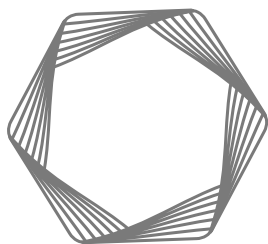


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VERSION

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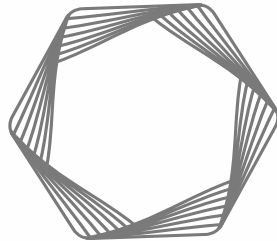
TECHNICAL DATA

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Disclaimer

Although CBC Fasteners has striven to ensure that all the information contained in this publication is accurate, reliance of the contents thereof, for any purpose whatsoever, is at the sole risk of that person or party. CBC is not responsible for any harm or damages caused to persons or property arising from use of any of the information contained herein.

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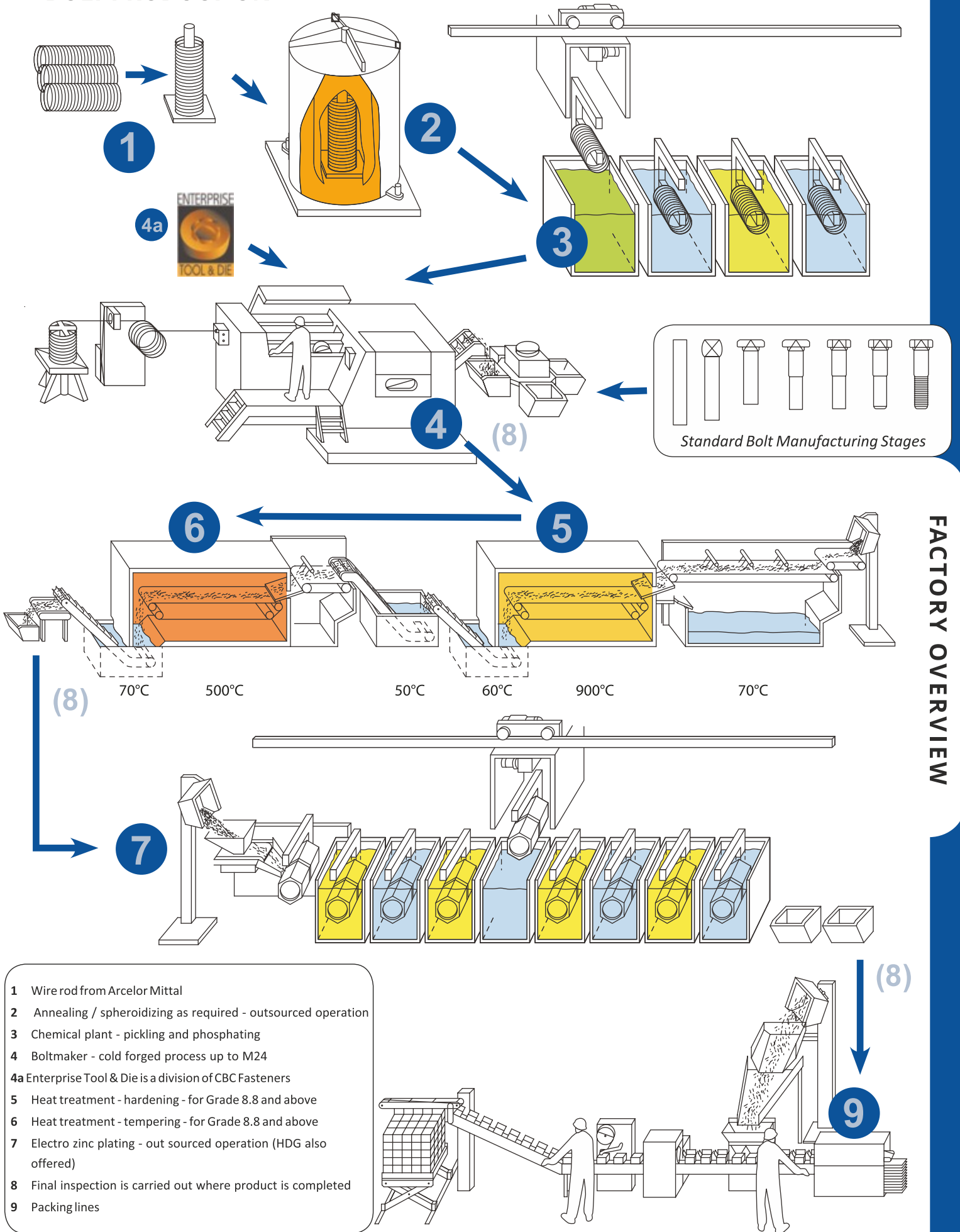
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BOLT PRODUCTION



CBC FASTENERS (PTY) LTD – PROCESS

No		Test / Inspection	Inspection Equipment	Sampling Size	Inspection Responsibility	Non Conformance
1 2	Steel (Coils) delivered from Arcelor Mittal and Harchris after heat treatment	Dimensional verification Cast No Tensile test verification Surface defects Colour coding	Micrometer ensile machine Magnifying equipment	Samples per cast, If non-conformance, check whole consignment	Metallurgical Laboratory Personnel	If non-conformance, isolate to holding bay Enerate NCR for ArcelorMittal or Harchris Heat Treatment
3	Steel surface preparation at pickling plant	Pickling time control Thickness of zinc-phosphate testing Chemicals are controlled in bath / acid with inhibitor for hydrogen prevention	Scratch test Laboratory equipment	Everyday chemical control Scratch test each coil	Plant operator Metallurgical Laboratory Personnel	If non-conformance, isolate coils for re-work NCR generated
4	Forging & Thread Rolling / Tapping	First off samples Verification of dimensions (work pack) Quality Control in process	Micrometers Verniers Gauges Visual surface inspection	Operator at all times Patrol Quality Inspector every 15 minutes At least 10 samples per bin	Machine Operator Quality Inspector	If non-conformance, isolate and generate NCR Can be re-worked or scrapped
5 6	Heat Treatment for certain products is required plus rust prevention	Hardness Tensile Visual check for blackening & lubrication for rust prevention	Hardness tester Tensile machine	Hardness every 15 minutes Tensile test 3 samples per bin	Plant Operator & Assistant Quality Inspector	If non-conformance, isolate product and generate NCR for re-work or scrap
7	Electro Plating Hot Dip Galvanising (done by sub-contractors audited by CBC Fasteners(Pty) Ltd	Work instruction Thickness of plating Visual inspection for surface integrity Delivery notes Plating certificates and salt spray test	Alcometer for thickness verification Verniers Micrometers Magnifying equipment	10 Samples for bin @ CBC Fasteners At the platers, as per internal instructions or as per customer requirements	Quality Department In coming Inspector	If non-conformance, isolate product and generate NCR for re-work or scrap.
8	Final Inspection & Certification as per EN 10204 standard requirement Special tests if required	Dimensions (as per Standard requirement) Hardness Tensile Additional as per customer contract requirements	Verniers Micrometers Hardness testers Tensile machines Metrology (Microscopic) Structure Decarburization Gauges	10 per bin. Inspector performing ongoing testing product and verifying parameters Customer contract requirement	Metallurgical Laboratory Personnel Quality Control Inspectors	If non-conformance, isolate product and generate NCR Re-worker Scrap
9.1	Transfer for packing and storing Packing activities	Transfer documentation All information is captured into the computer system	Verniers Micrometer Gauges Packing Documentation & scale verification documentation	Ongoing visual Inspection measurement of dimensions	Supervision Table Leaders	If non-conformance, Generate NCR Isolate product
9.2	Product storage (as per computer system)	Location captured in computer system	Location Verification	Supervision location verification	Quality Inspector Store Personnel Pickers	If non-conformance, action is taken and the computer data is updated

CERTIFICATE

PECB hereby certifies that the management system of

CBC Fasteners Pty Ltd.

6 Coppinger Street, Krugersdorp, Gauteng, 1752, South Africa

Has been assessed and found to be in accordance
with the management system requirements in

ISO 9001:2015

Certification Scope:

The manufacturing, import and distribution of fasteners


Eric Lachapelle
CEO

Montréal	2018-05-21
Certificate No.	C411-QMS167-05-18
Certified since	2018-05-21
Valid from	2018-05-21
until	2021-05-20


Faton Aliu
President and COO

**Subject to annual surveillance audits*

This assessment and certification was conducted in accordance with the PECB auditing and certification procedures

This certificate can be validated by email request at: ms@pecb.com
www.pecb.com



PECB
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MECHANICAL PROPERTIES OF BOLTS, SCREWS AND STUDS – ISO 898

MECHANICAL PROPERTY			PROPERTY CLASS				
			4.8	8.8		10.9	12.9
				d≤16mm	d>16mm		
Tensile Strength (N/mm ²)	nom	400	800	800	1000	1200	
	min	420	800	830	1040	1220	
Rockwell Hardness, HR	min	HRB	71,0	-	-	-	
		HRC	-	22	23	32	39
	max	HRB	99,5	-	-	-	-
		HRC	-	32	34	39	44
Lower Yield Stress(R _{eL} N/mm ²)	nom	320	-	-	-	-	
	min	340	-	-	-	-	
Proof Stress (Rp0,2 N/mm ²)	nom	-	640	640	900	1080	
	min	-	640	640	940	1100	
Elongation after Fracture, A	min	14	12	12	9	8	

TORQUE/PROOF LOAD VALUES FOR PRODUCT WITH METRIC THREADS - ISO

FINISH →	NUTS - PROOF LOAD					
	BLACK				HDG	
	DIN 934		ISO 4032		DIN 934	
	THREAD ↓	8	10	8	10	8
mm	N	N	N	N	N	N
M06	16000	20000	17200	20900	9510	13610
M08	29000	36500	31800	38100	18150	25980
M10	46000	58000	50500	60300	29500	42200
M12	67000	84000	74200	88500	43600	62300
M14	92000	115000	101200	120800	60300	86300
M16	126000	157000	138200	164900	83500	119000
M18	154000	192000	176600	203500	106000	147000
M20	196000	245000	225400	259700	136000	186000
M22	242000	303000	278800	321200	170000	236000
M24	282000	353000	324800	374600	197000	273000
M30	448000	561000	516100	594700	318000	440000

TIGHTENING TORQUE FOR STANDARD METRIC FASTENERS

The following table lists the maximum permissible tightening torques and resulting maximum pre-loads, for standard hex bolts based on 90% utilization of the bolt's yield strength point (elongation limit 0,2%), irrespective of grade.

The tightening torque does not include any safety factor and should be used with caution because the coefficient of friction μ is subject to many application variables. (See note examples below).

Coefficient of friction:

$\mu = 0.10$ for standard black bolts (light oiled) $\mu = 0.14$ for standard electro zinc plated bolts (dry)

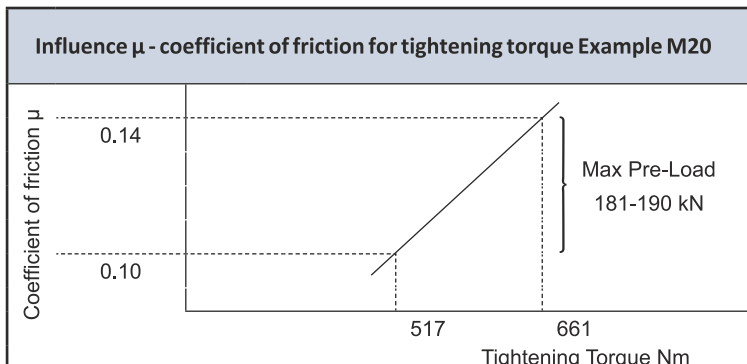
PROPERTY CLASS BASED ON ISO 898/1									
Metric Threads	Friction Coefficient	Maximum Tightening Torque Nm				Maximum Preload kN			
		Gr 4.8	Gr 8.8	Gr 0.9	Gr 12.9	Gr 4.8	Gr 8.8	Gr 10.9	Gr 12.9
M06 X 1.0	0.10	4.1	9.0	13.2	15.4	4.84	10.40	15.30	17.90
	0.14	5.2	11.3	6.5	19.3	4.57	9.90	14.50	17.00
M08X1.25	0.10	10.0	21.6	31.8	37.2	8.80	19.10	28.00	32.80
	0.14	12.6	27.3	40.1	46.9	8.30	18.10	26.60	31.10
M10X1.5	0.10	20.1	43.0	63.0	73.0	14.10	30.30	44.50	52.10
	0.14	25.3	54.0	79.0	93.0	13.30	28.80	42.20	49.40
M12X1.75	0.10	34.0	73.0	108.0	126.0	20.50	44.10	64.80	75.90
	0.14	43.0	93.0	137.0	160.0	19.40	41.90	61.50	72.00
M14X2.0	0.10	55.0	117.0	172.0	201.0	28.20	60.60	88.90	104.10
	0.14	69.0	148.0	218.0	255.0	26.70	57.50	84.40	98.90
M16X2.0	0.10	84.0	180.0	264.0	309.0	38.60	82.90	121.70	142.40
	0.14	107.0	230.0	338.0	395.0	36.60	78.80	115.70	135.40
M20X2.5	0.10	164.0	363.0	517.0	605.0	60.30	134.00	190.00	223.00
	0.14	209.0	464.0	661.0	773.0	57.20	127.00	181.00	212.00
M24X3.0	0.10	282.0	625.0	890.0	1041.0	86.90	192.00	274.00	320.00
	0.14	359.0	798.0	1136.0	1329.0	82.40	183.00	260.00	305.00
M30X3.5	0.10	563.0	1246.0	1775.0	2077.0	138.70	307.00	437.00	511.00
	0.14	719.0	1597.0	2274.0	2662.0	131.70	292.00	416.00	487.00

SOURCE: Calculation procedure follows VDI guidelines 2230 (2003). VDI = Verein Deutscher Ingenieure, the Association of German Engineers.

NOTE: DIN 18800 Part 7 states, "The bolt may be tightened either by NUT or by the BOLT"

The friction values μ can show great variation because of influencing factors, such as the material pairing, the surface quality, the surface treatment (electroplated, hot dip galvanized, blackened etc.) and the type of lubrication (with or without oil, molybdenum, "molykote" paste, dry or wet, etc).

Examples of coefficients of friction for various finishes - μ					
Metallic, black tempered	0.14 – 0.24	Standard Black Oil	~ - 0.10	Plain steel black	0.20 +
Black Oxide Treatment	0.16 – 0.19	Hot dip galvanized	~ - 0.15	Wax	0.10 – 0.16
Weathered rusted, wire-brushed	~ - 0.35	Electroplated & oiled	~ - 0.10	M _o S ₂	0.10 – 0.16
Sand blast cleaned surface	~ - 0.50	Electroplated only	0.12 – 0.18		



To achieve the suitable maximum preload:

- a higher value of coefficient of friction may require a higher tightening torque, and
- a lower value of coefficient of friction may require a lower tightening torque.

All tools used for tightening should be checked frequently and correctly calibrated following best practice procedures.

PRELOAD AND TIGHTENING FOR HIGH STRENGTH STRUCTURAL BOLTING ASSEMBLIES FOR PRELOADING (FRICTION BOLTS)

Methods used for control of bolt tightening

There are several methods that are available for controlling the desired level of pre-load in a fastener. The decision as to which method to use is dependant on the importance of the joint.

1. **Hand Operated Torque Wrenches** are often the most convenient and inexpensive tool for torquing a fastened joint. A manual torque wrench is easy to set and easy to use. When the specified setting is reached, the tool gives a visual/audible signal and the operator can proceed to the next fastener. The most important point to remember when using a manual torque wrench is to make sure that the instrument has been stored properly and has been calibrated by a independent, recognized torque consultant.

2. **Power Torque Wrenches** are more productive when large numbers of bolts are to be tightened. These tools require tightening of a sample of bolts in a bolt load measuring device in order to set the cut-off point for the desired tension, rather than measuring torque directly.

3. **Turn-of-Nut Method** involves first tightening the bolt to a “ snug tight” condition, then marking the relative position of both bolt & nut. Finally the nut is rotated and fully tensioned with respect to the stationary bolt-head by a certain degree of rotation. This method is time consuming but more accurate than the above methods when performed by an experienced operator.

NOTE

Dimensioning, design and manufacture of fasteners with high-strength structural bolting are regulated in DIN 18800 and EN 14399. The tables below, which are taken from DIN 18800 part 7, shows the necessary pre-loads, torques and tightening angles for grade 10.9 / 10.

TORQUE PROCEDURES						
	Bolt diameter	Required preload in the bolt F_M	Hand operated torque wrench		Power torque wrench	Turn-of-nut
			Tightening torque to be applied M_A		Preload to be applied F_M	Pre-tightening torque to be applied M_A
			Lubricated with MoS2	Lightly oiled		
	mm	kN	Nm	Nm	kN	Nm
1	M12	50	100	120	60	10
2	M16	100	250	350	110	50
3	M20	160	450	600	175	50
4	M24	220	800	1100	240	100
5	M30	350	1650	2200	390	200
6	M36	510	2800	3800	560	200

ANGLE AND ROTATION PROCEDURE : TURN-OF-NUT METHOD									
Bolt Dia	Angle	Rotations	Angle	Rotations	Angle	Rotations	Angle	Rotations	
M12–M22	180°	½	240°	¾	270°	¾	360°	1.	
M24-M36							270°	¾	
Clamping Length	lk ≤ 50		51 < lk ≤ 100		101 < lk ≤ 170		171 < lk ≤ 240		

The value M_A (tightening torque) depends upon the thread lubricant. The type of lubricant used has a definite effect on how much torque is needed to overcome friction. Common machine oil is considered to be a poor lubricant whilst Moly-disulphide is recommended.

All tools used for tightening should be checked frequently and correctly calibrated following best practice procedures.

HOT DIP GALVANIZING SPECIFICATION FOR BOLTS AND NUTS UP TO GRADE 8.8

Corrosion protection of carbon steel fasteners is generally achieved through the application of a coating (barrier protection), be it in the form of a paint system or through the use of a metallic coating. Metallic coatings comprise of different materials, zinc is usually chosen for reason of economics, ease of application as well as the mechanism of cathodic protection provided by zinc.

Zinc is applied either by an electroplating process (electro-galvanizing) or by immersion in molten zinc (hot dip galvanizing). Corrosion protection provided by zinc is generally proportional to the coating thickness, i.e. the thicker the coating the longer the service life.

Zinc coating thicknesses achieved using the electroplating process, generally range between 6µm to 10µm (µm = micrometers), while hot dip galvanized coating thicknesses range from 45µm through to about 65µm. It is therefore imperative to specify the specific type of zinc coating required for corrosion protection. The word “galvanized” alone is insufficient and should be avoided. Corrosion protection specifications should clearly state, “electroplated, or electro-galvanized” or “hot dip galvanized”.

The following specification is restricted to the requirements for Hot Dip Galvanized carbon steel fasteners, comprising bolts, nuts and washers.

From Grade 4.6 to Grade 8.8, fasteners shall be hot dip galvanized by the centrifuging process. The coating shall conform to the thicknesses listed in table No.1.

Table No. 1 - Coating thicknesses on sample that are centrifuged (Refer ISO 1461:2000)

Fastener diameter	Local coating thickness (minimum) Note: A µm or gms/m ²	Mean coating thickness (minimum) Note: B µm or gms/m ²
≥ 20 mm diameter	45 or 325	55 or 395
≥ 6 mm to < 20 mm diameter	35 or 250	45 or 325
< 6 mm diameter	20 or 175	25 or 200

NOTE:

- Local coating thickness obtained using a magnetic test or preferred single value from a gravimetric test.
- Mean coating thickness being the average value of the local thicknesses on all the articles in the control sample.
- Hot dip galvanized fasteners not commercially available in sizes <6mm diameter.

HOT DIP GALVANIZING SPECIFICATION FOR BOLTS AND NUTS OF GRADE 10.9 AND 12.9 FASTENERS

Grade 10.9 and 12.9 fasteners may be hot dipped galvanized provided a certificate of compliance is issued by the galvanizer stating that the hot dip galvanized coating has been carried out in terms of the published SANS 10094 code of practice (Annex B) but modified in terms of contact with acid. The two most important factors to be considered in terms of the hot dip galvanizing of Grade 10.9 and 12.9, fasteners is to eliminate completely the acid contact with component and to comply with the following coating thickness requirements.

Table No. 2 - Coating requirements for Grade 10.9 / 12.9 Hot Dip Galvanized Fasteners.

Threaded articles Grade 10.9 / 12.9 Fasteners Diameter	Local coating thickness (min.) µm or gms/m ²	Mean coating thickness µm or gms/m ²	Max. coating thickness µm or gms/m ²
≥ 20mm diameter	45 or 325	55 or 395	65 or 465
≥ 6 mm to < 20mm	35 or 250	45 or 325	55 or 395

Excessively thick hot dip galvanized coatings , i.e. zinc immersion times > 2 minutes, result in excessive growth of the hard Fe/Zn alloy layers, Excessively thick coatings on threads, will interfere with thread tolerances and could result in gauling during assembly of the fastener.

Threads should be clearly defined and free from excess solidified zinc, allowing for ease of nut fitting and tensioning.

Procedure for Hot Dip Galvanizing of Grade 10.9 and 12.9 Fasteners

It must be emphasised that incorrect coating procedure could result in hydrogen embrittlement and failure of all fasteners irrespective of the carbon content. For any high tensile fastening product, but especially where the application is safety critical, it is imperative that products conform to a minimum standard aimed at the prevention of hydrogen embrittlement. This standard contains clear instructions regarding product standard and coating procedure requirements, to totally eliminate the contact of products with acid, as follows:-

- Components are degreased thoroughly in heated caustic alkaline degreaser (5-8% solution) between 60 – 70 degrees Celsius.
- Light abrasive “mechanical cleaning” for 5 min. (Special equipment, to prevent damage to the products threads, is used by CBC Fasteners (Pty) sub-contracting hot dip galvanizers.)
- After the mechanical cleaning the components are rinsed in water, fluxed and immediately immersed into the molten zinc at 450°C.
- The immersion times should be limited to <2 minutes to avoid the coating exceeding the thickness standard requirement. A complete and even coating is achieved by agitating the product in the molten zinc and immediately followed by a centrifugal spinning process.
- No stripping and re-galvanizing of rejected sub-quality product is allowed.
- No uncoated areas are acceptable.

Oversize Tapping Allowance for Hot Dip Galvanized Nuts

The zinc coating on external threads shall be free from lumps and shall not have been subjected to a cutting, rolling or finishing operation that could damage the zinc coating. Hot dip galvanized nuts shall be processed as “blanks” and the oversized internal threads shall be cut after the zinc coating process in accordance with the allowances given in table No.3. Alternatively, under cutting of the bolt threads prior to hot dip galvanizing is permissible.

Table No.3 – Oversize tapping allowance

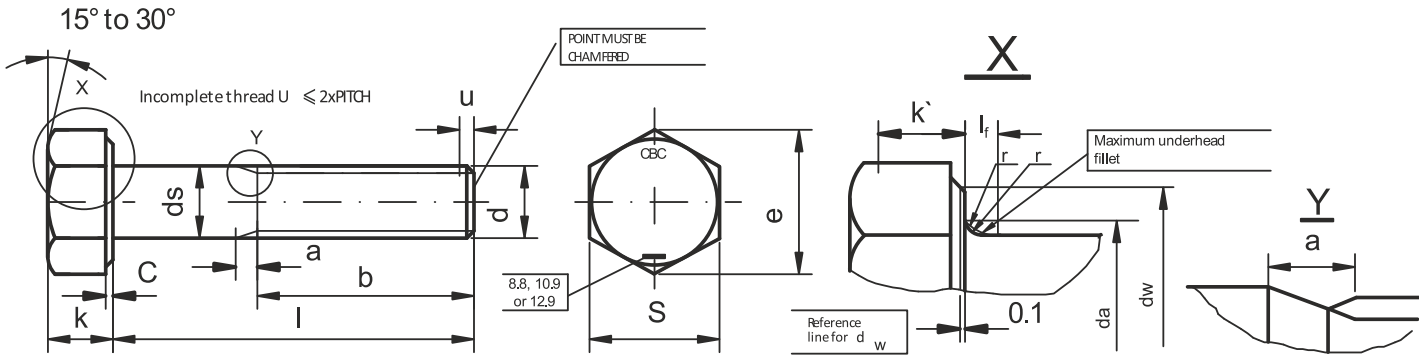
Nominal size of thread	Allowance (mm)
M8 to M12	0.33
M16 to M24	0.38
> M24	0.40

Reference Specifications

SANS 121 (ISO 1461) - Hot dip galvanized coatings on fabricated iron and steel articles.

SANS 10094 – The use of high-strength friction-grip bolts.

METRIC HEXAGON HEAD BOLTS



Dimensions for Bolt DIN 931

Grade 8.8, 10.9 and 12.9
Range M6 - M30

Dimensions in millimetres

⚡ Specifications differences between
DIN 931 and ISO 4014

NOTE This specification has been superseded
by ISO 4014. However, market preference
dictates the continued use of this specification.

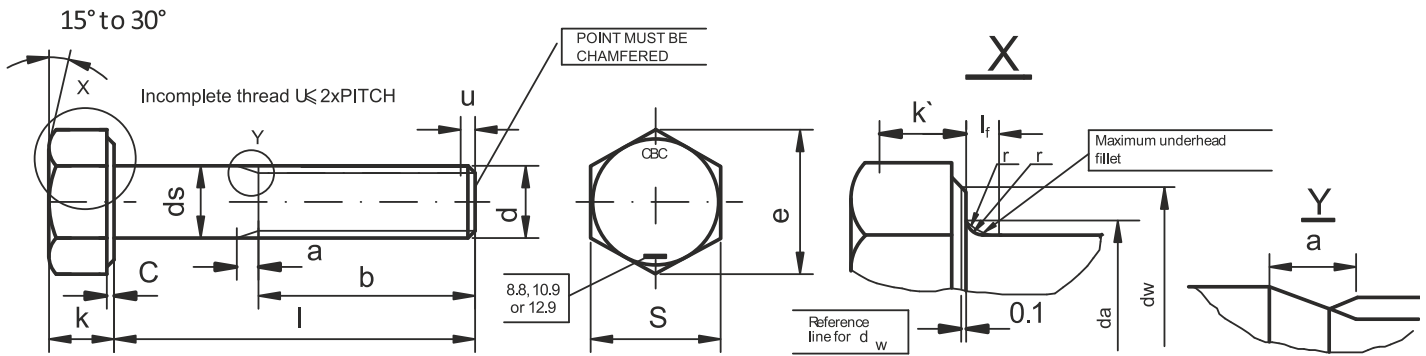
d	S		k		
	min	max	min	nom	max
M6	9.78	10.00	3.85	4.00	4.15
M8	12.73	13.00	5.15	5.30	5.45
M10	▶ 16.73	▶ 17.00	6.22	6.40	6.58
M12	▶ 18.67	▶ 19.00	7.32	7.50	7.68
M14	▶ 21.67	▶ 22.00	8.62	8.80	8.98
M16	23.67	24.00	9.82	10.00	10.18
M18	26.67	27.00	11.28	11.50	11.72
M20	29.67	30.00	12.29	12.50	12.71
M22	▶ 31.61	▶ 32.00	13.78	14.00	14.22
M24	35.38	36.00	14.79	15.00	15.21
M30	45.38	46.00	18.44	18.70	18.96

	ds (shank)		P	a	C		e	r	l _f	U	da	dw	k'
	min	max	pitch	min	min	max	min	min	max	max	max	min	min
M6	5.82	6.00	1.00	2.0	0.15	0.50	11.05	0.25	1.4	1.5	6.8	8.88	2.70
M8	7.78	8.00	1.25	2.5	0.15	0.60	14.38	0.40	2.0	1.8	9.2	11.63	3.61
M10	9.78	10.00	1.50	3.5	0.15	0.60	▶ 18.90	0.40	2.0	2.2	11.2	▶ 15.63	4.35
M12	11.73	12.00	1.75	4.0	0.15	0.60	▶ 21.10	0.60	3.0	2.6	13.7	▶ 17.37	5.12
M14	13.73	14.00	2.00	4.5	0.15	0.60	▶ 24.49	0.60	3.0	3.0	15.7	▶ 20.50	6.03
M16	15.73	16.00	2.00	5.0	0.20	0.80	26.75	0.60	3.0	3.0	17.7	22.49	6.87
M18	17.73	18.00	2.50	5.0	0.20	0.80	30.14	0.60	3.0	3.0	20.2	25.30	7.80
M20	19.67	20.00	2.50	7.0	0.20	0.80	33.53	0.80	4.0	3.5	22.4	28.19	8.60
M22	21.67	22.00	2.50	7.0	0.20	0.80	▶ 35.72	0.80	4.0	3.5	24.4	▶ 30.00	9.60
M24	23.67	24.00	3.00	8.0	0.20	0.80	39.98	0.80	4.0	4.5	26.4	33.61	10.35
M30	29.67	30.00	3.50	8.0	0.20	0.80	50.85	1.00	6.0	5.2	33.4	42.75	12.80

	l _{mm}	25	30	35	40	45	50	55	60	65	70	75	80	90-120	130-160	170-200	210-280
		± 0.42		± 0.50			± 0.60						± 0.70	± 0.80		± 0.92	
M6	b	18 + 2.0															
M8	b	22 + 2.5												28 + 2.5			
M10	b	26 + 3.0												32 + 3.0		45 + 3.0	
M12	b	30 + 3.5												36 + 3.5		49 + 3.5	
M14	b	34 + 4.0												40 + 4.0			
M16	b	38 + 4.0												44 + 4.0			
M18	b	42 + 5.0												48 + 5.0			
M20	b	46 + 5.0												52 + 5.0			
M22	b	50 + 5.0												56 + 5.0			
M24	b	54 + 6.0												60 + 6.0			
M30	b	66 + 7.0												72 + 7.0			

■ Not available in CBC Range □ Only available in full thread

METRIC HEXAGON HEAD BOLTS



Dimensions for Bolt ISO 4014

Grade 8.8, 10.9 and 12.9
Range M6 - M30

Dimensions in millimetres

► Specifications differences between
DIN 931 and ISO 4014

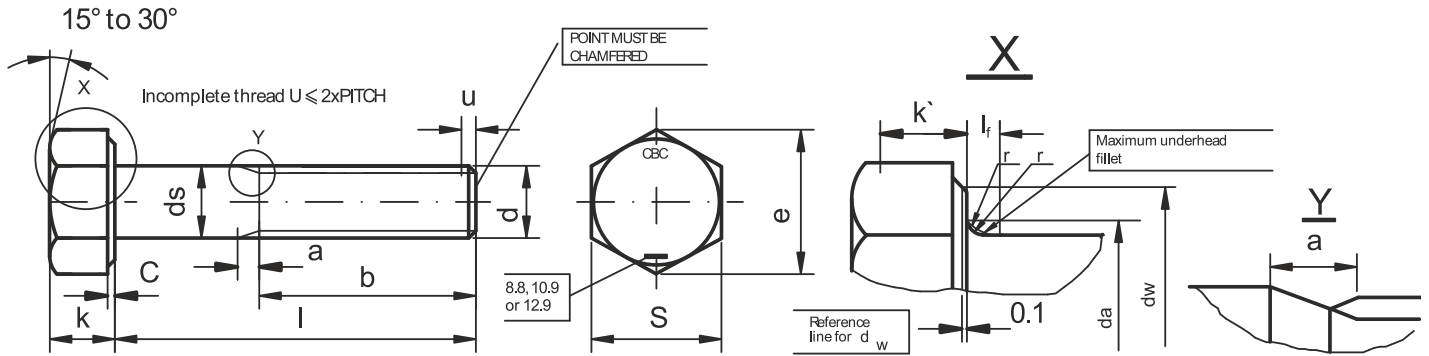
d	S		k		
	min	max	min	nom	max
M6	9.78	10.00	3.85	4.00	4.15
M8	12.73	13.00	5.15	5.30	5.45
M10	► 15.73	► 16.00	6.22	6.40	6.58
M12	► 17.67	► 18.00	7.32	7.50	7.68
M14	► 20.67	► 21.00	8.62	8.80	8.98
M16	23.67	24.00	9.82	10.00	10.18
M18	26.67	27.00	11.28	11.50	12.72
M20	29.67	30.00	12.29	12.50	12.71
M22	► 33.38	► 34.00	13.78	14.00	14.22
M24	35.38	36.00	14.79	15.00	15.21
M30	45.38	46.00	18.44	18.70	18.96

	ds (shank)		P	a	C		e	r	l_f	U	da	dw	k'
	min	max	pitch	min	min	max	min	min	max	max	max	min	min
M6	5.82	6.00	1.00	2.0	0.15	0.50	11.05	0.25	1.4	1.5	6.8	8.88	2.70
M8	7.78	8.00	1.25	2.5	0.15	0.60	14.38	0.40	2.0	1.8	9.2	11.63	3.61
M10	9.78	10.00	1.50	3.5	0.15	0.60	► 17.77	0.40	2.0	2.2	11.2	► 14.63	4.35
M12	11.73	12.00	1.75	4.0	0.15	0.60	► 20.03	0.60	3.0	2.6	13.7	► 16.63	5.12
M14	13.73	14.00	2.00	4.5	0.15	0.60	► 23.36	0.60	3.0	3.0	15.7	► 19.37	6.03
M16	15.73	16.00	2.00	5.0	0.20	0.80	26.75	0.60	3.0	3.0	17.7	22.49	6.87
M18	17.73	18.00	2.50	5.0	0.20	0.80	30.14	0.60	3.0	3.0	20.2	25.30	7.90
M20	19.67	20.00	2.50	7.0	0.20	0.80	33.53	0.80	4.0	3.5	22.4	28.19	8.60
M22	21.67	22.00	2.50	7.0	0.20	0.80	► 37.72	0.80	4.0	3.5	24.4	► 31.70	9.60
M24	23.67	24.00	3.00	8.0	0.20	0.80	39.98	0.80	4.0	4.5	26.4	33.61	10.35
M30	29.67	30.00	3.50	8.0	0.20	0.80	50.85	1.00	6.0	5.2	33.4	42.75	12.80

	l_{mm}	25	30	35	40	45	50	55	60	65	70	75	80	90-120	130-160	170-200	210-280
		± 0.42		± 0.50			± 0.60						± 0.70	± 0.80		± 0.92	
M6	b	18 + 2.0															
M8	b	22 + 2.5												28 + 2.5			
M10	b	26 + 3.0												32 + 3.0		45 + 3.0	
M12	b	30 + 3.5												36 + 3.5		49 + 3.5	
M14	b	34 + 4.0												40 + 4.0			
M16	b	38 + 4.0												44 + 4.0			
M18	b	42 + 5.0												48 + 5.0			
M20	b	Use full thread ISO 4017												52 + 5.0			
M22	b	Use full thread ISO 4017												56 + 5.0			
M24	b	Use full thread ISO 4017												60 + 6.0			
M30	b	Use full thread ISO 4017												72 + 7.0			

Not available in CBC Range Only available in full thread

METRIC HEXAGON HEAD BOLTS



Dimensions for Bolt DIN 960

Grade 8.8, 10.9 and 12.9
Range M8 - M24

Dimensions in millimetres

NOTE This specification has been superseded by ISO 8765. However, market preference dictates the continued use of this specification.

d & pitch	S		k		
	min	max	min	nom	max
M8 x 1.00	12.73	13.00	5.15	5.30	5.45
M10 x 1.00 & 1.25	16.73	17.00	6.22	6.40	6.58
M12 x 1.25 & 1.50	18.67	19.00	7.32	7.50	7.68
M14 x 1.50	21.67	22.00	8.62	8.80	8.98
M16 x 1.50	23.67	24.00	9.82	10.00	10.18
M20 x 1.50 & 2.00	29.67	30.00	12.29	12.50	12.72
M24 x 1.50 & 2.00	35.38	36.00	14.79	15.00	15.22

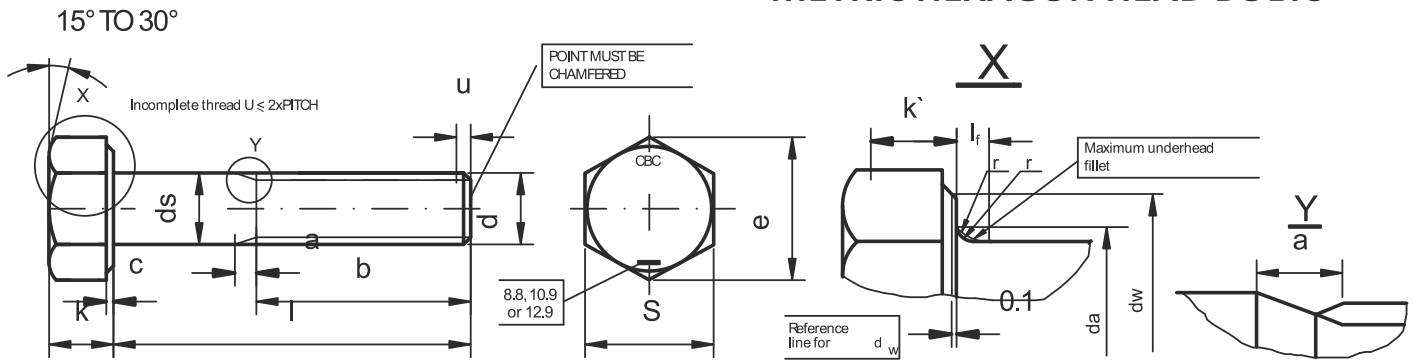
	ds (shank)		a	C		e	r	lf	U	da	dw	k'
	min	max	min	min	max	min	min	max	max	max	min	min
M8	7.78	8.00	2.5	0.15	0.60	14.38	0.4	2.0	1.8	9.2	11.63	3.61
M10	9.78	10.00	3.5	0.15	0.60	18.90	0.4	2.0	2.2	11.2	15.63	4.35
M12	11.73	12.00	4.0	0.15	0.60	21.10	0.6	3.0	2.6	13.7	17.37	5.12
M14	13.73	14.00	4.5	0.15	0.60	24.49	0.6	3.0	3.0	15.7	20.50	6.03
M16	15.73	16.00	5.0	0.20	0.80	26.75	0.6	3.0	3.0	17.7	22.49	6.87
M20	19.67	20.00	7.0	0.20	0.80	33.53	0.8	4.0	3.5	22.4	28.19	8.60
M24	23.67	24.00	8.0	0.20	0.80	39.98	0.8	4.0	4.5	26.4	33.61	10.35

	l mm	25	30	35	40	45	50	55	60	65	70	75	80	90-120	130-160	170-200	210-280
		± 0.42	± 0.50			± 0.60				± 0.70		± 0.80		± 0.92			
M8	b						22 + 2.5				28 + 2.5						
M10	b				26 + 3.0				32 + 3.0		45 + 3.0						
M12	b			30 + 3.5			36 + 3.5		49 + 3.5								
M14	b		34 + 4.0			40 + 4.0		44 + 4.0									
M16	b	Use full thread DIN 961			38 + 4.0				44 + 4.0								
M20	b			46 + 5.0				52 + 5.0									
M24	b		54 + 6.0			60 + 6.0		60 + 6.0									

Not available in CBC Range Only available in full thread

DIMENSIONS

METRIC HEXAGON HEAD BOLTS



Dimensions for Bolt ISO 8765 (4014 Fine Pitch)

Grade 8.8, 10.9 and 12.9
Range M8 - M24

Dimensions in millimetres

d & pitch	S		k		
	min	max	min	nom	max
M8 x 1.00	12.73	13.00	5.15	5.30	5.45
M10 x 1.00 & 1.25	15.73	16.00	6.22	6.40	6.58
M12 x 1.25 & 1.50	17.73	18.00	7.32	7.50	7.68
M14 x 1.50	20.67	21.00	8.62	8.80	8.98
M16 x 1.50	23.67	24.00	9.82	10.00	10.18
M20 x 1.50 & 2.00	29.67	30.00	12.29	12.50	12.72
M24 x 1.50 & 2.00	35.38	36.00	14.79	15.00	15.22

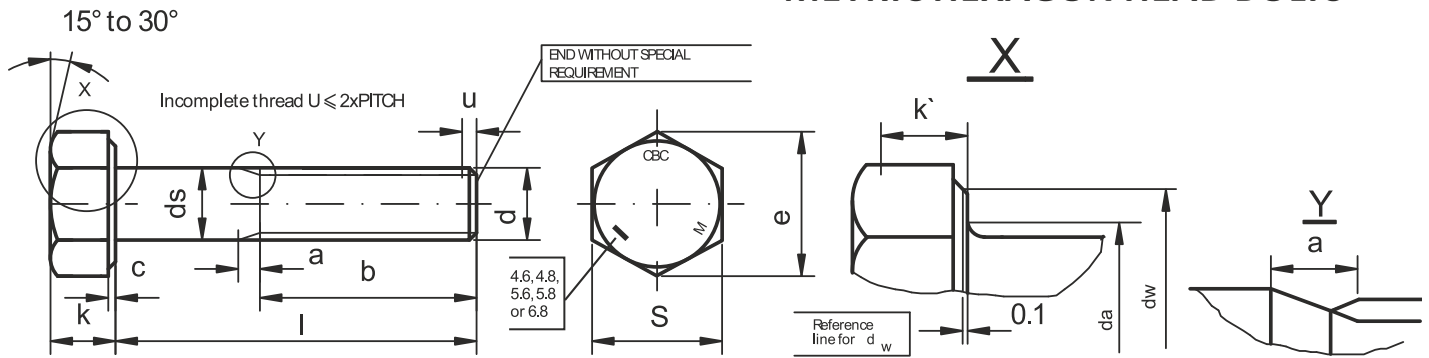
	ds (shank)		a	C		e	r	l_f	U	da	dw	k'
	min	max	min	min	max	min	min	max	max	max	min	min
M8	7.78	8.00	2.5	0.15	0.60	14.38	0.4	2.0	1.8	9.2	11.63	3.61
M10	9.78	10.00	3.5	0.15	0.60	17.77	0.4	2.0	2.2	11.2	14.63	4.35
M12	11.73	12.00	4.0	0.15	0.60	20.03	0.6	3.0	2.6	13.7	16.63	5.12
M14	13.73	14.00	4.5	0.15	0.60	23.36	0.6	3.0	3.0	15.7	19.37	6.03
M16	15.73	16.00	5.0	0.20	0.80	26.75	0.6	3.0	3.0	17.7	22.49	6.87
M20	19.67	20.00	7.0	0.20	0.80	33.53	0.8	4.0	3.5	22.4	28.19	8.60
M24	23.67	24.00	8.0	0.20	0.80	39.98	0.8	4.0	4.5	26.4	33.61	10.35

	l mm	25	30	35	40	45	50	55	60	65	70	75	80	90-120	130-160	170-200	210-280
		± 0.42		± 0.50			± 0.60						± 0.70		± 0.80		± 0.92
M8	b	22 + 2.5												28 + 2.5			
M10	b	26 + 3.0												32 + 3.0		45 + 3.5	
M12	b	30 + 3.5												36 + 3.5		49 + 3.5	
M14	b	34 + 4.0												40 + 4.0			
M16	b	38 + 4.0												44 + 4.0			
M20	b	46 + 5.0												52 + 5.0			
M24	b	54 + 6.0												60 + 6.0			

Not available in CBC Range Only available in full thread

DIMENSIONS

METRIC HEXAGON HEAD BOLTS



Dimensions for Bolt SABS 135 (DIN 601) (XOX)

Grade 4.6, 4.8, 5.6, 5.8 and 6.8

Range M6 - M30

Dimensions in millimetres

d	S		k		
	min	max	min	nom	max
M6	9.78	10.00	3.85	4.00	4.15
M8	12.73	13.00	5.15	5.30	5.45
M10	16.73	17.00	6.22	6.40	6.58
M12	18.67	19.00	7.32	7.50	7.68
M16	23.67	24.00	9.82	10.00	10.18
M20	29.67	30.00	12.29	12.50	12.71
M24	35.38	36.00	14.79	15.00	15.21
M30	45.00	46.00	18.44	18.70	18.96

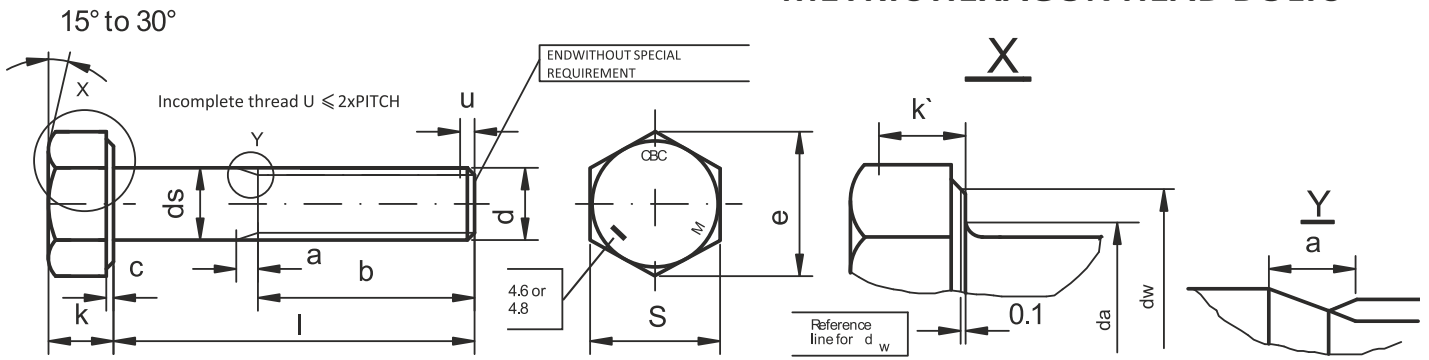
	ds		P	a	C		e	r	U	da	dw	k'
	min	max	lead	max	min	max	min	min	max	max	min	min
M6	5.82	6.00	1.00	2.0	0.15	0.50	11.05	0.25	1.5	6.8	8.88	2.70
M8	7.78	8.00	1.25	2.5	0.15	0.60	14.38	0.40	1.8	9.2	11.63	3.61
M10	9.78	10.00	1.50	3.5	0.15	0.60	18.90	0.40	2.2	11.2	15.63	4.35
M12	11.73	12.00	1.75	4.0	0.15	0.60	21.10	0.60	2.6	13.7	17.37	5.12
M16	15.73	16.00	2.00	5.0	0.20	0.80	26.75	0.60	3.0	17.7	22.49	6.87
M20	19.67	20.00	2.50	7.0	0.20	0.80	33.53	0.80	3.5	22.4	28.19	8.60
M24	23.67	24.00	3.00	8.0	0.20	0.80	39.98	0.80	4.5	26.4	33.61	10.35
M30	29.67	30.00	3.50	8.0	0.20	0.80	50.85	1.00	5.2	33.4	42.75	12.80

	l mm	25	30	35	40	45	50	55	60	65	70	75	80	85-125	130-180	190-200	210-300		
		± 0.42		± 0.50			± 0.60						± 0.70	± 0.80		± 0.92			
M6	b	18 + 2.0																	
M8	b	22 + 2.5												28 + 2.5					
M10	b	26 + 3.0												32 + 3.0		45 + 3.0			
M12	b	30 + 3.5												36 + 3.5		49 + 3.0			
M16	b	24 + 4.0												38 + 4.0		44 + 4.0		57 + 4.0	
M20	b	30 + 5.0												46 + 5.0		52 + 5.0		65 + 4.0	
M24	b	36 + 6.0												54 + 6.0		60 + 5.0		73 + 4.0	
M30	b	66 + 6.0												72 + 5.0		85 + 9.0			

Not available in CBC Range Only available in full thread

DIMENSIONS

METRIC HEXAGON HEAD BOLTS



Dimensions for Bolt ISO 4016

Grade 4.6 and 4.8
Range M6 - M30

Dimensions in millimetres

d	S		k		
	min	max	min	nom	max
M6	9.64	10.00	3.62	4.00	4.37
M8	12.57	13.00	4.92	5.30	5.67
M10	15.57	16.00	5.95	6.40	6.85
M12	17.57	18.00	7.05	7.50	7.95
M16	23.16	24.00	9.25	10.00	10.75
M20	29.16	30.00	11.60	12.50	13.40
M24	35.00	36.00	14.10	15.00	15.90
M30	45.00	46.00	17.65	18.70	19.75

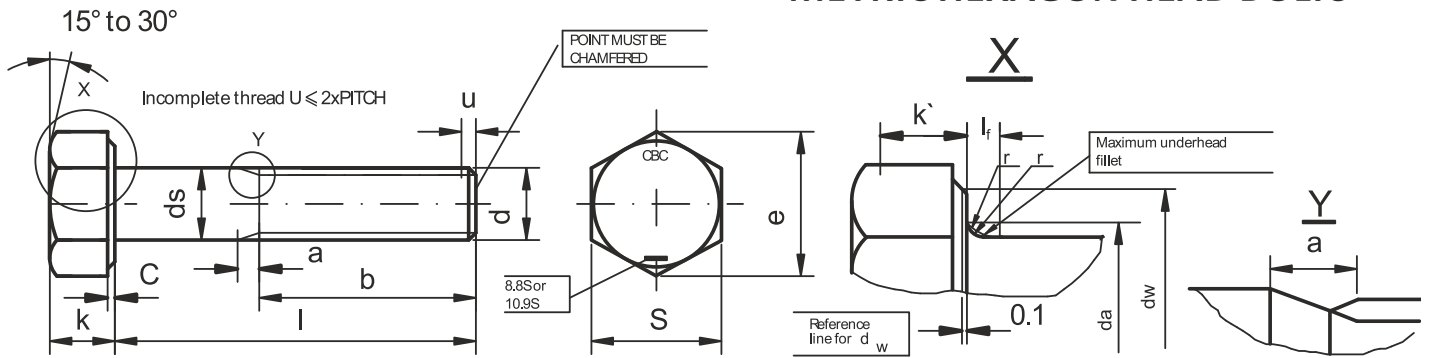
	ds		P lead	a max	C		e min	r min	U max	da max	dw min	k' min
	min	max			min	max						
M6	5.82	6.00	1.00	2.0	0.15	0.50	10.89	0.25	1.5	7.20	8.74	2.54
M8	7.78	8.00	1.25	2.5	0.15	0.60	14.20	0.40	1.8	10.20	11.47	3.45
M10	9.78	10.00	1.50	3.5	0.15	0.60	17.59	0.40	2.2	12.20	14.47	4.17
M12	11.73	12.00	1.75	4.0	0.15	0.60	19.85	0.60	2.6	14.70	16.47	4.94
M16	15.73	16.00	2.00	5.0	0.20	0.80	26.17	0.60	3.0	18.70	22.00	6.48
M20	19.67	20.00	2.50	7.0	0.20	0.80	32.95	0.80	3.5	24.40	27.70	8.12
M24	23.67	24.00	3.00	8.0	0.20	0.80	39.55	0.80	4.5	28.40	33.25	9.87
M30	29.67	30.00	3.50	8.0	0.20	0.80	50.85	1.00	5.2	35.40	42.75	12.36

	l mm	25	30	35	40	45	50	55	60	65	70	75	80	85-125	130-180	190-200	210-300
		± 0.42		± 0.50			± 0.60						± 0.70	± 0.80		± 0.92	
M6	b	18 + 2.0															
M8	b	22 + 2.5															
M10	b									26 + 3.0							
M12	b							30 + 3.5									
M16	b					38 + 4.0								44 + 4.0			
M20	b			46 + 5.0										52 + 5.0			
M24	b							54 + 6.0						60 + 6.0		73 + 4.0	
M30	b							66 + 6.0						72 + 6.0		85 + 4.0	

Not available in CBC Range

DIMENSIONS

METRIC HEXAGON HEAD BOLTS



Dimensions for Friction Grip Bolt SABS 1282 (ISO 7411)

Grade 8.8S and 10.9S
Range M12 - M24

Dimensions in millimetres

NOTE This specification has been superseded by EN 14399-3. However, market preference dictates the continued use of this specification.

d	S		k		
	min	max	min	nom	max
M12	20.16	21.00	7.95	7.50	7.05
M16	26.16	27.00	9.25	10.00	10.75
M20	33.00	34.00	11.60	13.00	13.40
M24	40.00	41.00	14.10	15.00	15.90

	ds		P	a	C		e	r	l _f	U	da	dw	k'
	min	max	lead	max	min	max	min	min	max	max	max	min	min
M12	11.73	12.00	1.75	3.5	0.4	0.8	22.78	1.2	3.0	2.6	14.70	19.2	4.9
M16	15.73	16.00	2.00	4.0	0.4	0.8	29.56	1.2	3.0	3.0	18.70	24.9	6.5
M20	19.67	20.00	2.50	5.0	0.4	0.8	37.29	1.5	4.0	3.8	23.24	31.4	8.1
M24	23.67	24.00	3.00	6.0	0.4	0.8	45.20	1.5	4.0	4.5	27.64	38.0	9.2

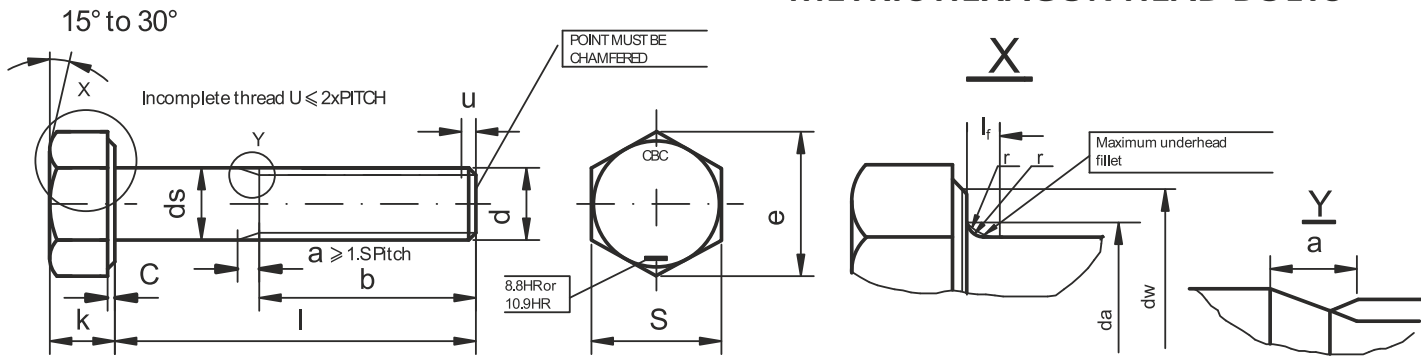
	l mm	25	30	35	40	45	50	55	60	65	70	75	80	85-120	130-150	160-180			
		± 1.05		± 1.25			± 1.50					± 1.75	± 2.00	± 4.00					
M12	b	Not available in CBC Range					30 + 3.5									Not available in CBC Range			
M16	b						38 + 4.0											44 + 4.0	
M20	b						46 + 5.0											52 + 5.0	
M24	b						54 + 6.0											60 + 6.0	

NOTE For installation notes see page 6.

 Not available in CBC Range

DIMENSIONS

METRIC HEXAGON HEAD BOLTS



Dimensions for High Strength Bolt EN 14399-3, HR (British/French) Bolt (Replaces SABS 1282 + ISO 7411)

Grade 8.8S and 10.9S
Range M12 - M24

Dimensions in millimetres

d	S		k		
	min	max	min	nom	max
M12	21.16	22.00	7.95	7.50	7.05
M16	26.16	27.00	9.25	10.00	10.75
M20	31.00	32.00	11.60	12.50	13.40
M24	40.00	41.00	14.10	15.00	15.90

	ds		P	a	C		e	r	l_f	U	da	dw
	min	max	lead	max	min	max	min	min	max	max	max	min
M12	11.73	12.00	1.75	3.5	0.4	0.8	23.91	1.2	3.0	2.6	15.20	20.1
M16	15.73	16.00	2.00	4.0	0.4	0.8	29.56	1.2	3.0	3.0	19.20	24.9
M20	19.67	20.00	2.50	5.0	0.4	0.8	35.03	1.5	4.0	3.8	24.40	29.5
M24	23.67	24.00	3.00	6.0	0.4	0.8	45.20	1.5	4.0	4.5	28.40	38.0

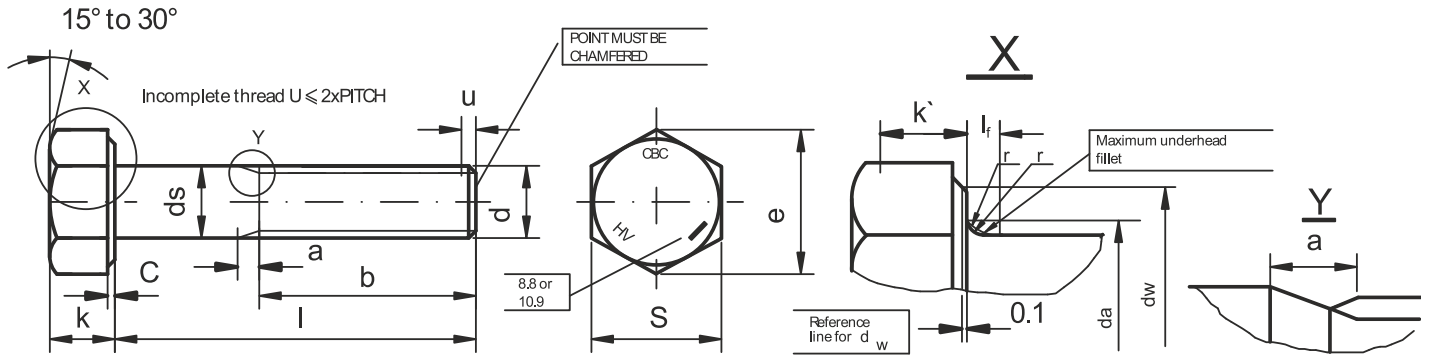
	l mm	35	40	45	50	55	60	65	70	75	80	85-120	130-180
		± 0.50				± 0.60						± 0.70	± 0.80
M12	b	23.75	28.75	30 + 3.50									
M16	b	26.00		31.00	36.00	41.00	38 + 4.00						44 + 4.00
M20	b	27.50			32.50	37.50	42.50	47.50	46 + 5.00				52 + 5.00
M24	b	34.00				39.00	44.00	49.00	54.00	59.00	54 + 6.00		60 + 6.00

NOTE

Installation - Torque control method with lubrication following EN 14399-1. See page 6.
Nuts for structural Bolting Assemblies Preloading to be EN14399-3.

Not available in CBC Range

METRIC HEXAGON HEAD BOLTS



Dimensions for Friction Grip Bolt DIN 6914

Grade 8.8 and 10.9
Range M12 - M30

Dimensions in millimetres

NOTE This specification has been superseded by EN 14399-4. However, market preference dictates the continued use of this specification.

d	S		k		
	min	max	min	nom	max
M12	20.16	22.02	7.55	8.00	8.45
M16	26.16	27.00	9.25	10.00	10.75
M20	31.00	32.00	12.10	13.00	13.90
M24	40.00	41.00	14.10	15.00	15.90
M30	49.00	50.00	17.95	19.00	20.05

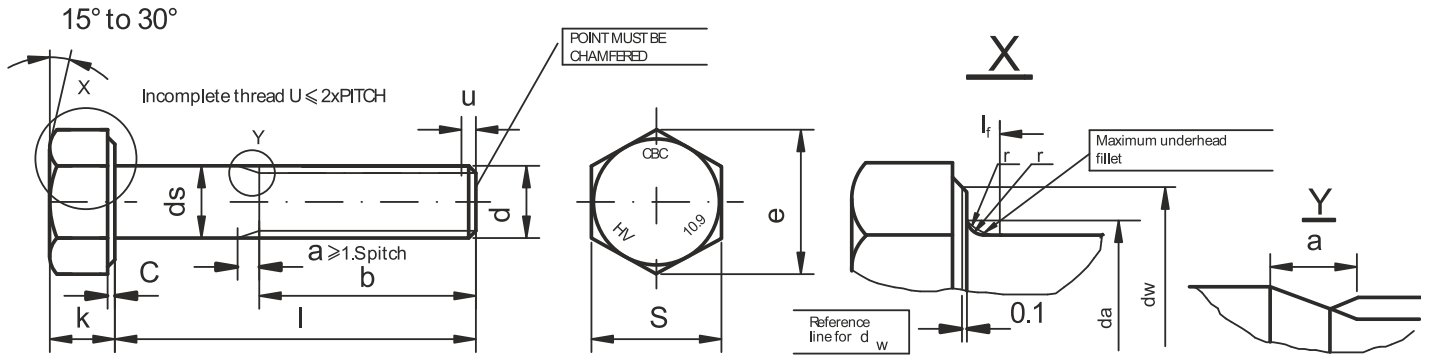
	ds		P	a	C		e	r	l _f	U	da	dw	k'
	min	max	lead	max	min	max	min	min	max	max	max	min	min
M12	11.73	12.00	1.75	3.5	0.4	0.6	23.91	1.2	3.0	2.6	15.20	20.0	5.28
M16	15.73	16.00	2.00	4.0	0.4	0.6	29.56	1.2	3.0	3.0	19.20	25.0	6.47
M20	19.67	20.00	2.50	5.0	0.4	0.8	35.03	1.5	4.0	3.8	24.00	30.0	8.47
M24	23.67	24.00	3.00	6.0	0.4	0.8	45.20	1.5	4.0	4.5	28.00	39.0	9.87
M30	29.67	30.00	3.50	7.0	0.4	0.8	55.37	2.0	5.0	5.5	35.00	47.5	12.56

	l mm	25	30	35	40	45	50	55	60	65	70	75	80	90	100-125	130-150	160-280
		± 1.05		± 1.25			± 1.50						± 1.75		± 2.00		± 4.00
M12	b	21 + 3.5			23 + 3.5												
M16	b	26 + 4.0								28 + 4.0							
M20	b					31 + 5.0								33 + 5.0			
M24	b					34 + 6.0								37 + 6.0			
M30	b									40 + 7.0				42 + 7.0			

NOTE For installation notes see page 6.

Not available in CBC Range

METRIC HEXAGON HEAD BOLTS



Dimensions for High Strength Bolt EN 14399-4 HV (German Bolt) (Replaces DIN 6914)

Grade 10.9
Range M12 - M30

Dimensions in millimetres

d	S		k		
	min	max	min	nom	max
M12	21.16	22.02	7.55	8.00	8.45
M16	26.16	27.00	9.25	10.00	10.75
M20	31.00	32.00	12.10	13.00	13.90
M24	40.00	41.00	14.10	15.00	15.90
M30	49.00	50.00	17.95	19.00	20.05

	ds		P	a	C		e	r	l _f	U	da	dw
	min	max	lead	max	min	max	min	min	max	max	max	min
M12	11.73	12.00	1.75	3.5	0.4	0.6	23.91	1.2	3.0	2.6	15.20	20.1
M16	15.73	16.00	2.00	4.0	0.4	0.6	29.56	1.2	3.0	3.0	19.20	24.9
M20	19.67	20.00	2.50	5.0	0.4	0.8	35.03	1.5	4.0	3.8	24.00	29.5
M24	23.67	24.00	3.00	6.0	0.4	0.8	45.20	1.5	4.0	4.5	28.00	38.0
M30	29.67	30.00	3.50	7.0	0.4	0.8	55.37	2.0	5.0	5.5	35.00	46.6

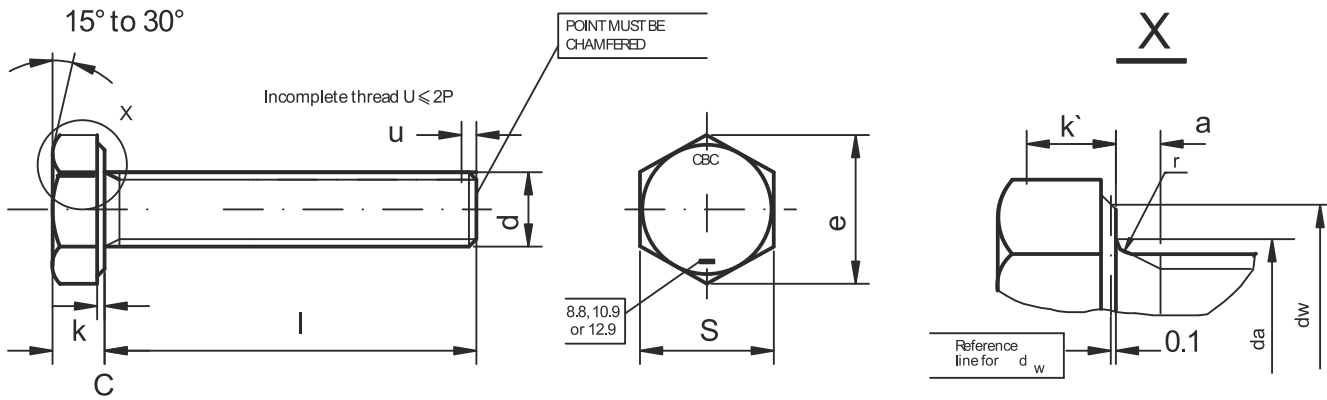
	l mm	25	30	35	40	45	50	55	60	65	70	75	80	90	100-125	130-150	160-280
		± 1.05		± 1.25			± 1.50					± 1.75		± 2.00		± 4.00	
M12	b	23 + 3.5															
M16	b	28 + 4.0															
M20	b	33 + 5.0															
M24	b	39 + 6.0															
M30	b	44 + 7.0															

NOTE

Installation - Torque control method with lubrication following EN 14399-1. See page 6.
Nuts for structural Bolting Assemblies Preloading to be EN 14399-4.

 Not available in CBC Range

METRIC HEXAGON HEAD SCREWS



Dimensions for Screw (Set) DIN 933

Grade 8.8, 10.9 and 12.9
Range M6 - M30

Dimensions in millimetres

► Specifications differences between
DIN 933 and ISO 4017

NOTE

This specification has been superseded by ISO 4017. However, market preference dictates the continued use of this specification.

d	S		k		
	min	max	min	nom	max
M6	9.78	10.00	3.85	4.00	4.15
M8	12.73	13.00	5.15	5.30	5.45
M10	▶ 16.73	▶ 17.00	6.22	6.40	6.58
M12	▶ 17.67	▶ 19.00	7.32	7.50	7.68
M14	▶ 21.67	▶ 22.00	8.62	8.80	8.98
M16	23.67	24.00	9.82	10.00	10.18
M18	26.67	27.00	11.28	11.50	11.72
M20	29.67	30.00	12.29	12.50	12.71
M22	▶ 31.61	▶ 32.00	13.78	14.00	14.22
M24	35.38	36.00	14.79	15.00	15.21
M30	45.00	46.00	18.44	18.70	18.96

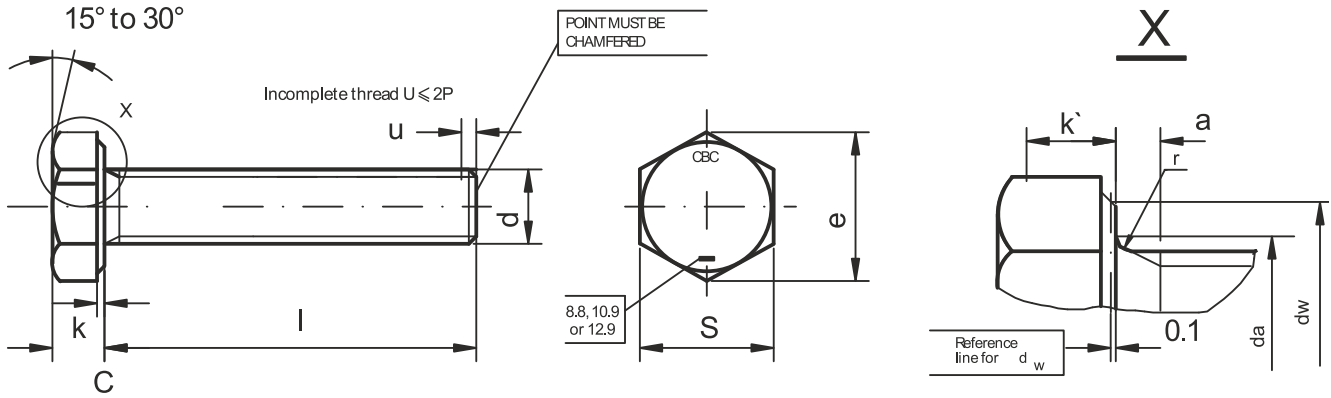
	P	a		C		e	r	U	da	dw	k'
	lead	min	max	min	max	min	min	max	max	min	min
M6	1.00	1.00	2.00	0.15	0.50	11.05	0.25	1.5	6.8	8.88	2.70
M8	1.25	1.25	2.50	0.15	0.60	14.38	0.40	1.8	9.2	11.63	3.61
M10	1.50	1.50	3.50	0.15	0.60	▶ 18.90	0.40	2.2	11.2	▶ 15.63	4.35
M12	1.75	1.75	4.00	0.15	0.60	▶ 21.10	0.60	2.6	13.7	▶ 17.37	5.12
M14	2.00	2.00	4.50	0.15	0.60	▶ 24.49	0.60	3.0	15.7	▶ 20.37	6.03
M16	2.00	2.00	5.00	0.20	0.80	26.75	0.60	3.0	17.7	22.49	6.87
M18	2.50	2.50	6.00	0.20	0.80	30.14	0.60	3.0	20.2	25.30	7.90
M20	2.50	2.50	7.00	0.20	0.80	33.53	0.80	3.5	22.4	28.19	8.60
M22	2.50	3.00	7.00	0.20	0.80	▶ 35.72	0.80	4.0	24.4	▶ 30.03	9.60
M24	3.00	3.00	8.00	0.20	0.80	39.98	0.80	4.5	26.4	33.61	10.35
M30	3.50	3.50	10.00	0.20	0.80	50.85	1.00	5.2	33.4	42.75	12.80

	L _{mm}	12-14	16-18	20	25-28	30	35-50	55-60	65-80	90	100	110-120
		± 0.35		± 0.42			± 0.50		± 0.60		± 0.70	
M6	tolerance											
M8												
M10												
M12												
M14												
M16												
M18												
M20												
M22												
M24												
M30												

Not available in CBC Range

DIMENSIONS

METRIC HEXAGON HEAD SCREWS



Dimensions for Screw (Set) ISO 4017

Grade 8.8, 10.9 and 12.9
Range M6 - M30

Dimensions in millimetres

► Specifications differences between ISO 4017 and DIN 933

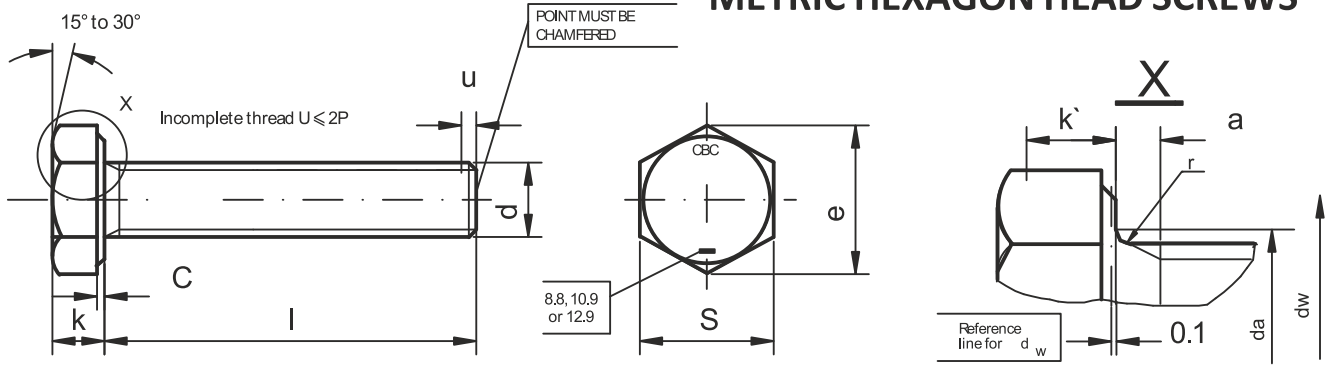
d	S		k		
	min	max	min	nom	max
M6	9.78	10.00	3.85	4.00	4.15
M8	12.73	13.00	5.15	5.30	5.45
M10	▶15.73	▶16.00	6.22	6.40	6.58
M12	▶17.73	▶18.00	7.32	7.50	7.68
M14	▶20.67	▶21.00	8.62	8.80	8.98
M16	23.67	24.00	9.82	10.00	10.18
M18	26.67	27.00	11.28	11.50	11.71
M20	29.67	30.00	12.29	12.50	12.71
M22	▶33.38	▶34.00	13.78	14.00	14.21
M24	35.38	36.00	14.79	15.00	15.21
M30	45.38	46.00	18.44	18.70	18.96

	P	a		C		e	r	U	da	dw	k'
	lead	min	max	min	max	min	min	max	max	min	min
M6	1.00	1.00	2.00	0.15	0.50	11.05	0.25	1.5	6.8	8.88	2.70
M8	1.25	1.25	2.50	0.15	0.60	14.38	0.40	1.8	9.2	11.63	3.61
M10	1.50	1.50	3.50	0.15	0.60	▶17.77	0.40	2.2	11.2	▶14.63	4.35
M12	1.75	1.75	4.00	0.15	0.60	▶20.03	0.60	2.6	13.7	▶16.63	5.12
M14	2.00	2.00	4.50	0.15	0.60	▶23.36	0.60	3.0	15.7	▶19.37	6.03
M16	2.00	2.00	5.00	0.20	0.80	26.75	0.60	3.0	17.7	22.49	6.87
M18	2.50	2.50	6.00	0.20	0.80	30.14	0.60	3.0	20.2	25.30	7.80
M20	2.50	2.50	7.00	0.20	0.80	33.53	0.80	3.5	22.4	28.19	8.60
M22	2.50	2.50	7.00	0.20	0.80	▶37.72	0.80	3.5	24.4	▶31.70	9.60
M24	3.00	3.00	8.00	0.20	0.80	39.98	0.80	4.5	26.4	33.61	10.35
M30	3.50	3.50	10.00	0.20	0.80	50.85	1.00	5.2	33.4	42.75	12.80

	L _{mm}	12-14	16-18	20	25-28	30	35-50	55-60	65-80	90	100	110-120
		± 0.35		± 0.42			± 0.50		± 0.60		± 0.70	
M6	tolerance											
M8												
M10												
M12												
M14												
M16												
M18												
M20												
M22												
M24												
M30												

Not available in CBC Range

METRIC HEXAGON HEAD SCREWS



Dimensions for Screw (Set) DIN 961

Grade 8.8, 10.9 and 12.9
Range M8 - M24

Dimensions in millimetres

NOTE

This specification has been superseded by ISO 8676. However, market preference dictates the continued use of this specification.

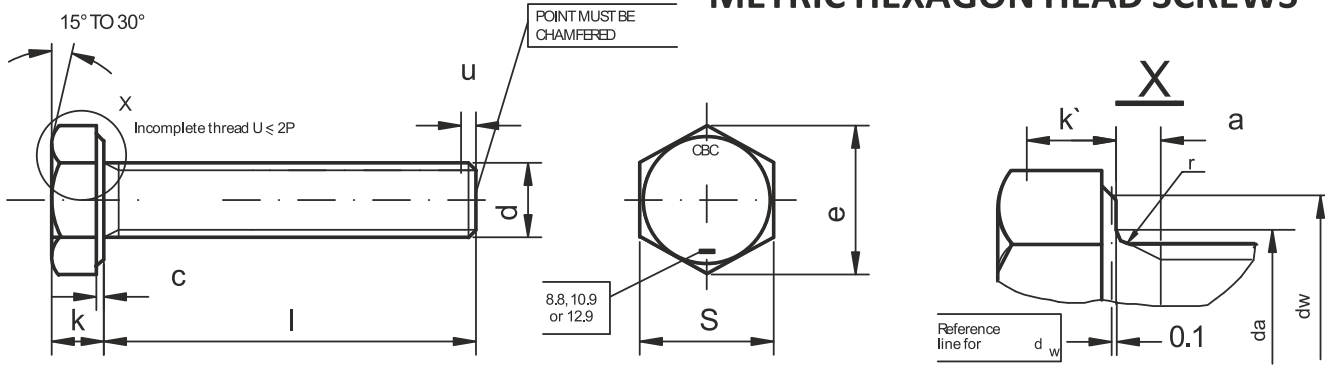
d & pitch	S		k		
	min	max	min	nom	max
M8 x 1.00	12.73	13.00	5.15	5.30	5.45
M10 x 1.00 & 1.25	16.73	17.00	6.22	6.40	6.58
M12 x 1.25 & 1.50	18.67	19.00	7.32	7.50	7.68
M14 x 1.50	21.67	22.00	8.62	8.80	8.98
M16 x 1.50	23.67	24.00	9.82	10.00	10.18
M20 x 1.50 & 2.00	29.67	30.00	12.29	12.50	12.72
M24 x 1.50 & 2.00	35.38	36.00	14.79	15.00	15.22

	a		C		e	r	U	da	dw	k'
	min	max	min	max	min	min	max	max	min	min
M8	1.25	2.50	0.15	0.60	14.38	0.4	1.8	9.2	11.63	3.61
M10	1.50	3.50	0.15	0.60	18.90	0.4	2.2	11.2	15.63	4.35
M12	1.75	4.00	0.15	0.60	21.10	0.6	2.6	13.7	17.37	5.12
M14	2.00	4.50	0.15	0.60	24.49	0.6	3.0	15.7	20.50	6.03
M16	2.00	5.00	0.20	0.80	26.75	0.6	3.0	17.7	22.49	6.87
M20	2.50	7.00	0.20	0.80	33.53	0.8	3.5	22.4	28.19	8.60
M24	3.00	8.00	0.20	0.80	39.98	0.8	4.5	26.4	33.61	10.35

	L _{mm}	12-14	16-18	20	25-28	30	35-50	55-60	65-80	90	100	110-120
		± 0.35		± 0.42			± 0.50	± 0.60		± 0.70		
M8	tolerance	Not available in CBC Range		Not available in CBC Range			Not available in CBC Range		Not available in CBC Range			
M10		Not available in CBC Range		Not available in CBC Range			Not available in CBC Range		Not available in CBC Range			
M12		Not available in CBC Range		Not available in CBC Range			Not available in CBC Range		Not available in CBC Range			
M14		Not available in CBC Range		Not available in CBC Range			Not available in CBC Range		Not available in CBC Range			
M16		Not available in CBC Range		Not available in CBC Range			Not available in CBC Range		Not available in CBC Range			
M20		Not available in CBC Range		Not available in CBC Range			Not available in CBC Range		Not available in CBC Range			
M24		Not available in CBC Range		Not available in CBC Range			Not available in CBC Range		Not available in CBC Range			

Not available in CBC Range

METRIC HEXAGON HEAD SCREWS



Dimensions for Screw (Set) ISO 8676

Grade 8.8, 10.9 and 12.9
 Range M8 - M24

Dimensions in millimetres

d & pitch	S		k		
	min	max	min	nom	max
M8 x 1.00	12.73	13.00	5.15	5.30	5.45
M10 x 1.00 & 1.25	15.73	16.00	6.22	6.40	6.58
M12 x 1.25 & 1.50	17.73	18.00	7.32	7.50	7.68
M14 x 1.50	20.67	21.00	8.62	8.80	8.98
M16 x 1.50	23.67	24.00	9.82	10.00	10.18
M20 x 1.50 & 2.00	29.67	30.00	12.29	12.50	12.72
M24 x 1.50 & 2.00	35.38	36.00	14.79	15.00	15.22

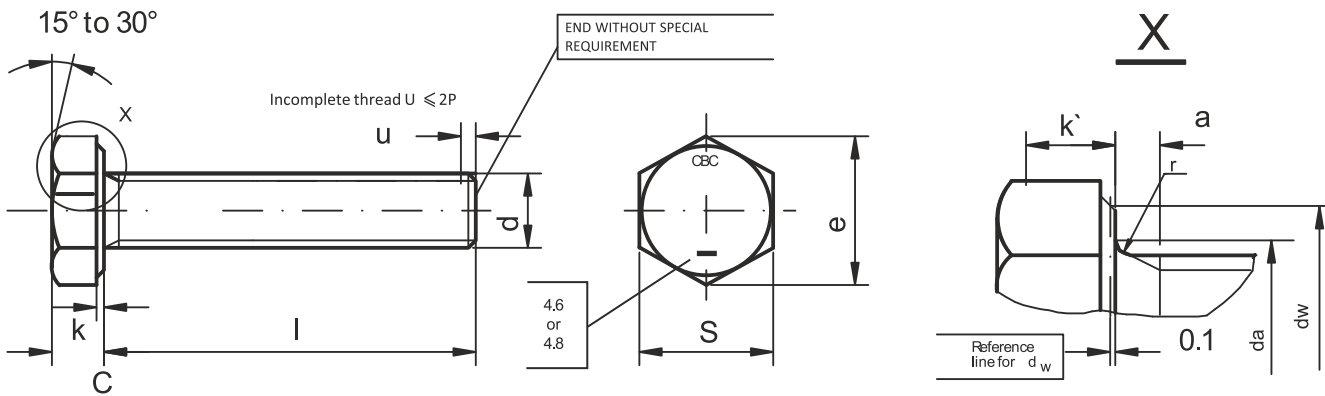
	a		C		e	r	U	da	dw	k'
	min	max	min	max	min	min	max	max	min	min
M8	1.25	2.50	0.15	0.60	14.38	0.4	1.8	9.2	11.63	3.61
M10	1.50	3.50	0.15	0.60	17.77	0.4	2.2	11.2	14.63	4.35
M12	1.75	4.00	0.15	0.60	20.03	0.6	2.6	13.7	16.63	5.12
M14	2.00	4.50	0.15	0.60	23.36	0.6	3.0	15.7	19.37	6.03
M16	2.00	5.00	0.20	0.80	26.75	0.6	3.0	17.7	22.49	6.87
M20	2.50	7.00	0.20	0.80	33.53	0.8	3.5	22.4	28.19	8.60
M24	3.00	8.00	0.20	0.80	39.98	0.8	4.5	26.4	33.61	10.35

DIMENSIONS

	L _{mm}	12-14	16-18	20	25-28	30	35-50	55-60	65-80	90	100	110-120
		± 0.35		± 0.42			± 0.50		± 0.60		± 0.70	
M8	tolerance	Not available in CBC Range										
M10		Not available in CBC Range										
M12		Not available in CBC Range										
M14		Not available in CBC Range										Not available in CBC Range
M16		Not available in CBC Range										Not available in CBC Range
M20		Not available in CBC Range										Not available in CBC Range
M24		Not available in CBC Range										Not available in CBC Range

Not available in CBC Range

METRIC HEXAGON HEAD SCREWS



Dimensions for Screw (Set) DIN 558

Grade 4.6, 4.8, 5.6, 5.8 and 6.8
Range M6 - M24

Dimensions in millimetres

NOTE

This specification has been superseded by ISO 4018. However, market preference dictates the continued use of this specification.

d	S		k		
	min	max	min	nom	max
M6	9.78	10.00	3.85	4.00	4.15
M8	12.73	13.00	5.15	5.30	5.45
M10	16.73	17.00	6.22	6.40	6.58
M12	18.67	19.00	7.32	7.50	7.68
M14	21.67	22.00	8.62	8.80	8.98
M16	23.67	24.00	9.82	10.00	10.18
M20	29.67	30.00	12.29	12.50	12.71
M24	35.38	36.00	14.79	15.00	15.21

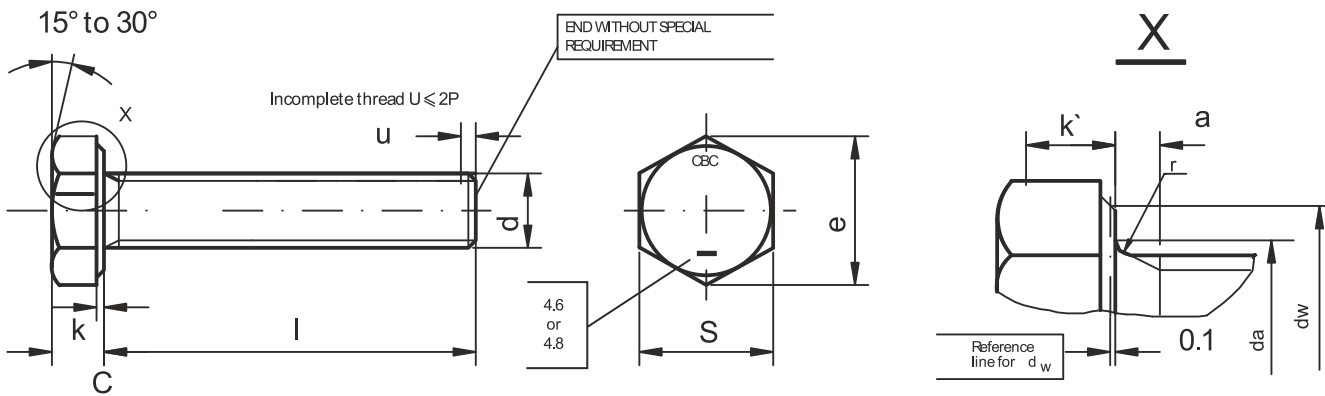
	P	a		C		e	r	U	da	dw	k'
	lead	min	max	min	max	min	min	max	max	min	min
M6	1.00	1.00	2.00	0.15	0.50	11.05	0.25	1.5	6.8	8.88	2.70
M8	1.25	1.25	2.50	0.15	0.60	14.38	0.40	1.8	9.2	11.63	3.61
M10	1.50	1.50	3.50	0.15	0.60	18.90	0.40	2.2	11.2	15.63	4.35
M12	1.75	1.75	4.00	0.15	0.60	21.10	0.60	2.6	13.7	17.37	5.12
M14	2.00	2.00	4.50	0.15	0.60	24.49	0.60	3.0	15.7	20.37	6.03
M16	2.00	2.00	5.00	0.20	0.80	26.75	0.60	3.0	17.7	22.49	6.87
M20	2.50	2.50	7.00	0.20	0.80	33.53	0.80	3.5	22.4	28.19	8.60
M24	3.00	3.00	8.00	0.20	0.80	39.98	0.80	4.5	26.4	33.61	10.35

	L _{mm}	12-14	16-18	20	25-28	30	35-50	55-60	65-80	90	100	110-120
		± 0.35		± 0.42			± 0.50		± 0.60		± 0.70	
M6	tolerance	Not available in CBC Range		Not available in CBC Range			Not available in CBC Range		Not available in CBC Range		Not available in CBC Range	
M8		Not available in CBC Range		Not available in CBC Range			Not available in CBC Range		Not available in CBC Range		Not available in CBC Range	
M10		Not available in CBC Range		Not available in CBC Range			Not available in CBC Range		Not available in CBC Range		Not available in CBC Range	
M12		Not available in CBC Range		Not available in CBC Range			Not available in CBC Range		Not available in CBC Range		Not available in CBC Range	
M14		Not available in CBC Range		Not available in CBC Range			Not available in CBC Range		Not available in CBC Range		Not available in CBC Range	
M16		Not available in CBC Range		Not available in CBC Range			Not available in CBC Range		Not available in CBC Range		Not available in CBC Range	
M20		Not available in CBC Range		Not available in CBC Range			Not available in CBC Range		Not available in CBC Range		Not available in CBC Range	
M24		Not available in CBC Range		Not available in CBC Range			Not available in CBC Range		Not available in CBC Range		Not available in CBC Range	

Not available in CBC Range

DIMENSIONS

METRIC HEXAGON HEAD SCREWS



Dimensions for Screw (Set) ISO 4018

Grade 4.6 and 4.8
Range M6 - M24

Dimensions in millimetres

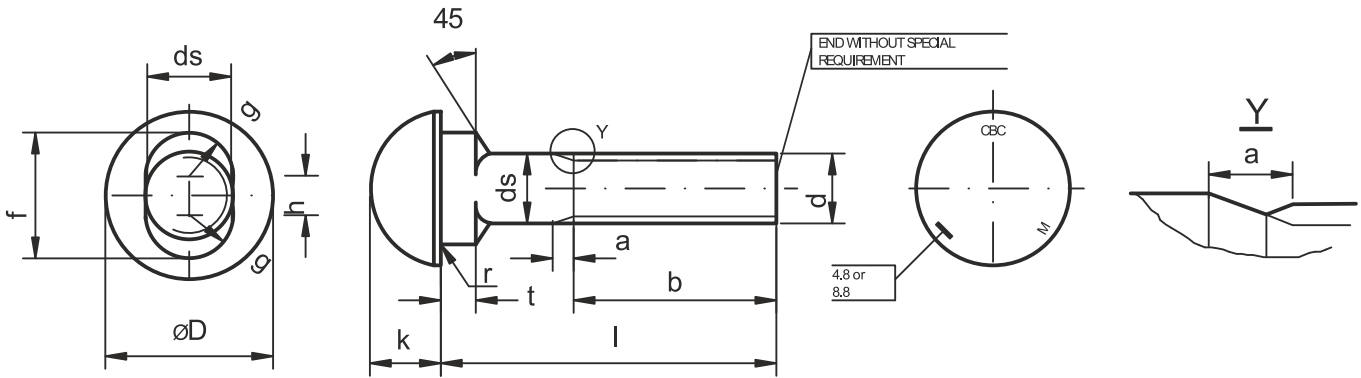
d	S		k		
	min	max	min	nom	max
M6	9.64	10.00	3.62	4.00	4.37
M8	12.57	13.00	4.92	5.30	5.67
M10	15.57	16.00	5.95	6.40	6.85
M12	17.57	18.00	7.05	7.50	7.95
M16	23.16	24.00	9.25	10.00	10.75
M20	29.16	30.00	11.60	12.50	13.40
M24	35.00	36.00	14.10	15.00	15.90

	P	a		C		e	r	U	da	dw	k'
	lead	min	max	min	max	min	min	max	max	min	min
M6	1.00	1.00	2.00	0.15	0.50	10.89	0.25	1.5	7.20	8.74	2.54
M8	1.25	1.25	2.50	0.15	0.60	14.20	0.40	1.8	10.20	11.47	3.45
M10	1.50	1.50	3.50	0.15	0.60	17.59	0.40	2.2	12.20	14.47	4.17
M12	1.75	1.75	4.00	0.15	0.60	19.85	0.60	2.6	14.70	16.47	4.94
M16	2.00	2.00	5.00	0.20	0.80	26.17	0.60	3.0	18.70	22.00	6.48
M20	2.50	2.50	7.00	0.20	0.80	32.95	0.80	3.5	24.40	27.70	8.12
M24	3.00	3.00	8.00	0.20	0.80	39.55	0.80	4.5	28.40	33.25	9.87

	L _{mm}	12-14	16-18	20	25-28	30	35-50	55-60	65-80	90	100	110-120
		± 0.35		± 0.42			± 0.50		± 0.60		± 0.70	
M6	tolerance											
M8												
M10												
M12												
M14												
M16												
M20												
M24												

Not available in CBC Range

METRIC ROUND HEAD BOLTS



Dimensions for Cup Oval SABS 916

Grade 4.8 and 8.8
Range M12 - M20

Dimensions in millimetres

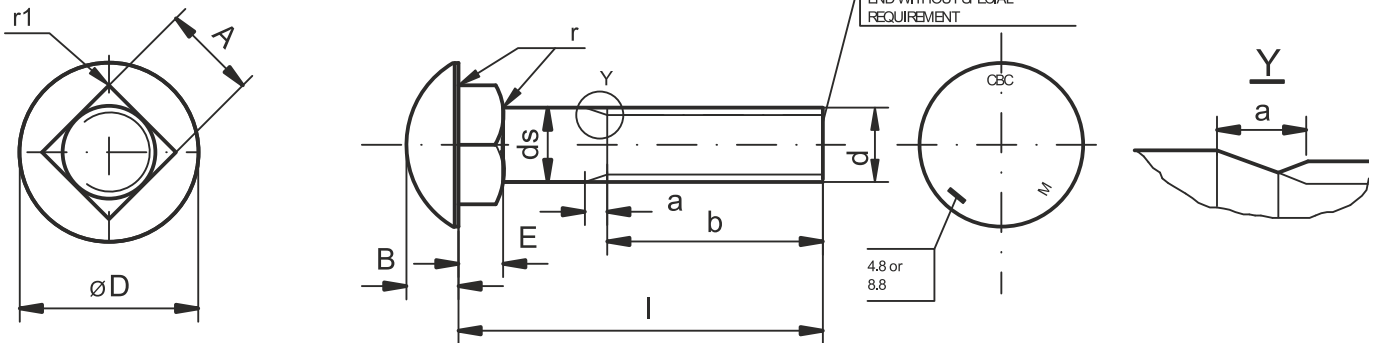
d	D		k	
	min	max	min	max
M12	20.3	21.6	8.5	9.6
M16	27.5	28.8	11.7	12.8
M20	34.4	36.0	14.9	16.0

	ds		P	a	t		r		f		h	g
	min	max	lead	max	min	max	min	max	min	max	nom	nom
M12	11.73	12.00	1.75	4.0	5.5	7.0	0.8	1.1	16.0	17.5	4.5	6.0
M16	15.73	16.00	2.00	5.0	7.5	9.0	0.8	1.1	21.5	23.0	6.0	8.0
M20	19.67	20.00	2.50	7.0	9.5	11.0	1.0	1.5	25.5	27.0	6.0	10.0

	l mm	l < 125
		± 0.70
M12 x 50	b	30 + 3.5
M16 x 60	b	38 + 4.0
M20 x 65	b	38 + 5.0
M20 x 75	b	46 + 5.0
M20 x 90	b	46 + 5.0
M20 x 100	b	46 + 5.0

DIMENSIONS

METRIC ROUND HEAD BOLTS



Dimensions for Cup Squares SABS 1143

Grade 4.8 and 8.8
Range M6 - M16

Dimensions in millimetres

d	D		B	
	min	max	min	max
M6	12.4	13.5	3.0	3.6
M8	16.9	18.0	4.0	4.8
M10	21.2	22.5	5.0	5.8
M12	25.7	27.0	6.0	6.8
M16	34.4	36.0	8.0	8.9

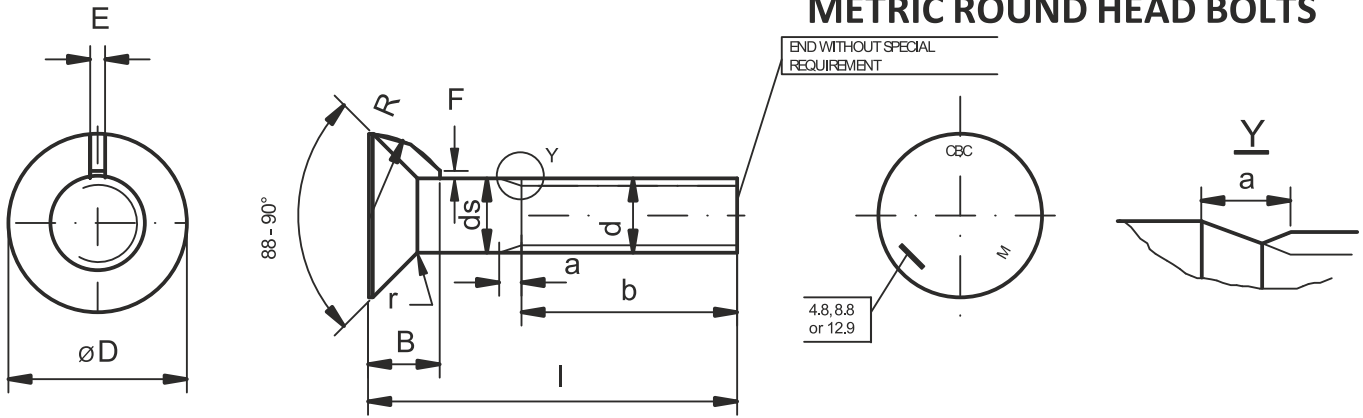
	ds		P	a	E		r1	r		A	
	min	max	lead	max	min	max	~	min	max	min	max
M6	5.24	6.00	1.00	2.0	3.0	3.6	0.9	0.3	0.4	5.52	6.48
M8	7.78	8.00	1.25	2.5	4.0	4.8	1.2	0.3	0.8	7.78	8.58
M10	9.78	10.00	1.50	3.5	5.0	5.8	1.5	0.3	0.8	9.78	10.58
M12	11.73	12.00	1.75	4.0	6.0	6.8	1.8	0.3	1.3	11.73	12.70
M16	15.73	16.00	2.00	5.0	8.0	8.9	2.4	0.3	1.3	15.73	16.70

	L mm	20-30	35-50	55-80	90-125
		± 0.42	± 0.50	± 0.60	± 0.70
M6	b				
M8	b				
M10	b				
M12	b				
M16	b				

Not available in CBC Range

DIMENSIONS

METRIC ROUND HEAD BOLTS



Dimensions for Nib Bolts SABS 1143

Grade 4.8, 8.8 and 12.9
Range M10 - M20

Dimensions in millimetres

d	D		B	
	min	max	min	max
M10	17.0	20.0	5.1	6.3
M12	20.4	24.0	6.2	7.5
M16	27.2	32.0	8.3	10.0
M20	34.0	40.0	10.4	12.5

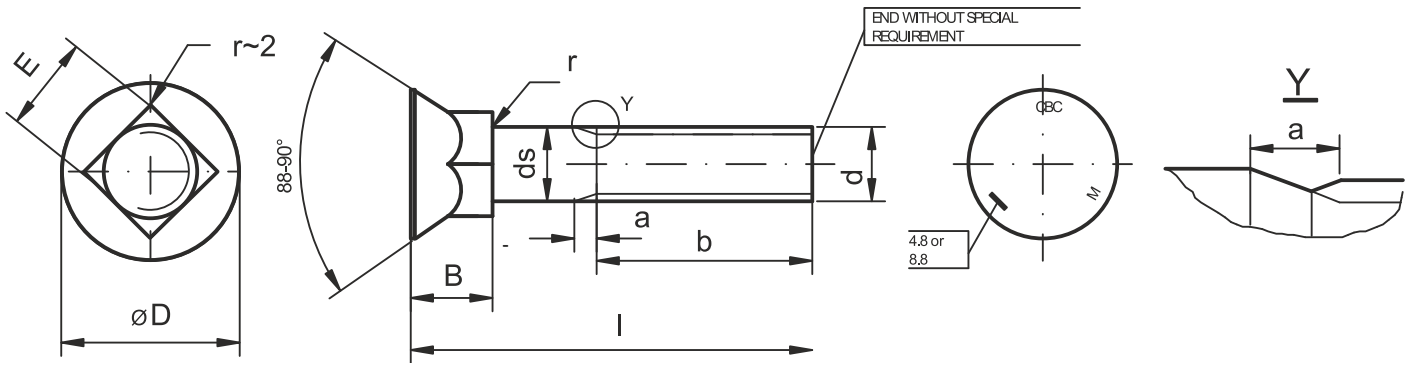
	ds		P	a	E		r	F	R
	min	max	lead	max	min	max	max	~	~
M10	9.78	10.00	1.50	3.5	2.1	2.5	0.8	1.25	8.0
M12	11.73	12.00	1.75	4.0	2.6	3.0	1.3	1.50	10.0
M16	15.73	16.00	2.00	5.0	3.5	4.0	1.3	2.00	13.0
M20	19.67	20.00	2.50	7.0	4.5	5.0	1.8	2.50	16.0

	l mm	25-30	35-50	55-80	90-100
		± 0.42	± 0.50	± 0.60	± 0.70
M10	b				
M12	b				
M16	b				
M20	b				

Not available in CBC Range

DIMENSIONS

METRIC ROUND HEAD BOLTS



Dimensions for Square Neck (Plough) Bolts SABS 1143

Grade 4.8 and 8.8
Range M10 - M16

Dimensions in millimetres

d	D		B	
	min	max	min	max
M10	17.0	20.0	6.0	7.5
M12	20.4	24.0	7.2	9.0
M16	27.2	32.0	9.6	12.0

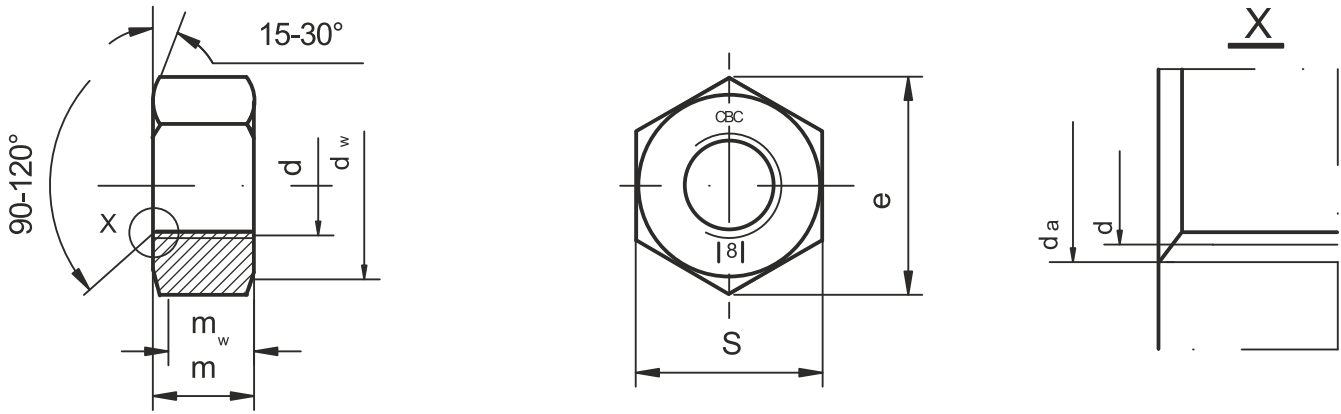
	ds		P	a	E		r
	min	max	lead	max	min	max	~
M10	9.78	10.00	1.50	3.5	9.78	10.58	0.8
M12	11.73	12.00	1.75	4.0	11.73	12.70	1.3
M16	15.73	16.00	2.00	5.0	15.73	16.70	1.3

	l mm	25-30	35-50	55-80	90-100
		± 0.42	± 0.50	± 0.60	± 0.70
M10	b				
M12	b				
M16	b				

Not available in CBC Range

DIMENSIONS

METRIC HEXAGON NUTS



Dimensions for Nut DIN 934

Range M5 - M30

Dimensions in millimetres

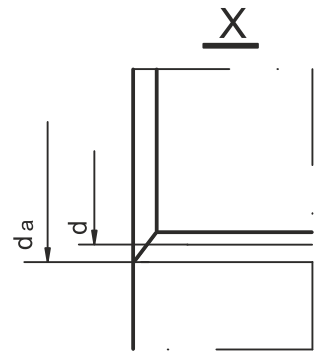
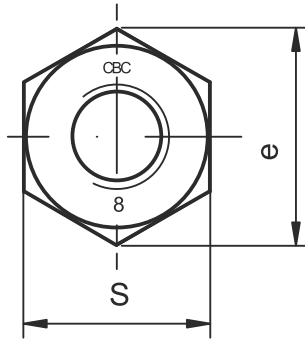
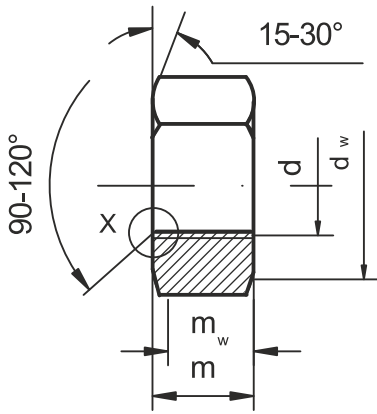
NOTE This specification has been superseded by ISO 4032. However, market preference dictates the continued use of this specification.

	P	e		bore dia.		da		dw	S		m		m _w
		min	max	min	max	min	max		min	max	min	max	
M5	0.80	8.79	4.13	4.34	5.00	5.75	6.8	7.78	8.00	3.70	4.00	2.96	
M6	1.00	11.05	4.92	5.15	6.00	6.75	8.8	9.78	10.00	4.70	5.00	3.76	
M8	1.25	14.38	6.45	6.91	8.00	8.75	11.3	12.73	13.00	6.14	6.50	4.91	
M10	1.50	18.90	8.38	8.67	10.00	10.80	15.3	16.73	17.00	7.64	8.00	6.11	
M12	1.75	21.10	10.11	10.44	12.00	13.00	17.2	18.67	19.00	9.64	10.00	7.71	
M14	2.00	24.49	11.79	12.24	14.00	15.10	20.2	21.67	22.00	10.30	11.00	8.24	
M16	2.00	26.75	13.84	14.21	16.00	17.30	22.2	23.67	24.00	12.30	13.00	9.84	
M20	2.50	32.95	17.30	17.74	20.00	21.60	28.2	29.16	30.00	14.90	16.00	11.92	
M24	3.00	39.55	20.75	21.38	24.00	25.90	33.2	35.00	36.00	17.70	19.00	14.16	
M30	3.50	50.85	26.29	26.74	30.00	32.40	42.7	45.00	46.00	22.70	24.00	18.16	

Grade |8| for Range M5 - M30

Grade |10| - on demand

METRIC HEXAGON NUTS



Dimensions for Nut ISO 4032

Range M6 - M30

Dimensions in millimetres

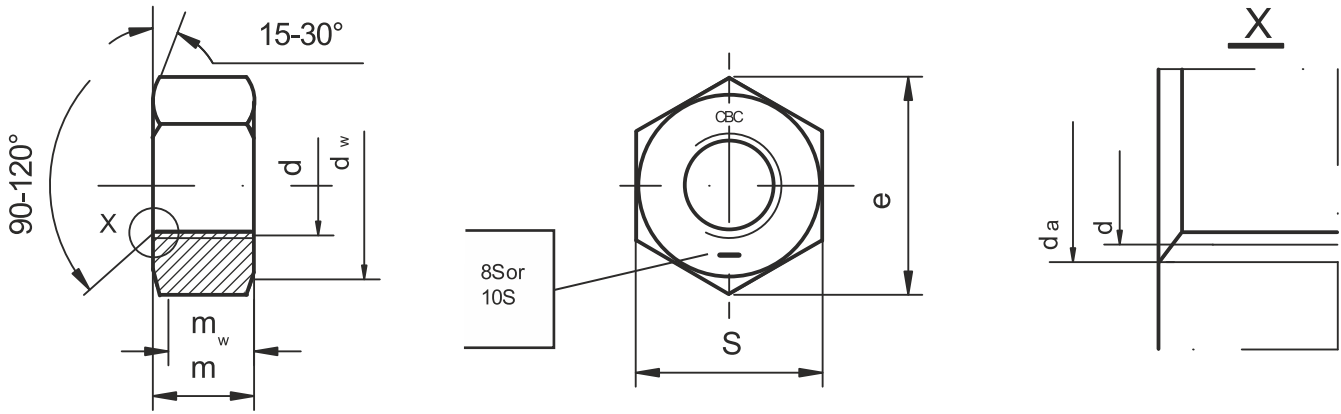
	P	e	bore dia.		da		dw	S		m		mw
			min	max	min	max		min	max	min	max	
M6	1.00	11.05	4.92	5.15	6.00	6.75	8.9	9.78	10.00	4.90	5.20	3.90
M8	1.25	14.38	6.45	6.91	8.00	8.75	11.6	12.73	13.00	6.44	6.80	5.20
M10	1.50	17.77	8.38	8.67	10.00	10.80	14.6	15.73	16.00	8.04	8.40	6.40
M12	1.75	20.03	10.11	10.44	12.00	13.00	16.6	17.73	18.00	10.37	10.80	8.30
M14	2.00	23.36	11.79	12.24	14.00	15.10	19.6	20.67	21.00	12.10	12.80	9.70
M16	2.00	26.75	13.84	14.21	16.00	17.30	22.5	23.67	24.00	14.10	14.80	11.30
M20	2.50	32.95	17.30	17.74	20.00	21.60	27.7	29.16	30.00	16.90	18.00	13.50
M24	3.00	39.55	20.75	21.38	24.00	25.90	33.3	35.00	36.00	20.20	21.50	16.20
M30	3.50	50.85	26.29	26.74	30.00	32.40	42.8	45.00	46.00	24.30	25.60	19.40

Grade 8 for Range M6 - M30

Grade 10 - on demand

DIMENSIONS

METRIC HEXAGON NUTS



Dimensions for Nut SABS 1282 (ISO 4775)

Range M12 - M30
Grade 8S and 10S

Dimensions in millimetres

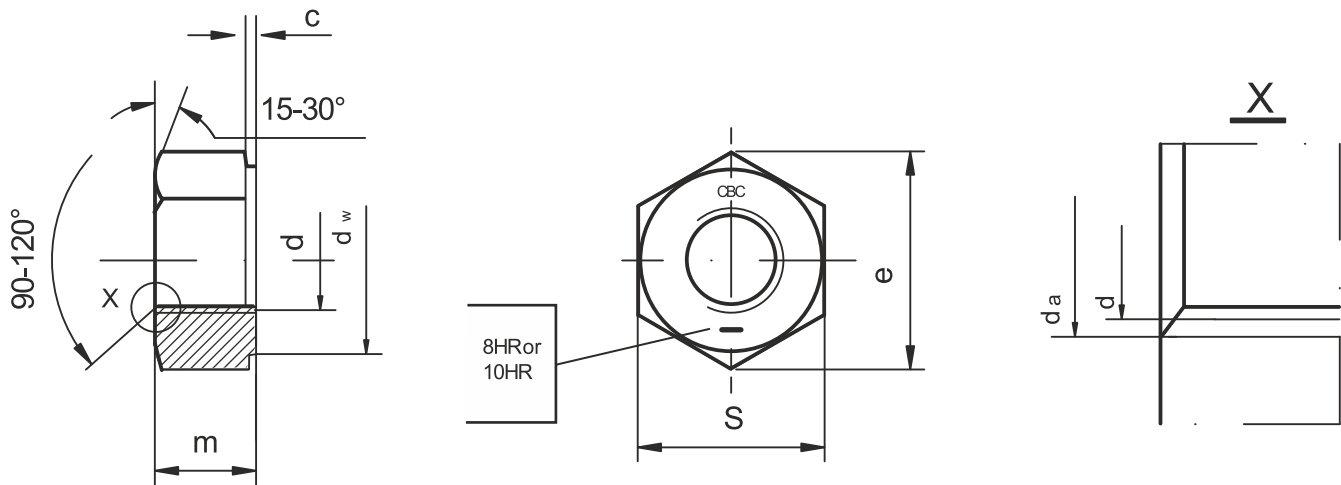
NOTE

This specification has been superseded by EN 14399-3.
However, market preference dictates the continued use
of this specification.

	P	e	bore dia.		da		dw	S		m		mw
			min	max	min	max		min	max	min	max	
M12	1.75	22.78	10.11	10.44	12.00	13.00	19.20	20.16	21.00	11.87	12.30	9.50
M16	2.00	29.56	13.84	14.21	16.00	17.30	24.90	26.16	27.00	16.40	17.10	13.10
M20	2.50	37.29	17.30	17.74	20.00	21.60	31.40	33.00	34.00	19.40	20.70	15.50
M24	3.00	45.20	20.75	21.38	24.00	25.90	38.00	40.00	41.00	22.90	24.20	18.30
M30	3.50	55.37	26.29	26.74	30.00	32.40	46.50	49.00	50.00	29.10	30.70	23.30

NOTE For installation notes see page 6.

METRIC HEXAGON NUTS



Dimensions for High Structural Nut EN 14399-3 HR (British/French Nut) Replaces SABS 1282 + ISO 4775

Range M12 - M30

Grade 8 and 10

Dimensions in millimetres

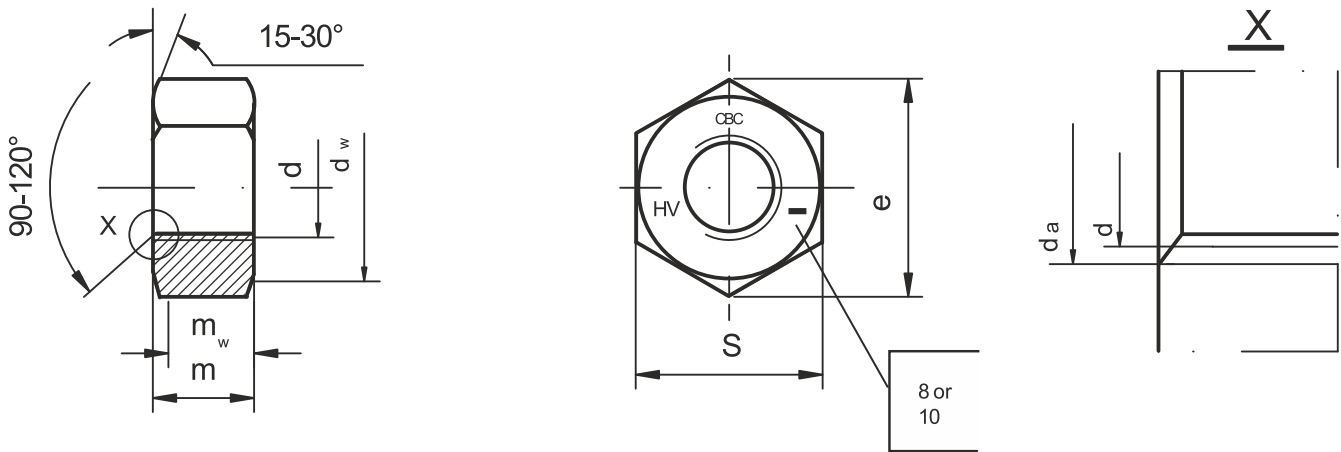
	P	e	bore dia.		c		dw	S		m	
		min	min	max	min	max	min	min	max	min	max
M12	1.75	23.91	10.11	10.44	0.4	0.8	20.10	21.16	22.00	10.37	10.80
M16	2.00	29.56	13.84	14.21	0.4	0.8	24.90	26.16	27.00	14.10	14.80
M20	2.50	35.03	17.30	17.74	0.4	0.8	29.50	31.00	32.00	16.90	18.00
M24	3.00	45.20	20.75	21.38	0.4	0.8	38.00	40.00	41.00	20.20	21.50
M30	3.50	55.37	26.29	26.74	0.4	0.8	46.60	49.00	50.00	24.30	25.60

NOTE

Installation - Torque control method with lubrication following EN 14399. See [page 6](#).

Nuts for structural Bolting Assemblies Preloading to be EN14399-3.

METRIC HEXAGON NUTS



Dimensions for Nut DIN 6915

Range M16 - M30
Grade 8 and 10

Dimensions in millimetres

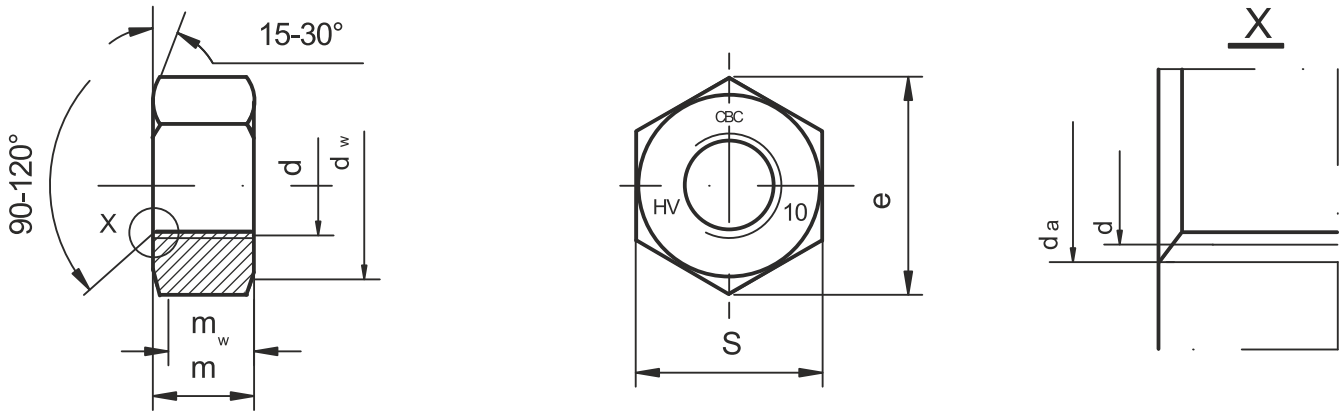
NOTE

This specification has been superseded by EN 14399-4. However, market preference dictates the continued use of this specification.

	P	e	bore dia.		da		dw	S		m		m _w
			min	max	min	max		min	max	min	max	
M16	2.00	29.56	13.84	14.21	16.00	17.30	25.0	26.16	27.00	12.30	13.00	9.84
M20	2.50	35.03	17.30	17.74	20.00	21.60	30.0	31.00	32.00	14.90	16.00	11.92
M24	3.00	45.20	20.75	21.38	24.00	25.90	39.0	40.00	41.00	18.70	20.00	14.96
M30	3.50	55.37	26.29	26.74	30.00	32.40	47.5	49.00	50.00	22.70	24.00	18.16

NOTE For installation notes see [page 6](#).

METRIC HEXAGON NUTS



Dimensions for High Structural Nut EN 14399-4 (HV German Nut) Replaces DIN 6915

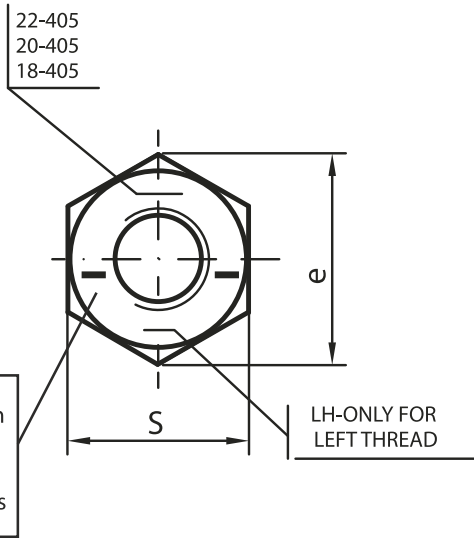
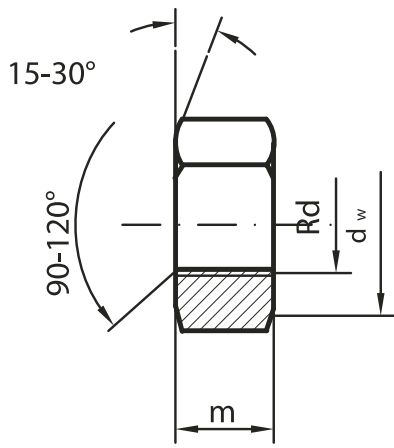
Range M16 - M30
Grade 10

Dimensions in millimetres

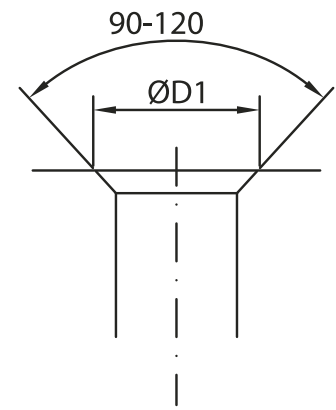
	P	e	bore dia.		da		dw	S		m		m _w
		min	min	max	min	max	min	min	max	min	max	min
M16	2.00	29.56	13.84	14.21	16.00	17.30	24.9	26.16	27.00	12.30	13.00	9.84
M20	2.50	35.03	17.30	17.74	20.00	21.60	29.5	31.00	32.00	14.90	16.00	11.92
M24	3.00	45.20	20.75	21.38	24.00	25.90	38.0	40.00	41.00	18.70	20.00	14.96
M30	3.50	55.37	26.29	26.74	30.00	32.40	46.6	49.00	50.00	22.70	24.00	18.16

NOTE

Installation - Torque control method with lubrication following EN 14399. See [page 6](#).
Nuts for structural Bolting Assemblies Preloading to be EN 14399-4.



HEXAGON NUTS



Dimensions for Nut

DIN 405

Range M18, M20 and M22

Grade 8

Dimensions in millimetres

Rd	Thread / inch	e		ØD1		bore dia.		dw	S		m	
		min	max	min	max	min	max		min	max	min	max
M18	8	29.56	18.50	19.30	15.45	15.50	24.3	26.67	27.00	19.57	20.00	
M20	8	35.03	20.00	21.60	17.81	17.65	28.8	31.61	32.00	17.57	18.00	
M20	8	35.03	20.00	21.60	17.81	17.65	28.8	31.61	32.00	19.57	20.00	
M22	8	35.03	22.10	22.80	19.45	19.50	28.8	31.61	32.00	17.57	18.00	
M22	8	35.03	22.10	22.80	19.45	19.50	28.8	31.61	32.00	19.57	20.00	



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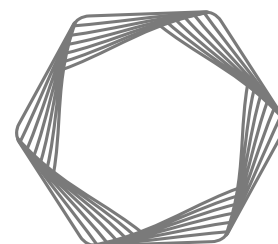
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