

2502/204

**PLANT ENGINEERING DRAWING**

June/July 2020

Time: 3 hours



**THE KENYA NATIONAL EXAMINATIONS COUNCIL**

**DIPLOMA IN MECHANICAL ENGINEERING  
(PLANT OPTION)**

**MODULE II**

**PLANT ENGINEERING DRAWING**

**3 hours**

**INSTRUCTIONS TO CANDIDATES**

*You should have the following for this examination:*

*Drawing instruments;*

*A3 Drawing paper.*

*This paper consists of TWO sections; A and B.*

*Answer questions 1 in section A (Compulsory) and any THREE questions from section B in the answer booklet provided.*

*Maximum marks for each part of a question are as indicated.*

*Candidates should answer the questions in English.*

**This paper consists of 6 printed pages.**

**Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**

**SECTION A : (Compulsory)**

1. Figure 1 shows parts of a blow off cork drawn in first angle projection. Assemble the parts and draw in half size, the following views in first angle projection:

- (a) a sectional front elevation along A-A;
- (b) end elevation in the direction of arrow B;
- (c) the plan.

Balloon and include a parts list. Show all hidden details and indicate any six leading dimensions.

(40 marks)

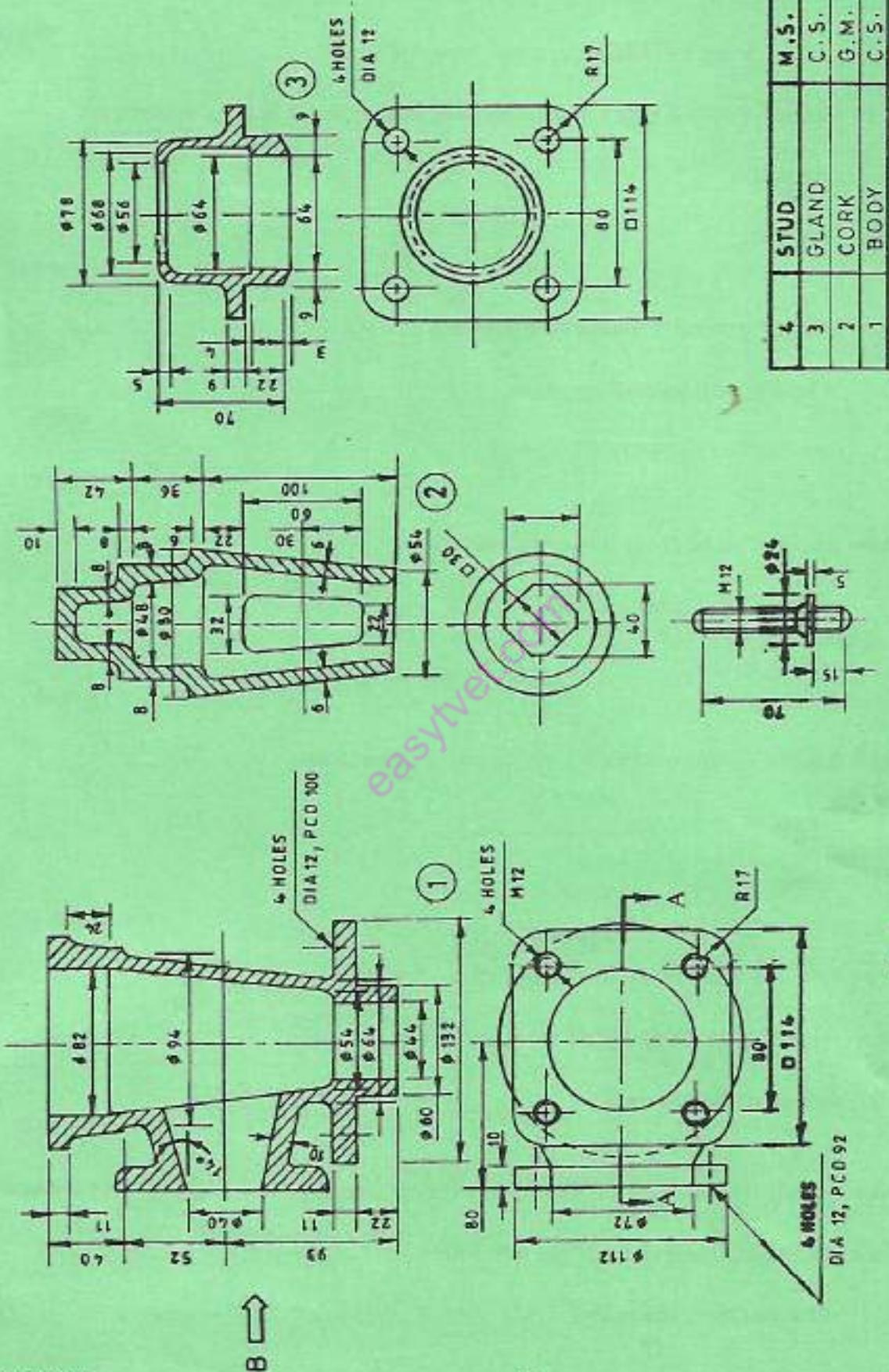


Fig. 1

2502/204  
June/July 2020

3

**Turn over**

## **SECTION B**

*Answer THREE questions from this section.*

2. (a) Draw labelled sectional views of the following holding down bolts in assembly:
- (i) tee bolt;
  - (ii) rag bolt.
- (6 marks)
- (b) Draw labelled sectional views of the following:
- (i) chevron seals assembly;
  - (ii) staffing box assembly.
- (6 marks)
- (c) Draw sectional views of the following assemblies:
- (i) anti vibration rubber mount;
  - (ii) spring mount.
- (8 marks)
3. (a) Draw labelled sectional views for the following thread forms
- (i) buttress;
  - (ii) acme.
- (8 marks)
- (b) Draw sectional views of the following locking devices:
- (i) slotted nut with split-pin locking assembly;
  - (ii) woodruff key assembly.
- (7 marks)
- (c) Draw a labelled cross sectional view of a frictional coupling. (5 marks)
4. (a) Draw labelled sectional views of the following:
- (i) float and lever steam trap;

- (ii) cyclonic type steam separator.

(8 marks)

- (b) A cam having a knife follower has the following specifications:

Shaft diameter: 15 mm

Direction of rotation: Clockwise

Minimum diameter: 20 mm

Lift: 30 mm

The performance of the cam is described as follows:

0° – 90°: Simple harmonic motion to full lift.

90° – 180°: Dwell.

180° – 360°: Uniform retardation.

Draw the following:

- (i) performance graph;

- (ii) the cam profile.

(12 marks)

5. (a) Illustrate the following types of fits indicating the maximum and minimum sizes of the shaft and hole:

- (i) clearance fit;

- (ii) interference fit.

(8 marks)

- (b) (i) Using the BS 4500 chart in table 1, determine the maximum and minimum sizes of the hole stated as 100 H9/d10.

- (ii) State the type of fit for b(i).

(5 marks)

- (c) Draw labelled diagrams of the following:

- (i) Soda acid water portable fire extinguisher (striking type).

- (ii) Chemical foam fire extinguisher.

(7 marks)

Table 1

Extracted from BS 4500: 1969

# SELECTED ISO FITS—HOLE BASIS

BRITISH STANDARD

Data sheet  
4500 A

Issue 1, February 1970

Nominal size	Tolerance			Tolerance			Tolerance			Tolerance			Tolerance			Tolerance			Tolerance			
	H11	G10	F9	J8	K7	M6	N5	P4	R3	S2	T1	U1	V1	W1	X1	Y1	Z1	A1	B1	C1	D1	E1
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
—	—	—	+0.00	-0.03	+0.25	+0.70	+0.12	+0.05	+0.02	+0.01	+0.01	+0.01	+0.01	+0.01	+0.01	+0.01	+0.01	+0.01	+0.01	+0.01	+0.01	+0.01
3	6	9	+0.01	-0.02	+0.26	+0.71	+0.13	+0.06	+0.03	+0.02	+0.02	+0.02	+0.02	+0.02	+0.02	+0.02	+0.02	+0.02	+0.02	+0.02	+0.02	+0.02
6	10	12	+0.02	-0.03	+0.27	+0.72	+0.14	+0.07	+0.04	+0.03	+0.03	+0.03	+0.03	+0.03	+0.03	+0.03	+0.03	+0.03	+0.03	+0.03	+0.03	+0.03
10	18	20	+0.03	-0.04	+0.28	+0.73	+0.15	+0.08	+0.05	+0.04	+0.04	+0.04	+0.04	+0.04	+0.04	+0.04	+0.04	+0.04	+0.04	+0.04	+0.04	+0.04
18	30	35	+0.04	-0.05	+0.29	+0.74	+0.16	+0.09	+0.06	+0.05	+0.05	+0.05	+0.05	+0.05	+0.05	+0.05	+0.05	+0.05	+0.05	+0.05	+0.05	+0.05
30	40	45	+0.05	-0.06	+0.30	+0.75	+0.17	+0.10	+0.07	+0.06	+0.06	+0.06	+0.06	+0.06	+0.06	+0.06	+0.06	+0.06	+0.06	+0.06	+0.06	+0.06
40	50	55	+0.06	-0.07	+0.31	+0.76	+0.18	+0.11	+0.08	+0.07	+0.07	+0.07	+0.07	+0.07	+0.07	+0.07	+0.07	+0.07	+0.07	+0.07	+0.07	+0.07
50	63	68	+0.07	-0.08	+0.32	+0.77	+0.19	+0.12	+0.09	+0.08	+0.08	+0.08	+0.08	+0.08	+0.08	+0.08	+0.08	+0.08	+0.08	+0.08	+0.08	+0.08
63	80	90	+0.08	-0.09	+0.33	+0.78	+0.20	+0.13	+0.10	+0.09	+0.09	+0.09	+0.09	+0.09	+0.09	+0.09	+0.09	+0.09	+0.09	+0.09	+0.09	+0.09
80	100	110	+0.09	-0.10	+0.34	+0.79	+0.21	+0.14	+0.11	+0.10	+0.10	+0.10	+0.10	+0.10	+0.10	+0.10	+0.10	+0.10	+0.10	+0.10	+0.10	+0.10
100	120	130	+0.10	-0.11	+0.35	+0.80	+0.22	+0.15	+0.12	+0.11	+0.11	+0.11	+0.11	+0.11	+0.11	+0.11	+0.11	+0.11	+0.11	+0.11	+0.11	+0.11
120	140	150	+0.11	-0.12	+0.36	+0.81	+0.23	+0.16	+0.13	+0.12	+0.12	+0.12	+0.12	+0.12	+0.12	+0.12	+0.12	+0.12	+0.12	+0.12	+0.12	+0.12
140	160	170	+0.12	-0.13	+0.37	+0.82	+0.24	+0.17	+0.14	+0.13	+0.13	+0.13	+0.13	+0.13	+0.13	+0.13	+0.13	+0.13	+0.13	+0.13	+0.13	+0.13
160	180	190	+0.13	-0.14	+0.38	+0.83	+0.25	+0.18	+0.15	+0.14	+0.14	+0.14	+0.14	+0.14	+0.14	+0.14	+0.14	+0.14	+0.14	+0.14	+0.14	+0.14
180	200	210	+0.14	-0.15	+0.39	+0.84	+0.26	+0.19	+0.16	+0.15	+0.15	+0.15	+0.15	+0.15	+0.15	+0.15	+0.15	+0.15	+0.15	+0.15	+0.15	+0.15
200	225	235	+0.15	-0.16	+0.40	+0.85	+0.27	+0.20	+0.17	+0.16	+0.16	+0.16	+0.16	+0.16	+0.16	+0.16	+0.16	+0.16	+0.16	+0.16	+0.16	+0.16
225	250	265	+0.16	-0.17	+0.41	+0.86	+0.28	+0.21	+0.18	+0.17	+0.17	+0.17	+0.17	+0.17	+0.17	+0.17	+0.17	+0.17	+0.17	+0.17	+0.17	+0.17
250	280	300	+0.17	-0.18	+0.42	+0.87	+0.29	+0.22	+0.19	+0.18	+0.18	+0.18	+0.18	+0.18	+0.18	+0.18	+0.18	+0.18	+0.18	+0.18	+0.18	+0.18
280	315	335	+0.18	-0.19	+0.43	+0.88	+0.30	+0.23	+0.20	+0.19	+0.19	+0.19	+0.19	+0.19	+0.19	+0.19	+0.19	+0.19	+0.19	+0.19	+0.19	+0.19
315	355	385	+0.19	-0.20	+0.44	+0.89	+0.31	+0.24	+0.21	+0.20	+0.20	+0.20	+0.20	+0.20	+0.20	+0.20	+0.20	+0.20	+0.20	+0.20	+0.20	+0.20
355	400	430	+0.20	-0.21	+0.45	+0.90	+0.32	+0.25	+0.22	+0.21	+0.21	+0.21	+0.21	+0.21	+0.21	+0.21	+0.21	+0.21	+0.21	+0.21	+0.21	+0.21
400	450	480	+0.21	-0.22	+0.46	+0.91	+0.33	+0.26	+0.23	+0.22	+0.22	+0.22	+0.22	+0.22	+0.22	+0.22	+0.22	+0.22	+0.22	+0.22	+0.22	+0.22
450	500	530	+0.22	-0.23	+0.47	+0.92	+0.34	+0.27	+0.24	+0.23	+0.23	+0.23	+0.23	+0.23	+0.23	+0.23	+0.23	+0.23	+0.23	+0.23	+0.23	+0.23

THIS IS THE LAST PRINTED PAGE.