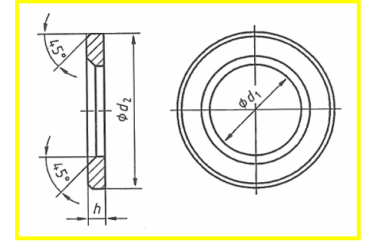
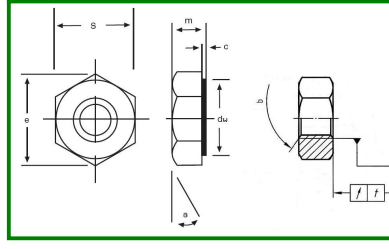
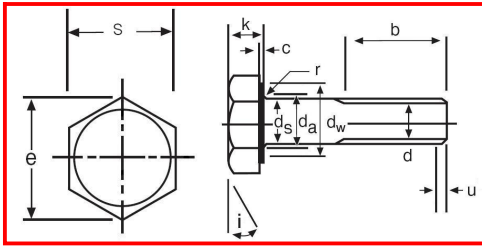
Additional Note for the Nut drawing -
Washer face is optional with BS EN 14399 product but not with BS 4395 PT1 product.
a. BS EN 14399 15° to 30°. BS 4395 PT1 approx 30°. b BS EN 14399 100° to 130°.

Additional Note for the Washer drawing -
1. BS EN 14399-6 Washers do not have the three 'nibs' which BS 4395 washers have.
2. BS EN 14399-6 Washers have a 45 degree chamfer on the outside and inside of the washer.

Additional Note for the full assembly -
BS EN 14399 product an impact test at -20 degrees and a suitability test are required (BS EN 14399-2).

M12 DIAMETER BOLTS, NUTS AND WASHERS

BOLT – DIMENSIONS	BS EN 14399	BS 4395
Length (l nom)	35 - 100	40 - 300
Depth of washer face (c)	0.4 - 0.8	0.4 max
Max. Transition diameter (d _a)	15.2	14.7
Diameter of washer face (d _w)	20.1 to max = actual bolt head across flats (s actual)	19.91 - 22
Across corners (e)	23.91 min with no max	23.70 - 25.4
Head thickness (k)	7.05 – 7.95	7.55 – 8.45
Radius under head (r)	1.2 min with no max	0.60 - 1.0
BOLT – MECHANICAL PROPERTIES		
Proof Load	50 700 N	49 400 N
0.2 Proof Stress	640 N/mm ²	635 N/mm ²
Min Wedge Strength	70 000 N	69 600 N
Hardness	22 – 32 HRC	25 - 34 HRC
NUT – DIMENSIONS		
Across corners (e)	23.91 min with no max	23.82 - 25.4
Thickness (m)	10.37 – 10.8	10.45 – 11.55
Depth of washer face (c)	0.4 - 0.8	no min - 0.4 max
Diameter of washer face (d _w)	20.1 to max = actual nut across flats (s actual)	19.91 – 22
Tolerance on squareness (t)	0.38	0.37
NUT – MECHANICAL PROPERTIES		
Hardness – NON-HDG	200 - 302 HV	175 - 310 HV
Hardness – HDG	260 - 353 HV 24 - 36 HRC	175 – 310 HV 88 HRB - 30 HRC
WASHERS – DIMENSIONS		
Inside diameter (d ₁)	13 - 13.27	13.4 – 13.8
Outside diameter (d ₂)	23.48 – 24	29 - 30
Thickness (h)	2.7 – 3.3	2.4 – 2.8
WASHERS – MECHANICAL PROPERTIES		
Hardness	300 - 370 HV	38 – 45 HRC



Additional Note for the Bolt drawing -
i BS EN 14399 15° to 30° BS 4395 PT1 approx 30°

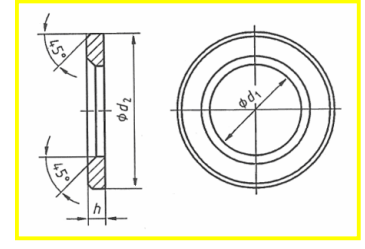
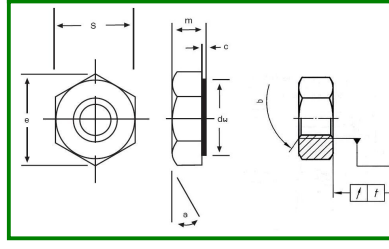
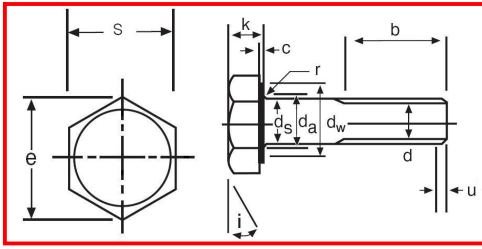
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Additional Note for the full assembly -
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M16 DIAMETER BOLTS, NUTS AND WASHERS

BOLT – DIMENSIONS	BS EN 14399	BS 4395
Length (l nom)	40 - 150	50 - 300
Depth of washer face (c)	0.4 - 0.8	0.4 max
Max. Transition diameter (d _a)	19.2	18.7
Diameter of washer face (d _w)	24.9 - max = actual bolt head across flats (s actual)	24.91 – 27
Across corners (e)	29.56 min with no max	29.30 - 31.2
Head thickness (k)	9.25 – 10.75	9.55 – 10.45
Radius under head (r)	1.2 min with no max	0.60 - 1.0
BOLT – MECHANICAL PROPERTIES		
Proof Load	94 500 N	92 100 N
0.2 Proof Stress	640 N/mm ²	635 N/mm ²
Hardness	22 - 32 HRC	25 – 34 HRC
NUT – DIMENSIONS		
Across corners (e)	29.56 min with no max	29.30 - 31.2
Thickness (m)	14.10 – 14.8	14.45 – 15.55
Depth of washer face (c)	0.4 - 0.8	no min - 0.4 max
Diameter of washer face (d _w)	24.90 - max = actual nut across flats (s actual)	24.91 – 27
Tolerance on squareness (t)	0.47	0.46
NUT – MECHANICAL PROPERTIES		
Hardness – NON-HDG	200 - 302 HV	175 - 310 HV
Hardness – HDG	260 - 353 HV 24 – 36 HRC	175 – 310 HV 88 HRB – 30 HRC
WASHERS – DIMENSIONS		
Inside diameter (d ₁)	17 - 17.27	17.4 – 17.8
Outside diameter (d ₂)	29.48 – 30	36 – 37
Thickness (h)	3.7 – 4.3	3.0 – 3.4
WASHERS – MECHANICAL PROPERTIES		
Hardness	300 - 370 HV	38 – 45 HRC



Additional Note for the Bolt drawing -
i BS EN 14399 15° to 30° BS 4395 PT1 approx 30°

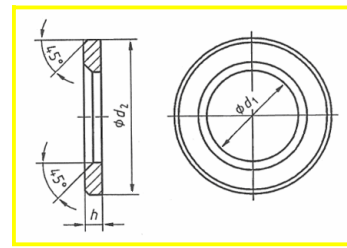
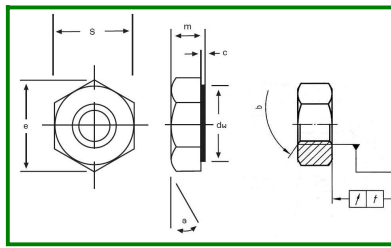
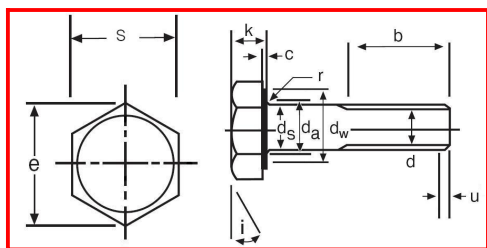
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2. BS EN 14399-6 Washers have a 45 degree chamfer on the outside and inside of the washer.

Additional Note for the full assembly -
BS EN 14399 product an impact test at -20 degrees and a suitability test are required (BS EN 14399-2).

M20 DIAMETER BOLTS, NUTS AND WASHERS

BOLT – DIMENSIONS	BS EN 14399	BS 4395
Length (l nom)	45 - 150	60 - 300
Depth of washer face (c)	0.4 – 0.8	0.4 max
Max. Transition diameter (d _a)	24.4	23.24
Diameter of washer face (d _w)	29.5 - max = actual bolt head across flats (s actual)	29.75 - 32
Across corners (e)	no max	36.9 max
Head thickness (k)	11.60 – 13.40	12.1 – 13.90
Radius under head (r)	1.5 min with no max	0.80 - 1.2
BOLT – MECHANICAL PROPERTIES		
Proof Load	147 000 N	144 000 N
0.2 Proof Stress	660 N/mm ²	635 N/mm ²
Hardness	23 HRC min	25 HRC min
NUT – DIMENSIONS		
Across corners (e)	no max	36.9 max
Thickness (m)	16.9 – 18.0	17.45 – 18.55
Depth of washer face (c)	0.4 - 0.8	no min - 0.4 max
Diameter of washer face (d _w)	29.5 – max = actual nut across flats (s actual)	29.75 – 32
Tolerance on squareness (t)	0.58	0.54
NUT – MECHANICAL PROPERTIES		
Hardness – NON-HDG	233 - 353 HV	175 - 310 HV
Hardness – HDG	260 - 353 HV 24 - 36 HRC	175 – 310 HV 88 HRB - 30 HRC
WASHERS – DIMENSIONS		
Inside diameter (d ₁)	21 - 21.33	21.1 – 21.5
Outside diameter (d ₂)	36.38 – 37	43 – 44
Thickness (h)	3.7 – 4.3	3.3 – 3.7
WASHERS – MECHANICAL PROPERTIES		
Hardness	300 - 370 HV	38 – 45 HRC



Additional Note for the Bolt drawing -
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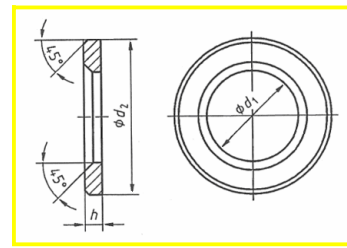
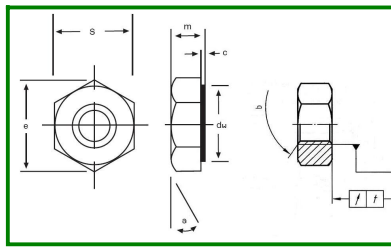
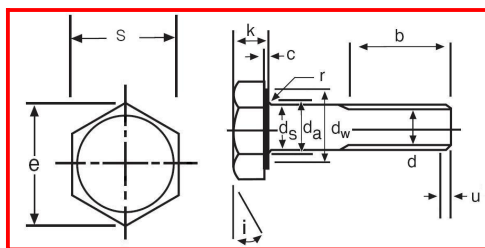
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Additional Note for the full assembly -
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M22 DIAMETER BOLTS, NUTS AND WASHERS

BOLT – DIMENSIONS	BS EN 14399	BS 4395
Length (l nom)	50 – 150	65 - 300
Depth of washer face (c)	0.4 - 0.8	0.4 max
Max. Transition diameter (d _a)	26.4	25.24
Diameter of washer face (d _w)	33.3 - max = actual bolt head across flats (s actual)	33.75 – 36
Across corners (e)	no max	41.6 max
Radius under head (r)	1.5 min with no max	0.80 - 1.2
BOLT – MECHANICAL PROPERTIES		
Proof Load	182 000 N	177 000 N
0.2 Proof Stress	660 N/mm ²	635 N/mm ²
Min Wedge Strength	252 000 N	250 000 N
Hardness	23 HRC min	25 HRC min
NUT – DIMENSIONS		
Across corners (e)	no max	41.6 max
Thickness (m)	18.10 – 19.4	18.35 – 19.65
Depth of washer face (c)	0.4 - 0.8	no min - 0.4 max
Diameter of washer face (d _w)	33.30 - max = actual nut across flats (s actual)	33.75 – 36
Tolerance on squareness (t)	0.63	0.61
NUT – MECHANICAL PROPERTIES		
Hardness – NON-HDG	233 - 353 HV	175 - 310 HV
Hardness – HDG	260 - 353 HV 24 – 36 HRC	175 – 310 HV 88 HRB - 30 HRC
WASHERS – DIMENSIONS		
Inside diameter (d ₁)	23.33 max	23.4 max
Outside diameter (d ₂)	38.38 – 39	48.5 – 50
Thickness (h)	3.7 – 4.3	3.8 – 4.2
WASHERS – MECHANICAL PROPERTIES		
Hardness	300 - 370 HV	38 – 45 HRC



Additional Note for the Bolt drawing -
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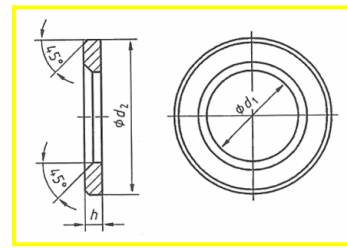
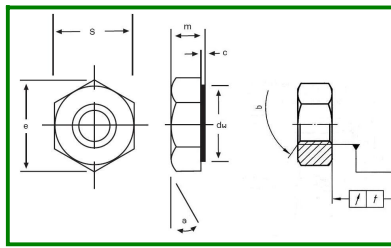
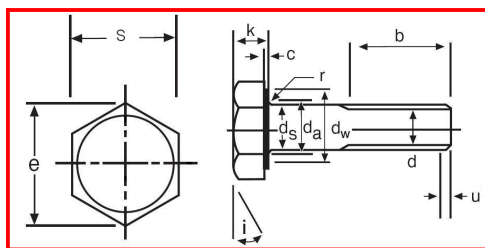
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Additional Note for the Washer drawing -
1. BS EN 14399-6 Washers do not have the three 'nibs' which BS 4395 washers have.
2. BS EN 14399-6 Washers have a 45 degree chamfer on the outside and inside of the washer.

Additional Note for the full assembly -
BS EN 14399 product an impact test at -20 degrees and a suitability test are required (BS EN 14399-2).

M24 DIAMETER BOLTS, NUTS AND WASHERS

BOLT – DIMENSIONS	BS EN 14399	BS 4395
Length (l nom)	55 – 200	70 - 300
Depth of washer face (c)	0.4 - 0.8	0.5 max
Max. Transition diameter (d_a)	28.4	27.24
Diameter of washer face (d_w)	38 - max = actual bolt head across flats (s actual)	38.75 – 41
Across corners (e)	no max	47.3 max
Radius under head (r)	1.5 min with no max	0.80 - 1.2
BOLT – MECHANICAL PROPERTIES		
Proof Load	212 000 N	207 000 N
0.2 Proof Stress	660 N/mm ²	635 N/mm ²
Min Wedge Strength	293 000 N	292 000 N
Hardness	23 HRC min	25 HRC min
NUT – DIMENSIONS		
Across corners (e)	no max	47.3 max
Thickness (m)	20.20 – 21.5	21.35 – 22.65
Depth of washer face (c)	0.4 - 0.8	no min - 0.5 max
Diameter of washer face (d_w)	38 - max = actual nut across flats (s actual)	38.75 – 41
Tolerance on squareness (t)	0.72	0.70
NUT – MECHANICAL PROPERTIES		
Hardness – NON-HDG	233 - 353 HV	175 - 310 HV
Hardness – HDG	260 - 353 HV 24 – 36 HRC	175 – 310 HV 88 HRB - 30 HRC
WASHERS – DIMENSIONS		
Inside diameter (d₁)	25 - 25.33	26 - 26.4
Outside diameter (d₂)	43.38 – 44	54.5 – 56
Thickness (h)	3.7 – 4.3	3.8 – 4.2
WASHERS – MECHANICAL PROPERTIES		
Hardness	300 - 370 HV	38 – 45 HRC



Additional Note for the Bolt drawing -
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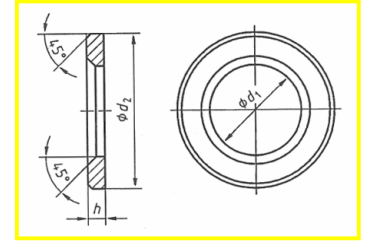
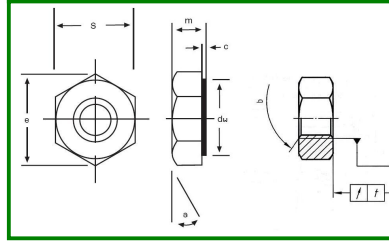
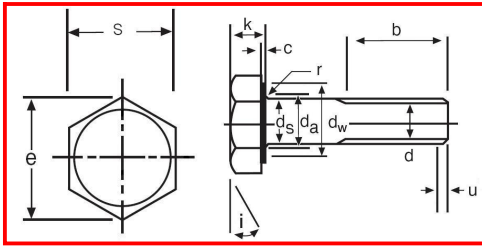
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Additional Note for the full assembly -
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M27 DIAMETER BOLTS, NUTS AND WASHERS

BOLT – DIMENSIONS	BS EN 14399	BS 4395
Length (l nom)	60 – 200	75 – 500
Depth of washer face (c)	0.4 - 0.8	0.5 max
Max. Transition diameter (d _a)	32.4	30.84
Diameter of washer face (d _w)	42.8 - max = actual bolt head across flats (s actual)	43.75 – 46
Across corners (e)	no max	53.1 max
Radius under head (r)	2.0 min with no max	1.0 - 1.5
BOLT – MECHANICAL PROPERTIES		
Proof Load	275 000 N	234 000 N
0.2 Proof Stress	660 N/mm ²	558 N/mm ²
Min Wedge Strength	381 000 N	333 000 N
Hardness	23 - 34 HRC	19 - 30 HRC
NUT – DIMENSIONS		
Across corners (e)	no max	53.1 max
Thickness (m)	22.50 – 23.8	23.35 – 24.65
Depth of washer face (c)	0.4 - 0.8	no min - 0.5 max
Diameter of washer face (d _w)	42.8 - max = actual nut across flats (s actual)	43.75 – 46
Tolerance on squareness (t)	0.80	0.78
NUT – MECHANICAL PROPERTIES		
Hardness – NON-HDG	233 - 353 HV	175 - 310 HV
Hardness – HDG	260 - 353 HV 24 – 36 HRC	175 – 310 HV 88 HRB - 30 HRC
WASHERS – DIMENSIONS		
Inside diameter (d ₁)	28 - 28.52	29 - 29.4
Outside diameter (d ₂)	49 – 50	58.5 – 60
Thickness (h)	4.4 – 5.6	3.8 – 4.2
WASHERS – MECHANICAL PROPERTIES		
Hardness	300 - 370 HV	38 – 45 HRC



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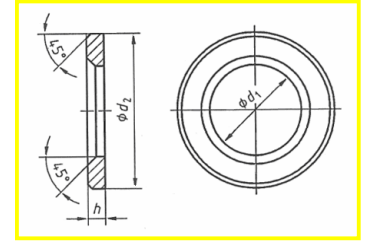
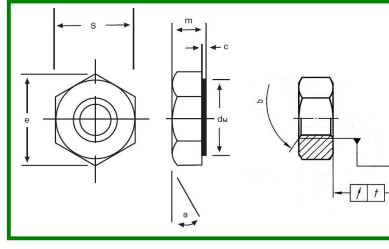
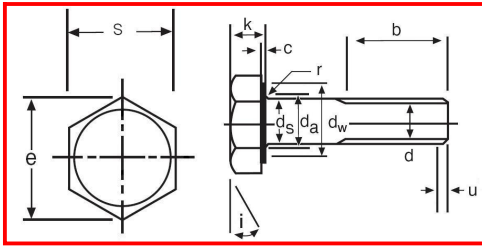
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M30 DIAMETER BOLTS, NUTS AND WASHERS

BOLT – DIMENSIONS	BS EN 14399	BS 4395
Length (l nom)	70 – 200	85 – 500
Depth of washer face (c)	0.4 - 0.8	0.5 max
Max. Transition diameter (d _a)	35.4	33.84
Diameter of washer face (d _w)	46.6 – max = actual bolt head across flats (s actual)	47.75 – 50
Across corners (e)	no max	57.7 max
Head thickness (k)	17.65 – 19.75	17.95 – 20.05
Radius under head (r)	2.0 min with no max	1.0 - 1.5
BOLT – MECHANICAL PROPERTIES		
Proof Load	337 000 N	286 000 N
0.2 Proof Stress	660 N/mm ²	558 N/mm ²
Min Wedge Strength	466 000 N	406 000 N
Hardness	23 - 34 HRC	19 - 30 HRC
NUT – DIMENSIONS		
Across corners (e)	no max	57.7 max
Thickness (m)	24.30 – 25.6	25.35 – 26.65
Depth of washer face (c)	0.4 - 0.8	no min - 0.5 max
Diameter of washer face (d _w)	46.6 - max = actual nut across flats (s actual)	47.75 – 50
Tolerance on squareness (t)	0.87	0.85
NUT – MECHANICAL PROPERTIES		
Hardness – NON-HDG	233 - 353 HV	175-310 HV
Hardness – HDG	260 - 353 HV 24 – 36 HRC	175 – 310 HV 88 HRB - 30 HRC
WASHERS – DIMENSIONS		
Inside diameter (d ₁)	31 – 31.62	32.4 – 32.8
Outside diameter (d ₂)	54.8 – 56	64.5 – 66
Thickness (h)	4.4 – 5.6	3.8 – 4.2
WASHERS – MECHANICAL PROPERTIES		
Hardness	300 - 370 HV	38 – 45 HRC



Additional Note for the Bolt drawing -
i BS EN 14399 15° to 30° BS 4395 PT1 approx 30°

Additional Note for the Nut drawing -
Washer face is optional with BS EN 14399 product but not with BS 4395 PT1 product.
a. BS EN 14399 15° to 30°. BS 4395 PT1 approx 30°. b BS EN 14399 100° to 130°.

Additional Note for the Washer drawing -
1. BS EN 14399-6 Washers do not have the three 'nibs' which BS 4395 washers have.
2. BS EN 14399-6 Washers have a 45 degree chamfer on the outside and inside of the washer.

Additional Note for the full assembly -
BS EN 14399 product an impact test at -20 degrees and a suitability test are required (BS EN 14399-2).

M36 DIAMETER BOLTS, NUTS AND WASHERS

BOLT – DIMENSIONS	BS EN 14399	BS 4395
Length (l nom)	85 – 200	100 - 500
Depth of washer face (c)	0.4 - 0.8	0.5 max
Max. Transition diameter (d _a)	42.4	40
Diameter of washer face (d _w)	55.9 - max = actual bolt head across flats (s actual)	57.75 – 60
Across corners (e)	no max	69.3 max
Head thickness (k)	21.45 – 23.55	21.95 – 24.05
Radius under head (r)	2.0 min with no max	1.0 - 1.5 max
BOLT – MECHANICAL PROPERTIES		
Proof Load	490 000 N	418 000 N
0.2 Proof Stress	660 N/mm ²	558 N/mm ²
Min Wedge Strength	678 000 N	591 000 N
Hardness	23 - 34 HRC	19 - 30 HRC
NUT – DIMENSIONS		
Across corners (e)	no max	69.3 max
Thickness (m)	29.40 – 31.0	30.20 – 31.80
Depth of washer face (c)	0.4 - 0.8	no min - 0.5 max
Diameter of washer face (d _w)	55.9 - max = actual nut across flats (s actual)	57.75 – 60
Tolerance on squareness (t)	1.05	1.03
NUT – MECHANICAL PROPERTIES		
Hardness – NON-HDG	233 - 353 HV	175 - 310 HV
Hardness – HDG	260 - 353 HV 24 – 36 HRC	175 – 310 HV 88 HRB - 30 HRC
WASHERS – DIMENSIONS		
Inside diameter (d ₁)	37 - 37.62	38.4 – 38.8
Outside diameter (d ₂)	64.8 – 66	83.5 – 85
Thickness (h)	5.4 – 6.6	4.2 – 4.6
WASHERS – MECHANICAL PROPERTIES		
Hardness	300 - 370 HV	38 – 45 HRC

