SULIT

POLITEKNIK MALAYSIA

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR

SESI DISEMBER 2016

DCB2072 : PLUMBING SERVICES

TARIKH : 06 APRIL 2017
MASA : 8.30 AM - 10.30 AM (2 JAM)

Kertas ini mengandungi **EMPAT BELAS (14)** halaman bercetak.
Bahagian A : Struktur (2 soalan)
Bahagian B : Struktur (4 soalan)
Dokumen sokongan yang disertakan : Tiada

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SECTION A : 50 MARKS
BAHAGIAN A : 50 MARKAH

INSTRUCTION:
This section consists of **TWO (2)** structured questions. Answer **ALL** questions.

ARAHAN:
*Bahagian ini mengandungi **DUA (2)** soalan berstruktur. Jawab **SEMUA** soalan.*

QUESTION 1
SOALAN 1

CLO1
C1

a) List **FIVE (5)** sources of raw water supply in Malaysia.

*Senaraikan **LIMA (5)** sumber bekalan air mentah di Malaysia.*

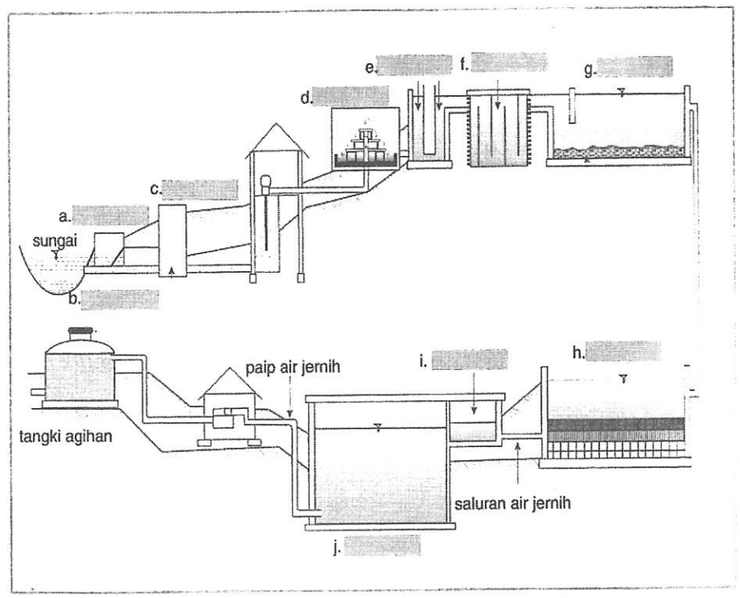
[5 marks]
[*5 markah*]

CLO1
C2

b) Label the water treatment process in the figure below.

Labelkan proses rawatan air bagi gambarajah di bawah.

[8 marks]
[*8 markah*]



CLO2
C3

(c) Determine the diameter of the main cold water supply pipe for a single storey office block shown in Figure 1. (Refer Table A, B, C and D).

Tentukan diameter paip utama bekalan air sejuk bagi bangunan pejabat setingkat seperti mana ditunjukkan oleh gambarajah 1. (Rujuk Jadual A,B,C dan D).

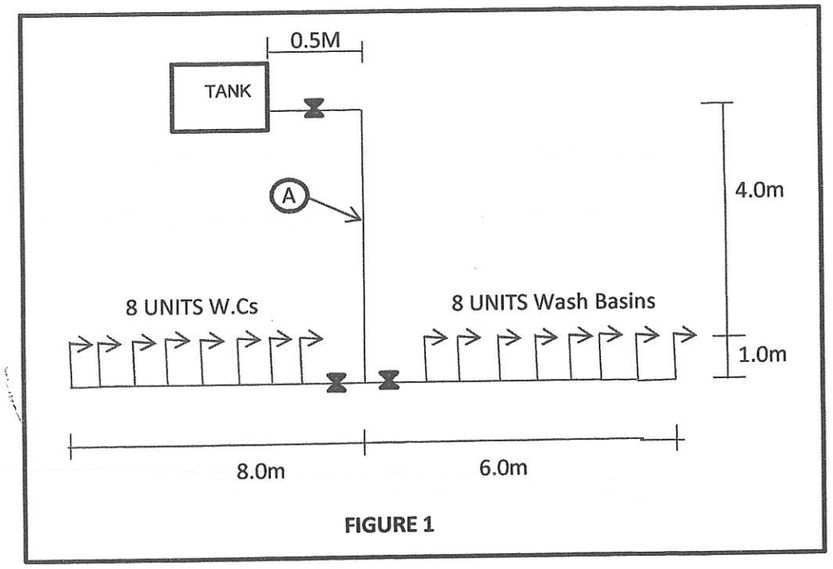


FIGURE 1

[12 marks]
[*12 markah*]

QUESTION 2
SOALAN 2

CLO1
C1

a) List **FIVE (5)** suitable materials for sanitary appliances.

*Senaraikan **LIMA (5)** jenis bahan yang sesuai digunakan untuk perkakasan sanitasi.*

[5 marks]
[*5 markah*]

CLO1
C2

b) Identify the loss factor of water seal in the sanitary appliances below:-
Kenalpasti faktor kehilangan kedap air dalam perkakasan sanitasi berikut:-

i. Self siphonage / *Pensifonan Kendiri*

ii. Induced siphonage / *Pensifonan Teraruh*

[8 marks]
[8 markah]

CLO2
C3

(c) Figure 2.0 shows a schematic sketch of a sanitary piping system for a 4 storey school building. Based on the sketch given, calculate: (refer table 1, 2, 3 & 4)

Rajah 2.0 menunjukkan lakaran skematik sistem paip kebersihan untuk sebuah bangunan sekolah 4 tingkat. Berdasarkan pada lakaran yang diberikan, tentukan:

(rujuk jadual 1, 2, 3 & 4)

i. The total discharge unit at point A, B & C / *Jumlah unit pelepasan pada titik A, B & C*

ii. The size for the branch pipe at point A & B / *Saiz untuk paip cabang di titik A & B*

iii. The size of the stack pipe at point C / *Saiz paip tumpu pada titik C*

iv. The size for the ventilation stack pipe / *Saiz untuk paip pengudaraan timbunan*

[12 marks]
[*12 markah*]

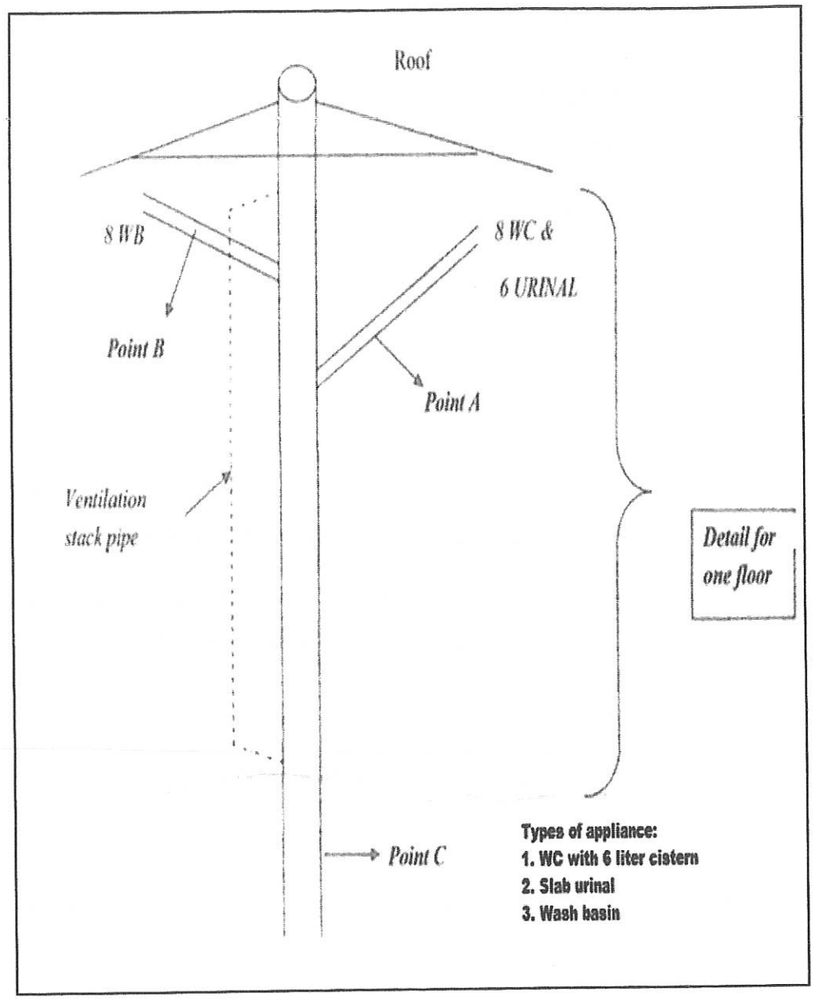


Figure 2.0 / *Rajah 2.0*

SECTION B : 50 MARKS
BAHAGIAN B : 50 MARKAH

INSTRUCTION:
This section consists of **FOUR (4)** structured questions. Answer **TWO (2)** questions only.

ARAHAN:
*Bahagian ini mengandungi **EMPAT (4)** soalan berstruktur. Jawab **DUA (2)** soalan sahaja.*

QUESTION 1

SOALAN 1

CLO 1
C1

(a) Define surface water.

Definisikan air permukaan.

[5 marks]
[*5markah*]

CLO1
C2

(b) Compare the differences between direct and indirect water supply system.

Nyatakan perbezaan antara sistem bekalan air jenis langsung dan tidak langsung.

[8 marks]
[*8 markah*]

CLO2
C3

(c) Sketch and label direct and indirect cold water supply system for a two storey building.

Lakar serta labelkan sistem langsung dan tidak langsung bekalan air sejuk untuk bangunan dua tingkat.

[12 marks]
[*12 markah*]

QUESTION 2

SOALAN 2

CLO1 C1

(a) Define the terms below:

Takrifkan istilah di bawah:

i. Boiler / *Dandang*

ii. Boiler power / *Kuasa dandang*

[5 marks]
[*5 markah*]

CLO1 C2

(b) Explain direct centralized hot water system.

Terangkan sistem berpusat air panas secara langsung.

[8 marks]
[*8 markah*]

CLO 2 C3

(c) Explain the instant hot water cylinder by using a sketch .

Huraikan dengan lakaran selinder air panas jenis segera.

[12 marks]
[12*markah*]

QUESTION 3

SOALAN 3

CLO1 C1

(a) State **five (5)** conditions in a drainage system that require the construction of manholes according the the Uniform Building Regulations 1992.

*Nyatakan **lima (5)** keadaan dalam sistem saliran yang memerlukan pembinaan lurang mengikut Undang-Undang Kecil Bangunan Seragam 1992.*

[5 marks]
[*5markah*]

CLO1 C2

(b) Draw and label the diagram of a manhole.

Lakarkan dan labelkan gambarajah sebuah lurang.

[8marks]
[*8 markah*]

CLO2 C3

(c) Based on Figure 3.0, calculate the size of the manhole by referring to table given below.

Berdasarkan Rajah 3.0 di bawah, kirakan saiz lurang dengan merujuk jadual di bawah.

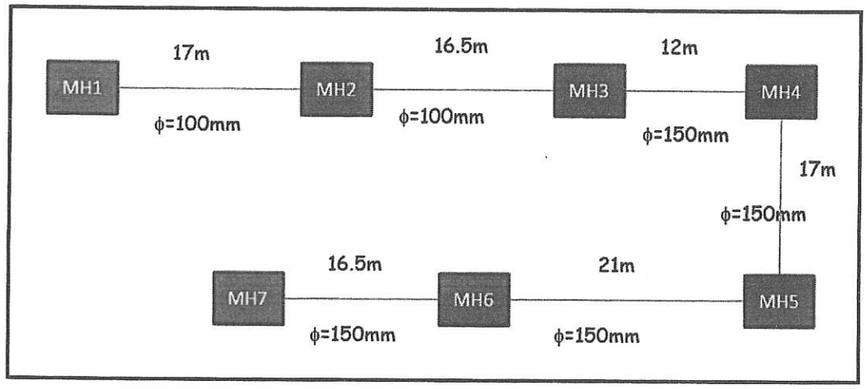


Figure 3.0 / *Rajah 3.0*

Manhole pipe size (mm)/ *Saiz paip lurang*	Slope / *Kecerunan*	Manhole depth / *Kedalaman lurang*
100	1:40	250
150	1:60	300
225	1:90	450
300	1:100	600

Table 2 / *Jadual 2*

Manhole depth (mm) / *Kedalam lurang*	Manhole Size / *Saiz lurang*	
	Length (mm) / *Panjang*	Width (mm) / *Lebar*
< 600mm	600	450
600 – 900mm	750	600
900 - 1500mm	750	750
1500 - 2400mm	900	1125

Table 3 / *Jadual 3*

[12 marks]
[*12 markah*]

QUESTION 4

SOALAN 4

CLO1
C1

a) List the general requirements that need to be addressed for sanitation plumbing work.

Senaraikan keperluan umum yang diperlukan untuk kerja-kerja perpaipan sanitasi.

[5 marks]
[*5 markah*]

CLO1
C3

b) A 15-storey residential building with one pipe system has 8 water closets, 8 wash basins, 8 sinks and 8 bathtubs for each level. Calculate;

Sebuah bangunan kediaman 15 tingkat yang menggunakan sistem satu paip dan mempunyai 8 mangkuk tandas, 8 basin basuh, 8 singki dan 8 tab mandi bagi setiap tingkat. Kirakan;

i) Total DU (Discharge Unit) for each floor / *Jumlah DU bagi setiap tingkat.*

[4 marks]
[*4 markah*]

ii) The size of branch pipe (with 1 ¼ gradient) / *Saiz paip cabang (dengan kecerunan 1 ¼)*

[4 marks]
[*4 markah*]

CLO2
C3

c) Sketch and label the following system :-

Lakar serta labelkan sistem berikut :-

i. Septic Tank / *Tangki Septik*
ii. Sewage Treatment Process / *Proses Rawatan Kumbahan*

[6 marks]
[6 markah]

CLO2
C3

d) If a sewage treatment plant is designed to receive the sewage of 120 people, calculate :-

Jika sebuah loji rawatan kumbahan adalah direka untuk menerima kumbahan daripada 120 orang, kirakan :-

i. The capacity of the tank in litres
Kapasiti tangki dalam liter

ii. The diameter of the biological filter (assuming that a circular filter is used and average depth of 1.8m.
Diameter penapis biologi (dengan menganggap penapis bulat digunakan dan kedalaman purata 1.8 m)

[6marks]
[*6 markah*]

SOALAN TAMAT

Table A : Loading units rate at a variety of fitments for offices block

Fitment	Loading units
Wash basin	1.5
WC cictern	2

Table B : Frictional resistances of fittings expressed in equivalent pipe lengths

JADUAL 2.3 Panjang Setara Untuk Lekapan (Tee / Elbow)

Copper Pipe			Galvanised steel			
Nominal outside diameter (mm)	Meter run of pipe		Nominal outside diameter (mm)	Meter run of pipe		
	Elbow	Tee		Elbow	Bend	Tee
15	0.5	0.6	15	0.5	0.4	1.2
22	0.8	1.0	20	0.6	0.5	1.4
28	1.0	1.5	25	0.7	0.6	1.8
35	1.4	2.0	32	1.0	0.7	2.3
42	1.7	2.5	40	1.2	1.0	2.7
54	2.3	3.5	50	1.4	1.2	3.4
62	3.0	4.5	65	1.7	1.3	4.2
76	3.4	5.8	80	2.0	1.6	5.3
108	4.5	8.0	100	2.7	2.0	6.8

JADUAL 2.4 Panjang Setara Untuk Lekapan (Tap & Valve)

	Equivalent Length (m) for nominal dia. (mm)								
Types	12	18	25	32	38	50	62	75	100
Taps and Globe valves	5	8	9	11	14	18	21	25	36
Ball valve	75	40	40	35	21	20			

Table C : Conversion Chart

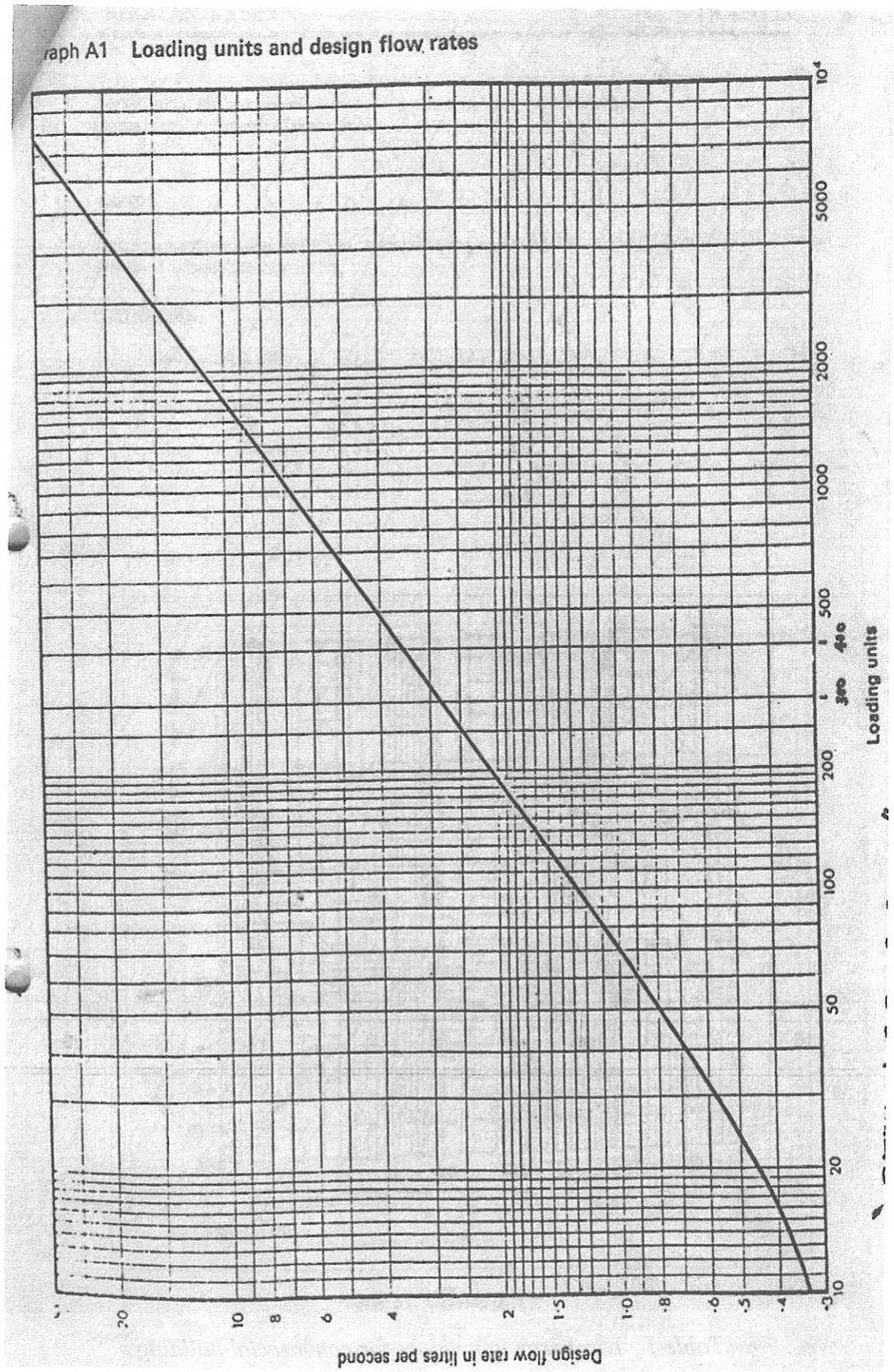


Table D : Pipe sizing graph

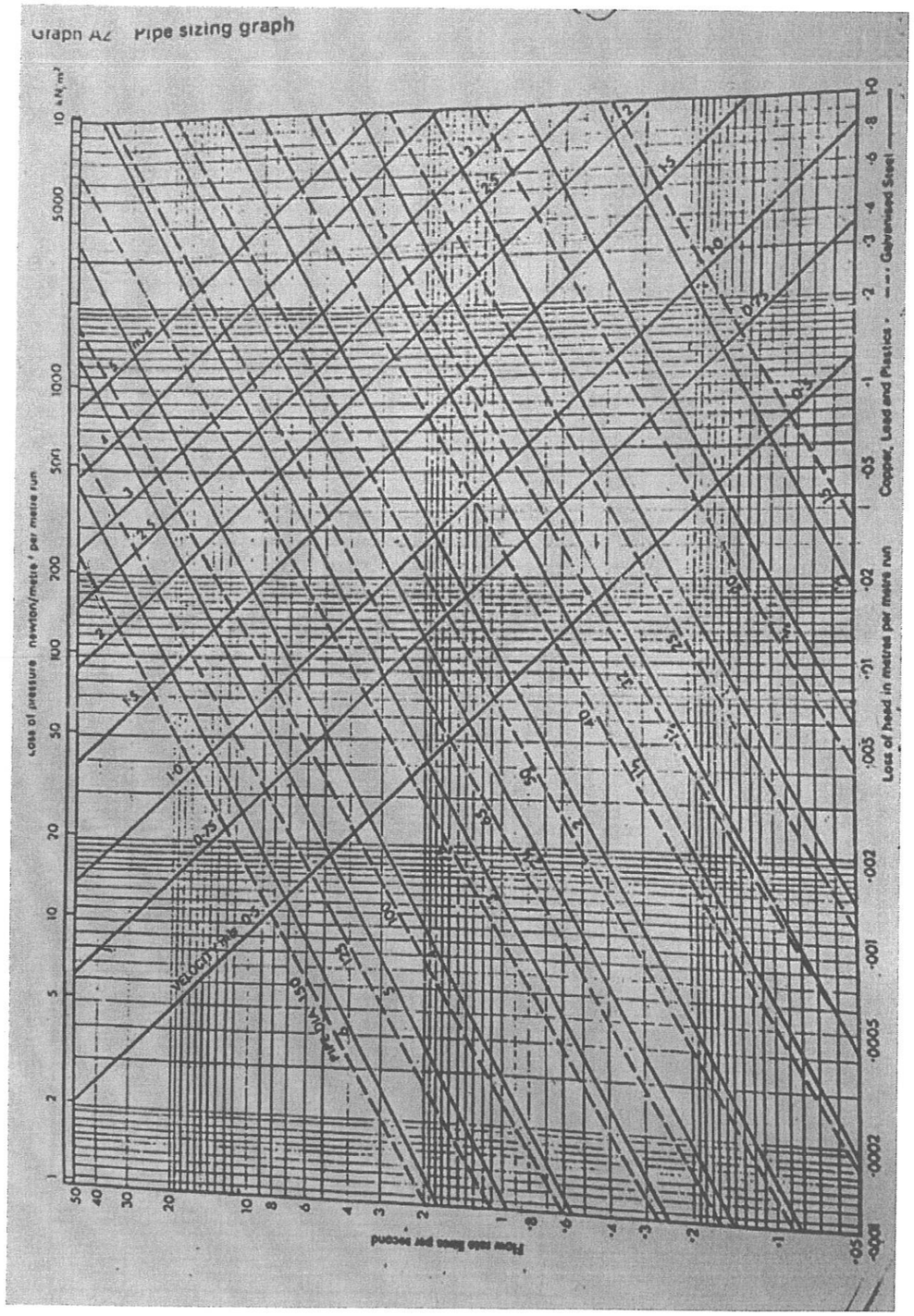


Table 1 : Discharge unit values for commercial building

Appliance	D.U
WC	14
WB	3
URINAL	0.3

Table 2 : Discharge units and stack diameter

Diameter pipe (mm)	D.U
50	10
65	60
75	200
90	350
100	750
125	2500
150	5500

Table 3 : Discharge units and branch diameter

Diameter pipe (mm)	D.U
65	35
75	100
90	230
100	430
125	1500
150	5500

Table 4: Diameter of vent pipe

Branch or stack diameter	Ventalating pipe min. diamater
Up to 75mm bore	2/3 D (min.25mm)
Over 75mm bore	½ D