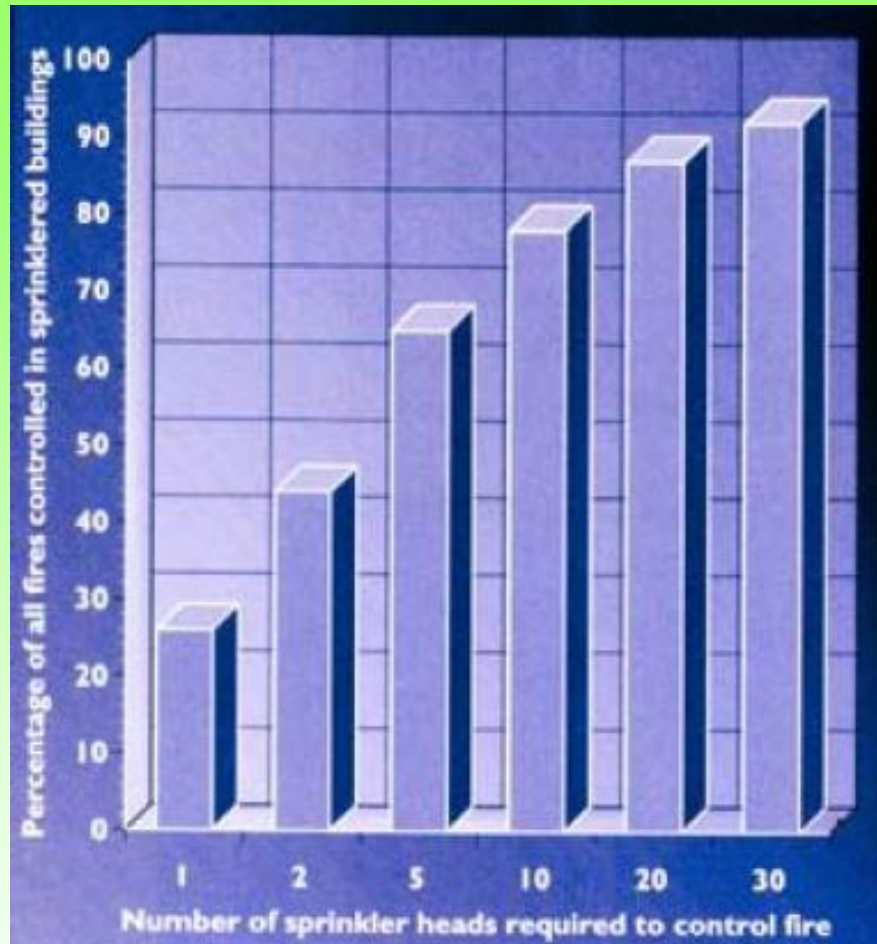
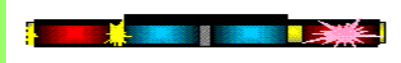


SPRINKLER



**60 % KEBAKARAN DAPAT DIKAWAL
DENGAN 4 KEPALA SPRINKLER**



TAJUK - TAJUK SESI :

PIAWAIAN & PERATURAN

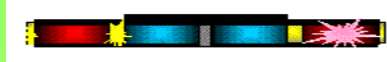
SISTEM & KOMPONEN

UJIAN & UJITERIMA

PENYELENGGARAAN



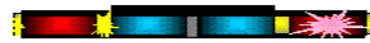
SPRINKLER



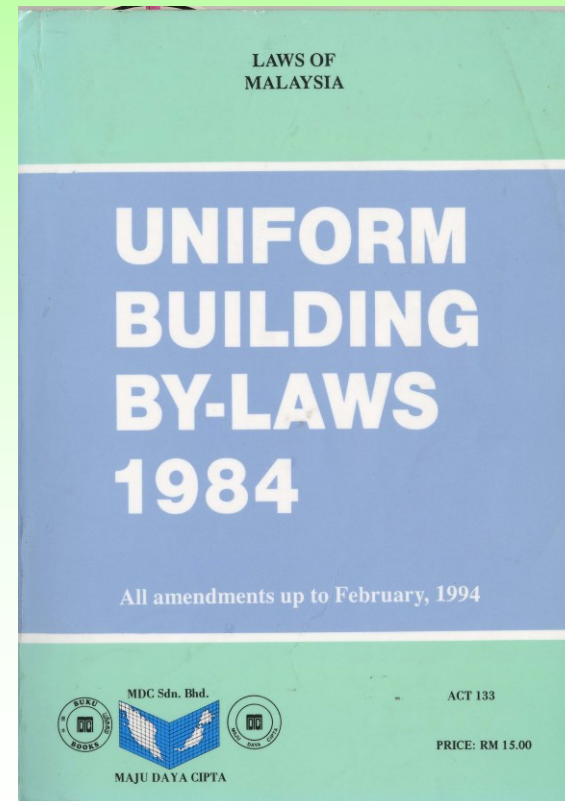
APA KAH DIA SISTEM SPRINKLER ?

**IA ADALAH SISTEM MELAWAN KEBAKARAN
MENGUNAKAN SEMBURAN AIR DARI
KEPALA SPRINKLER YANG DIPAM MELALUI
SISTEM PAIP.**





PIAWAIAN & PERATURAN AKTA 133, UBBL, 1984 - SKEDUL 10 KEDIAMAN KECIL DIKECUALIKAN. KRITERIA LAIN- LUAS, TINGGI, PROSES, BIL. ORANG



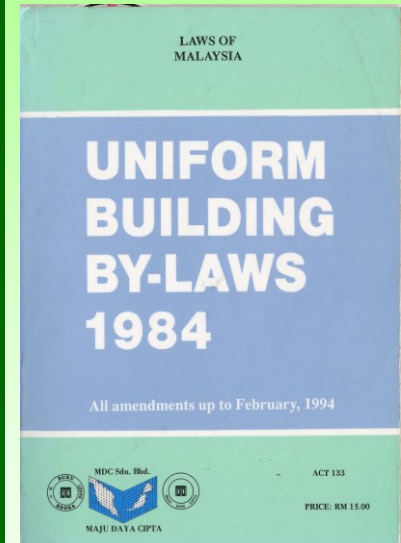
SPRINKLER

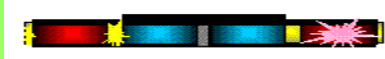


PIAWAIAN & PERATURAN

Rujuk Skedul 10, nyatakan kriteria sprinkler diperlukan untuk bangunan berikut :

PENDIDIKAN	
HOSTEL	
PEJABAT	
PENTAS	
STOR, 1 TINGKAT	





PIAWAIAN & PERATURAN

**BS 5306 : PART 2 juga
dikenali sebagai Piawaian Loss
Prevention Council, LPC.**

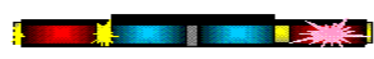


Mengikut piawaian LPC, namakan

- PENGECUALIAN WAJIB**
- PENGECUALIAN PILIHAN**

**WAJIB - gdng bijirin, bahang panas, oven, pembakaran
poteri, kaw. air boleh memudaratkan**

**PILIHAN - tangga, lift shaft, bilik elektrik, tandas,
bahan mudah bakar.**

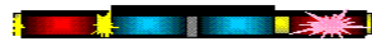


PIAWAIAN & PERATURAN

PANDUAN KERJA MEKANIKAL JKR

- ianya mematuhi penentuan UBBL dan kehendak JKR



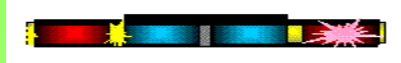


PIAWAIAN & PERATURAN

NATIONAL FIRE PROTECTION
ASSOCIATION (NFPA)

- PIAWAIAN AMERICA





TAJUK - TAJUK SESI :

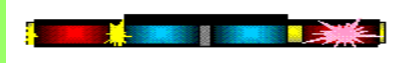
PIAWAIAN & PERATURAN

SISTEM & KOMPONEN

UJIAN & UJITERIMA

PENYELENGGARAAN





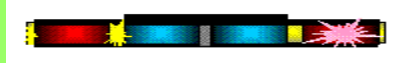
SISTEM & KOMPONEN

WET INSTALLATION - Dipenuhi air

DRY INSTALLATION - Dipenuhi udara mampat

ALTERNATE INSTALLATION - Bergilir

PRE-ACTION INSTALLATION - Dipenuhi udara mampat, injap kawalan terbuka apabila pengesanan kebakaran mengesan api.

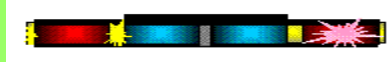


SISTEM & KOMPONEN

RECYCLING INSTALLATION - Dipenuhi air.
Injap kawalan dibuka dan ditutup melalui operasi
pengesan haba

DELUGE INSTALLATION - Manual / Auto.
Semua kepala terbuka

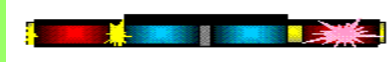
KENAPA BANYAK SANGAT JENIS NI ?



SISTEM & KOMPONEN

TANGKI AIR - Saiz ditentukan melalui BS 5306 Pt.2.

TABLE 21	APA KANDUNGAN TABLE BERIKUT ? RUJUK BS 5306 PT.2
TABLE 22	
TABLE 23	
T24 & T25	

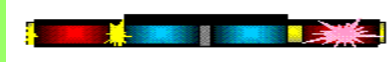


SISTEM & KOMPONEN

TANGKI AIR - Saiz ditentukan melalui BS 5306 Pt.2.

TABLE 21	Inflow independent, precalc. LIGHT HAZARD
TABLE 22	Inflow independent, precalc. ORDINARY HAZARD
TABLE 23	Inflow independent, precalc. HIGH HAZARD
T24 & T25	

SPRINKLER



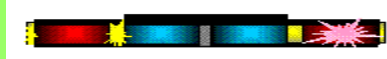
SISTEM & KOMPONEN

TANGKI AIR - Bahan

Bahan 'Pressed steel / Hot dipped galv.'

Bolehkah di kongsi ?



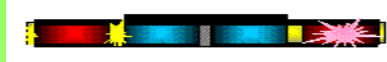


SISTEM & KOMPONEN

TANGKI AIR - BS 5306 Pt.2, CONTOH :

TABLE 22. OH & PRECALCULATED NOT DEPENDENT ON INFLOW		
GROUP	HEIGHT OF HIGHEST SPR. ABOVE LOWEST SPR NOT EXCEEDING (M)	DESIGN CAPACITY (CU.M)
I	15	55
	30	70
	45	80
II	...	...
III	...	...
IIIS	15	160
	30	185

SPRINKLER



SISTEM & KOMPONEN

PAM AIR - Satu duty, satu standby, satu jockey

5 % tekanan turun, jockey mula

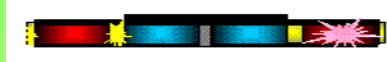
20 % tekanan turun, duty mula

Duty gagal, standby akan mula

SIZING ?



SPRINKLER SISTEM & KOMPONEN



PAM AIR - SIZING cabutan. Table 28

TABLE 28. PUMP PRESSURE & FLOW FOR LIGHT & OH (Precalculated) INSTALLATION				
HAZARD CLASS	HIGHEST TO LOWEST		NOMINAL RATING	
	>	<	Pressure at outlet	Flow
LIGHT	m	m	bar	L / min
	0	15	1.5	300
	15	30	1.8	340
	30	45	2.3	375
OH I	0	15	1.2	900
	15	30	1.9	1150
	30	45	2.7	1360



SISTEM & KOMPONEN - kelengkapan berkaitan



Pressure gauge
- memberikan bacaan tekanan sistem

SISTEM & KOMPONEN - kelengkapan berkaitan



Pressure switch

- kawal operasi pam
- 5 %, 20 % pressure drop



SISTEM & KOMPONEN - kelengkapan berkaitan



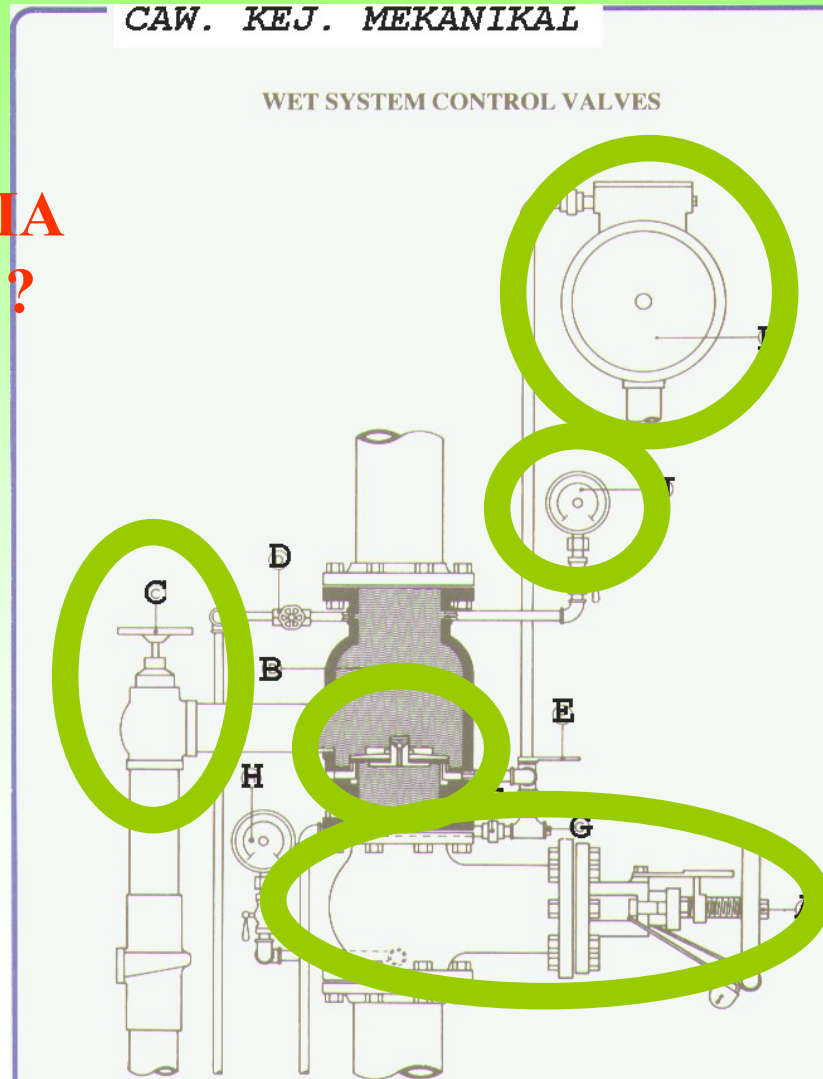
Flow switch - memberi isyarat aliran (kepala sprinkler pecah) untuk zon berkenaan.



SISTEM & KOMPONEN - kelengkapan berkaitan

Main installation valve

**BAGAIMANA IA
BEROPERASI ?**



Alarm gong

Pressure gauge

Alarm valve

Drain valve

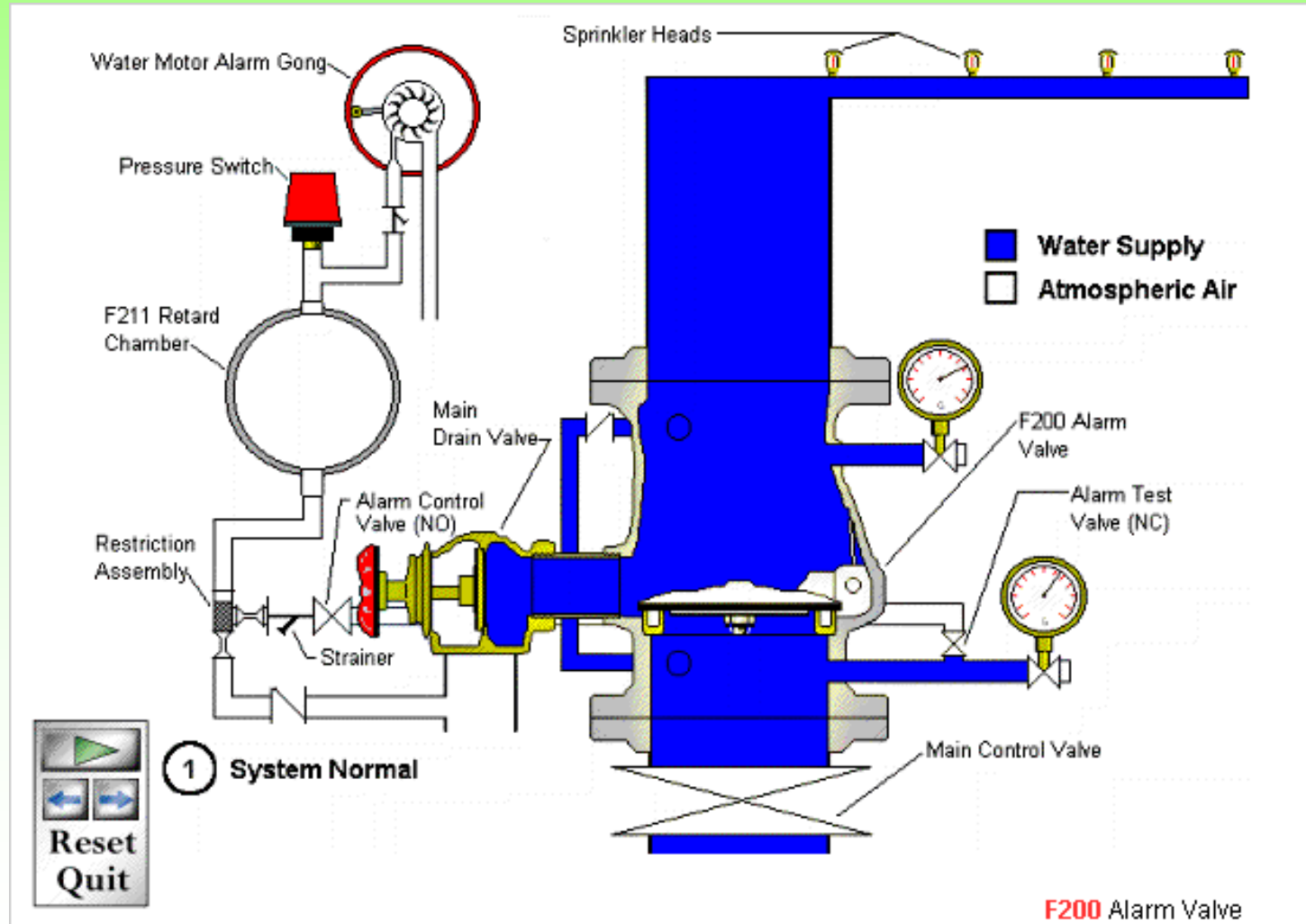
Main valve

SPRINKLER



SISTEM & KOMPONEN - kelengkapan berkaitan

1. KEADAAN BIASA

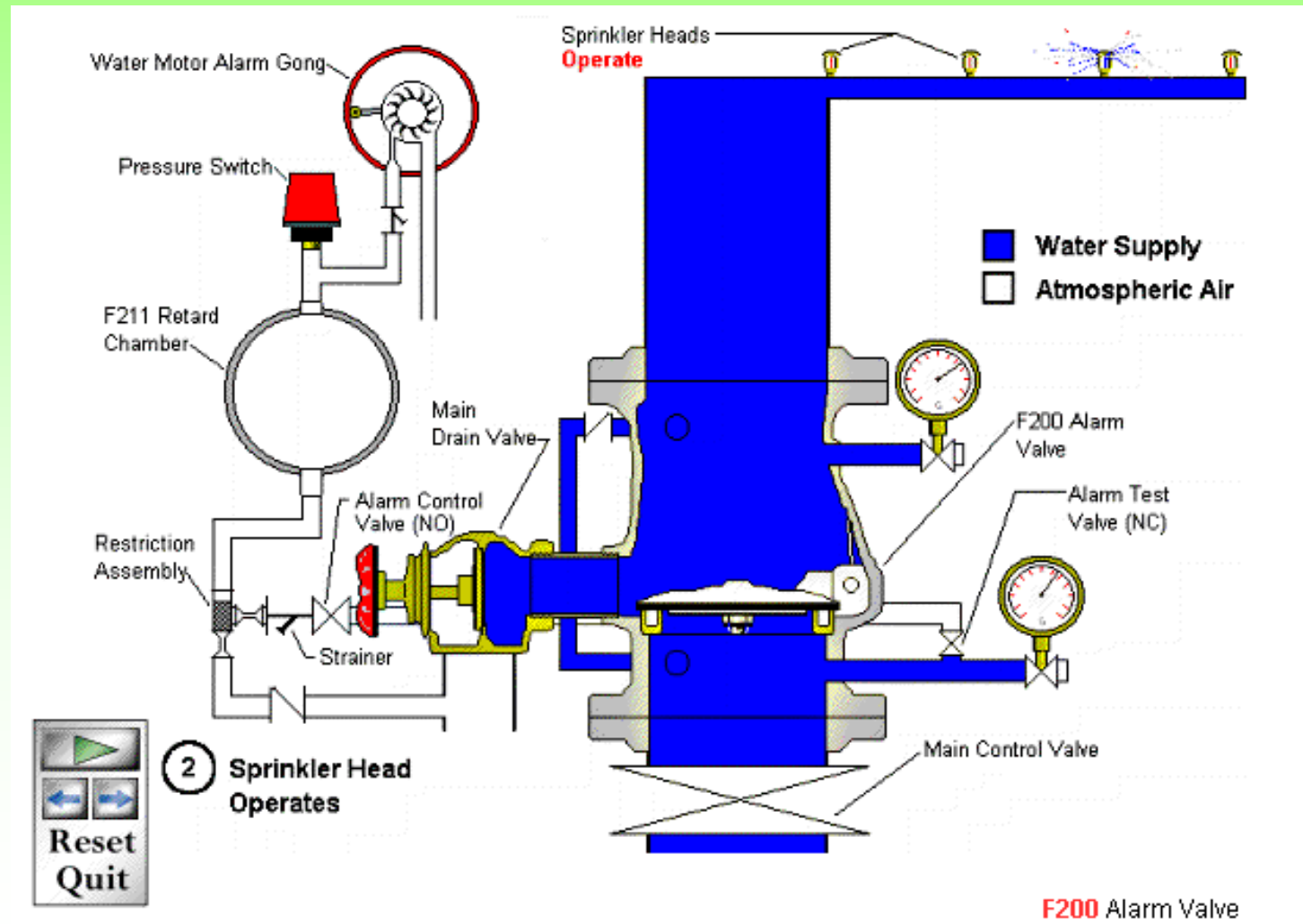


SPRINKLER



SISTEM & KOMPONEN - kelengkapan berkaitan

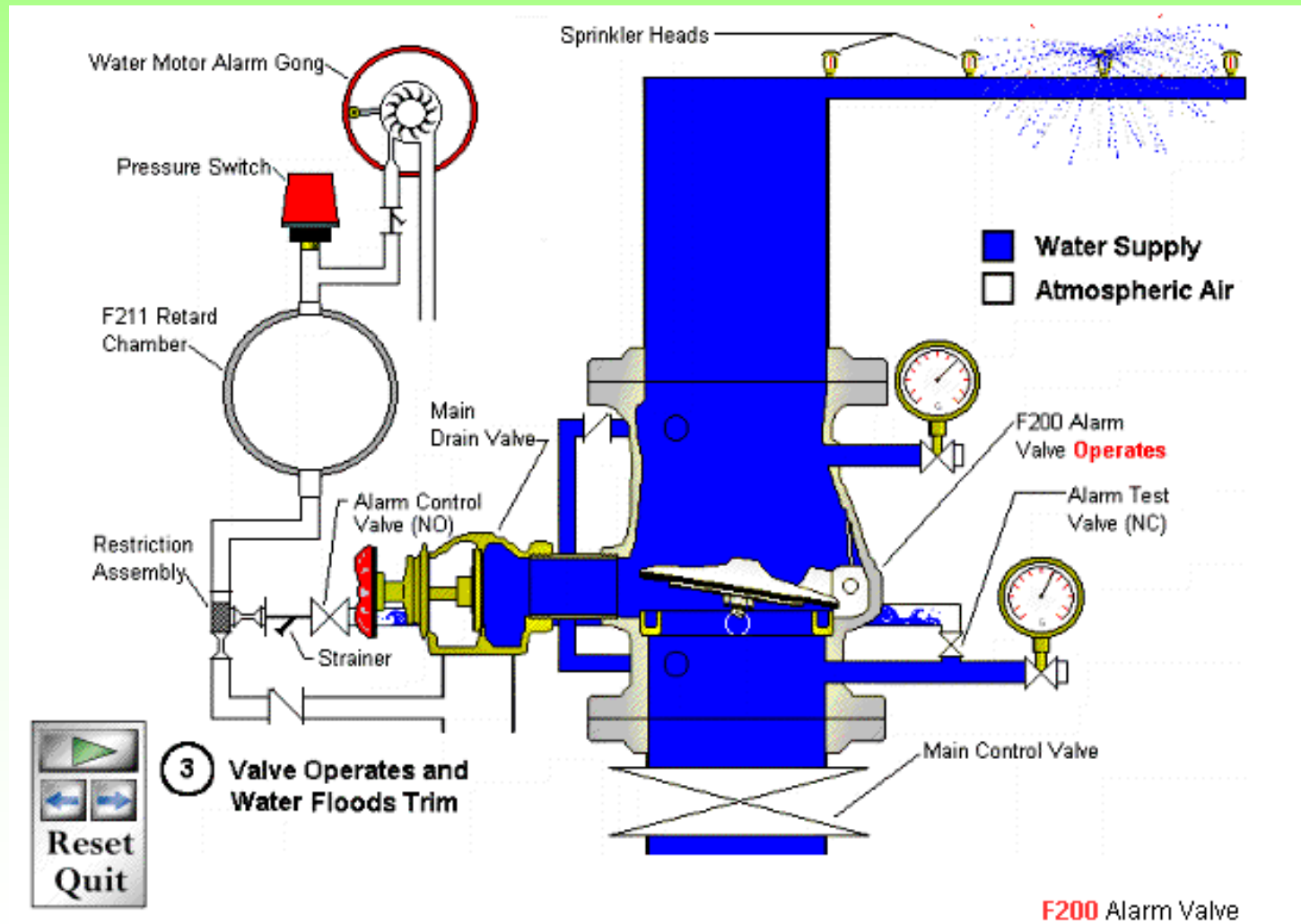
2. SPRINKLER PECAH





SISTEM & KOMPONEN - kelengkapan berkaitan

3. ALARM VALVE TERBUKA

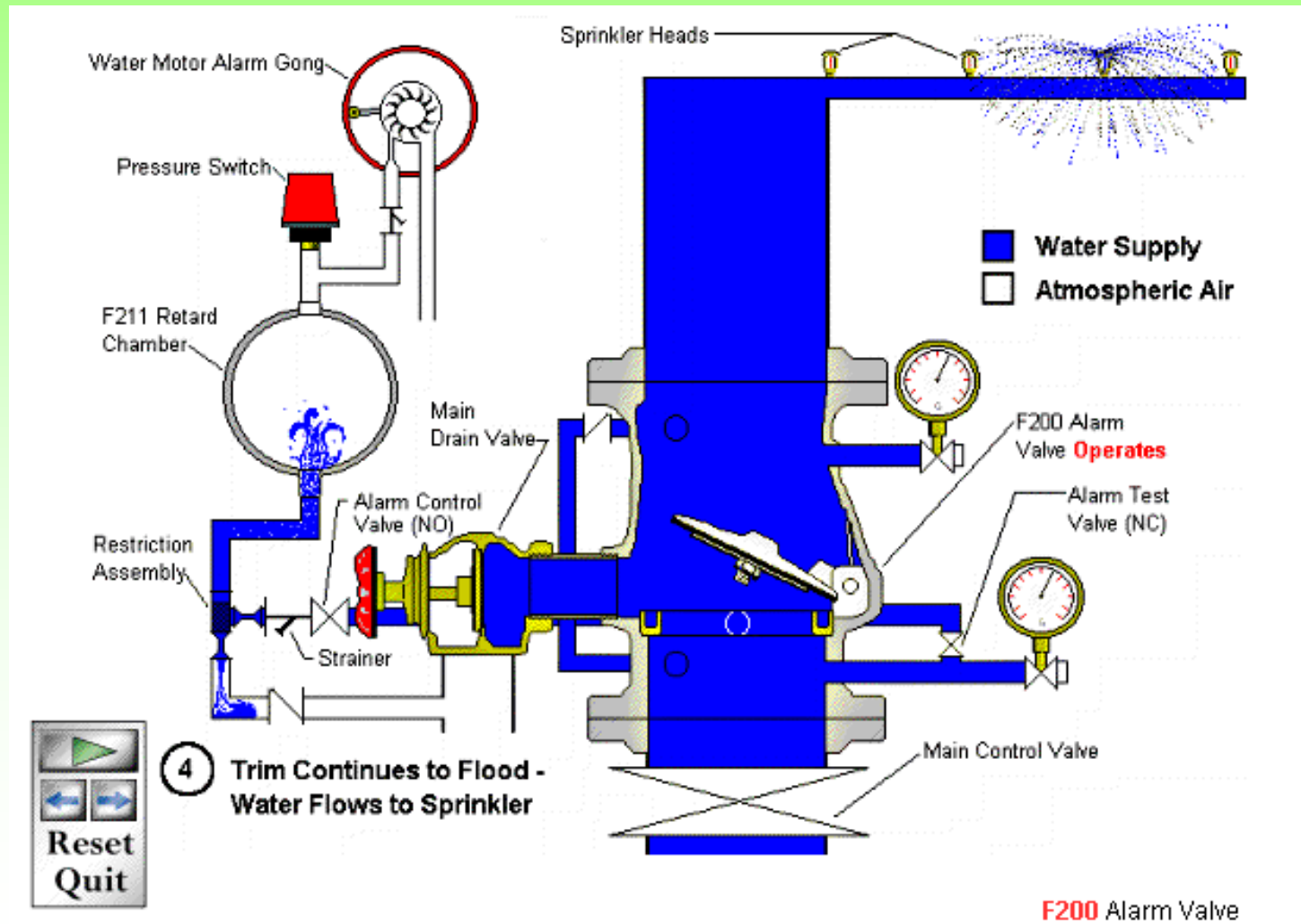


SPRINKLER



SISTEM & KOMPONEN - kelengkapan berkaitan

4. AIR MASUK CHAMBER

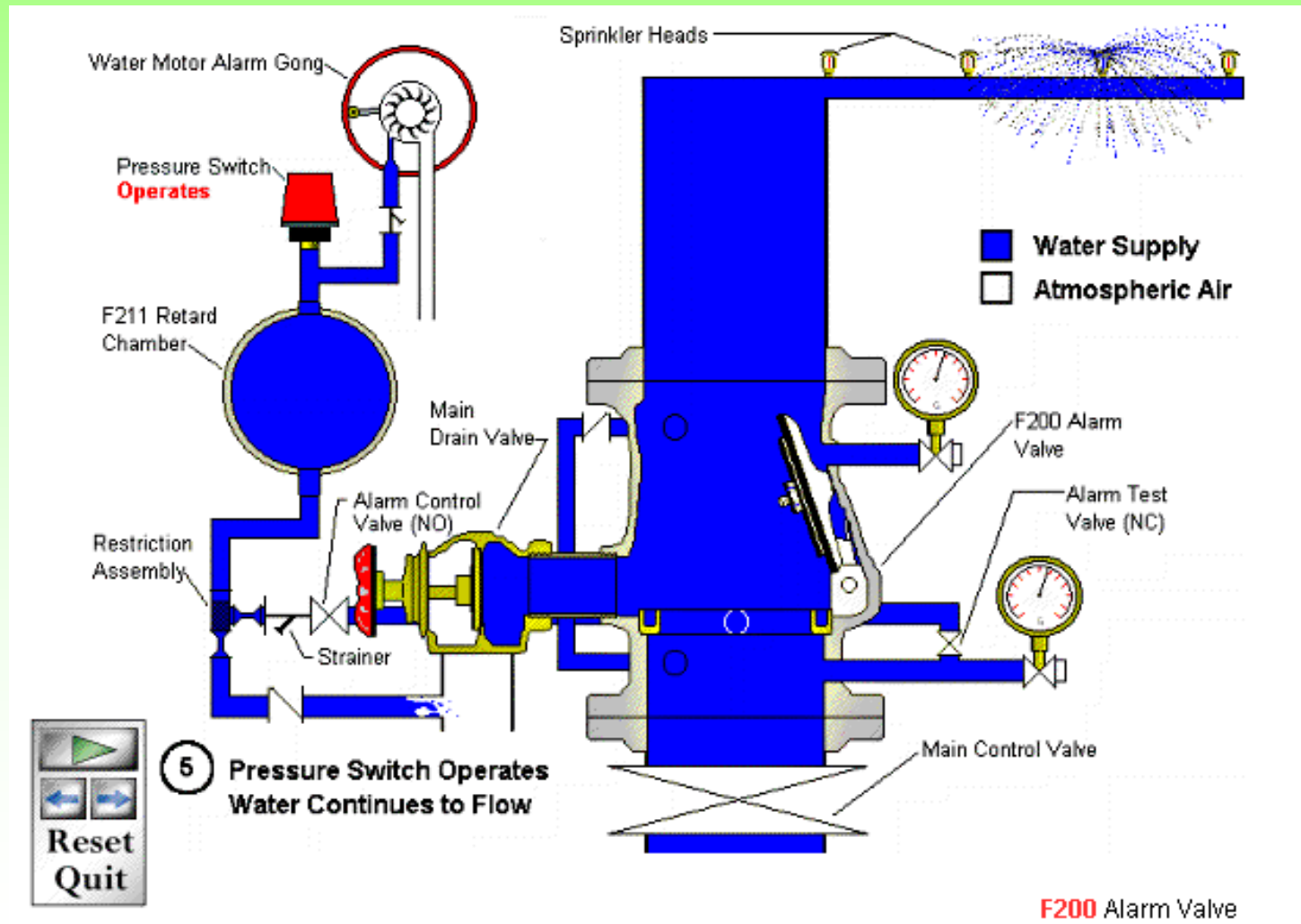


SPRINKLER



SISTEM & KOMPONEN - kelengkapan berkaitan

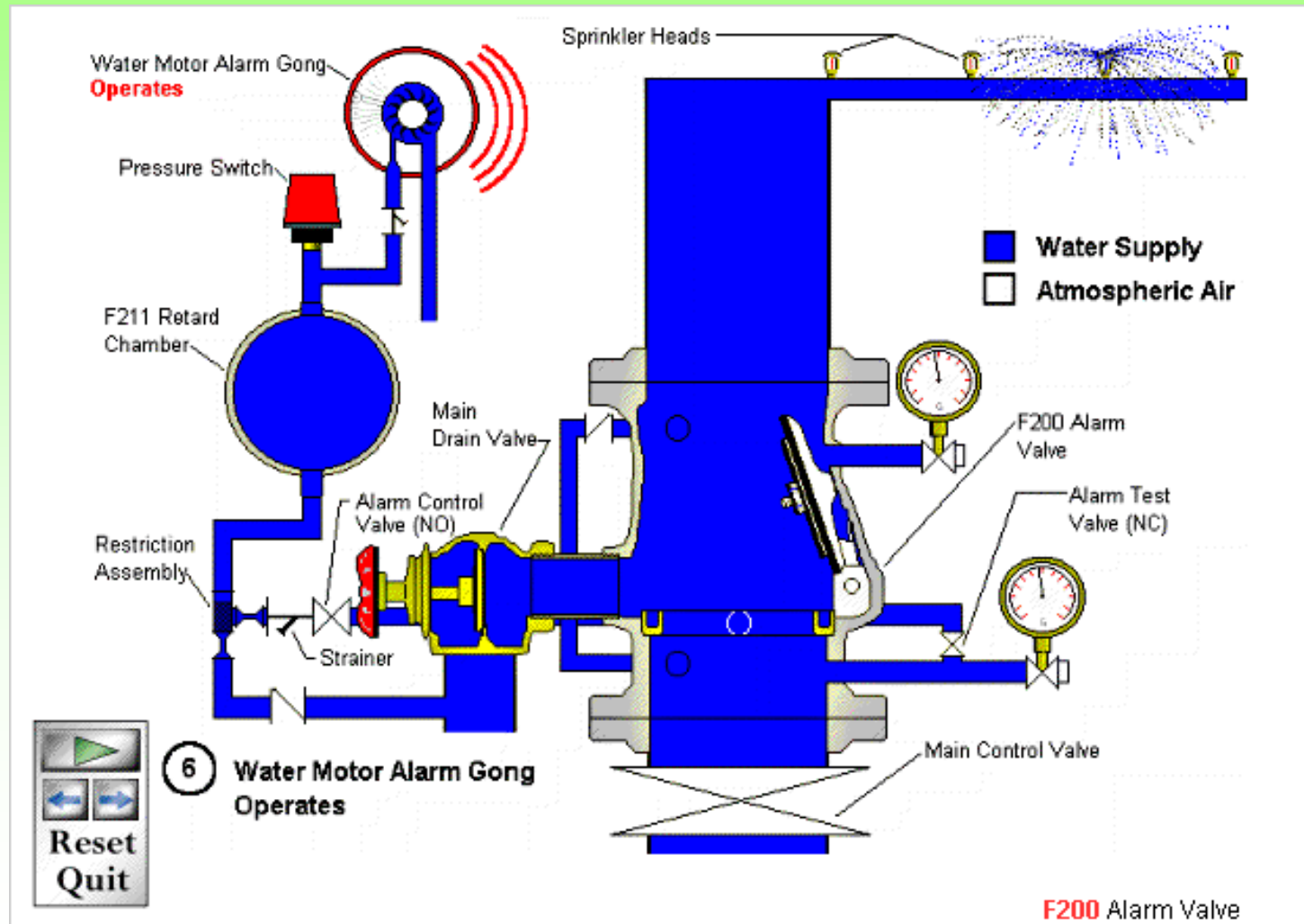
5. PRESSURE SWITCH ON





SISTEM & KOMPONEN - kelengkapan berkaitan

6. ALARM GONG BERBUNYI

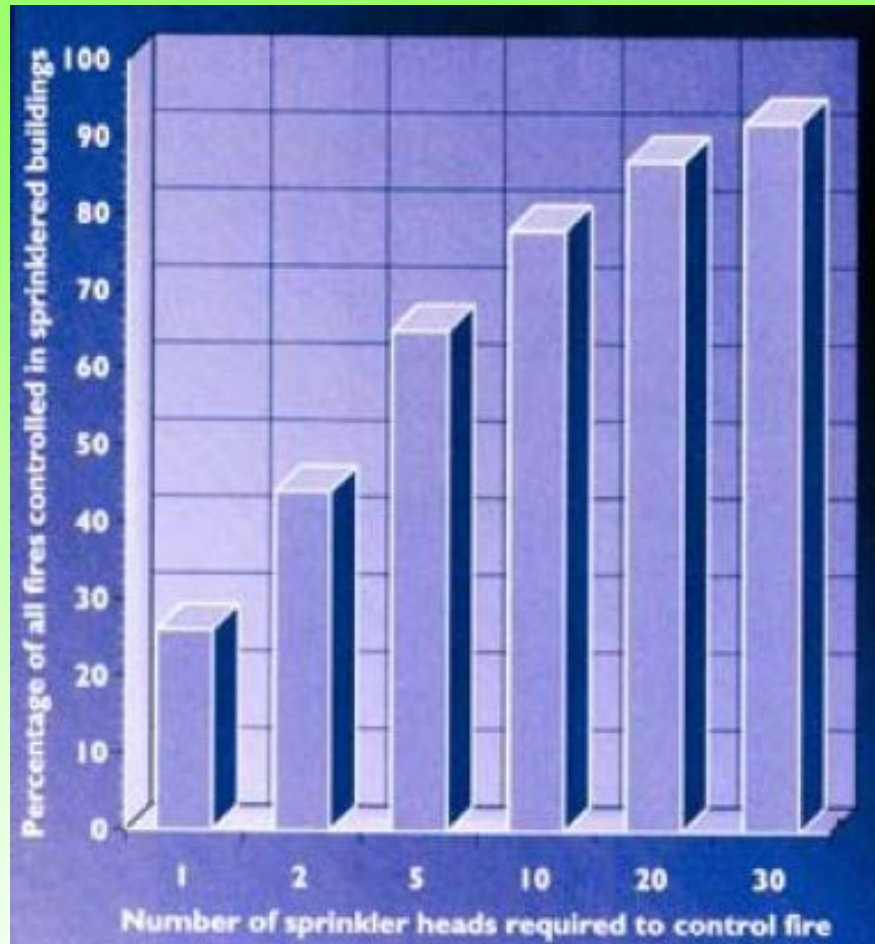
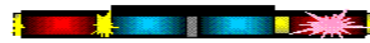


ADA SOALAN ?

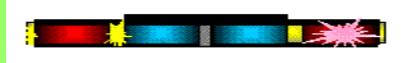


**REHAT
SEBENTAR**

SPRINKLER



60 % KEBAKARAN 4 KEPALA
SISTEM CEKAP



TAJUK - TAJUK SESI :

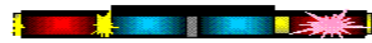
PIAWAIAN & PERATURAN

SISTEM & KOMPONEN

UJIAN & UJITERIMA

PENYELENGGARAAN

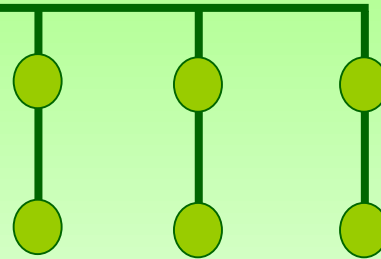




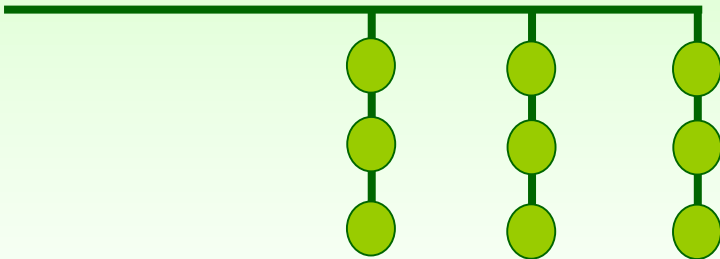
SISTEM & KOMPONEN : PAIP

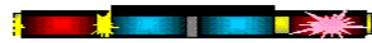
NAMA SUSUNAN PAIP Fig.2

**2 END-SIDE w
END FEED**



**3 END-SIDE w
END FEED**

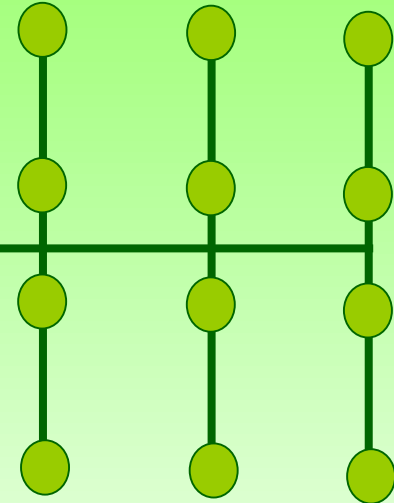




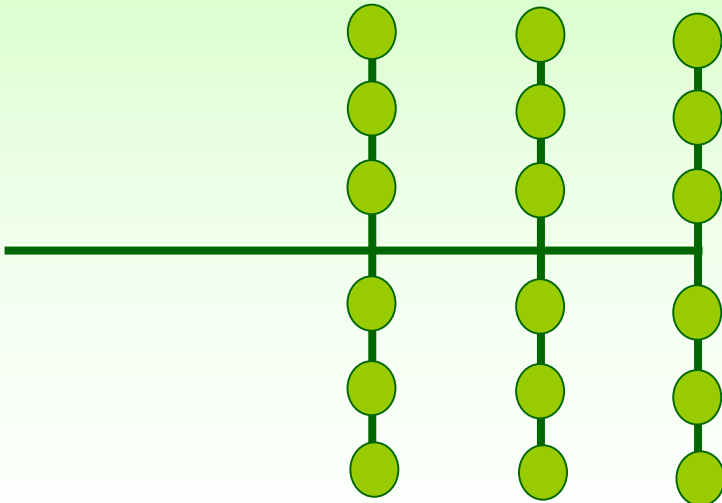
SISTEM & KOMPONEN : PAIP

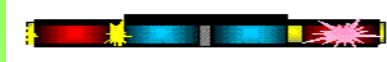
NAMA SUSUNAN PAIP Fig.2

**2 END-CENTRE
w END FEED**



**3 END-CENTRE
w END FEED**

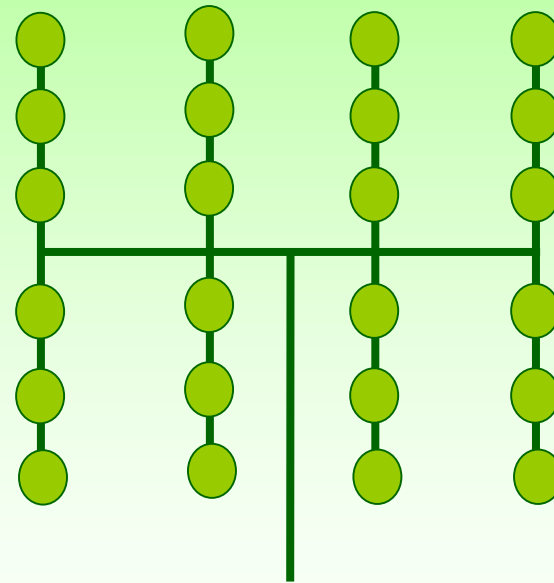
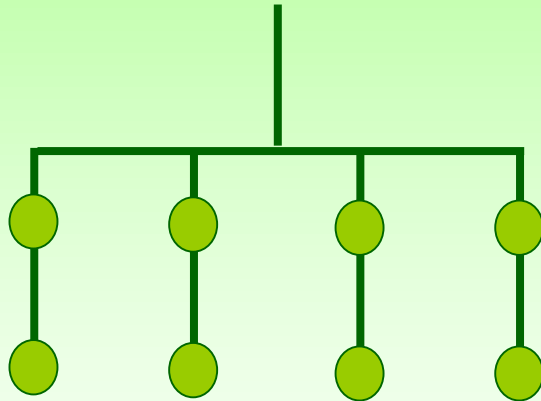


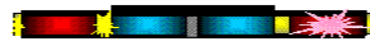


LAKAR SUSUNAN PAIP

Mengikut piawaian LPC, lakarkan

- 2 end-side with central feed
- 3 end-centre with central feed

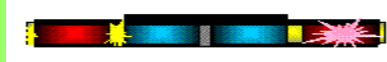




SISTEM & KOMPONEN : Bantuan Minda

Pada Borang Bantuan Minda yang diberikan,
Di kolum Hazard, baris manakah Light, OH,
High process & High storage ? Tuliskan.

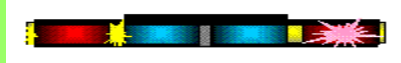




SISTEM & KOMPONEN : Bantuan Minda

**Pada Borang Bantuan Minda yang diberikan,
Di kolum Max. Area, Max. Dist. & Min. Dist.,
baca data di T70, T71 dan Klausa 26.2 ? Tuliskan.**

	Max. area	Max. dist	Min. dist
Light	21 sq.m SW = 17	4.6 m	2 m
Ordinary	12 sq.m SW = 9	4.0 m Stag.=4.6	2 m
High	9 sq.m No SW	3.7 m	2 m



SISTEM & KOMPONEN : Latihan Bantuan Minda

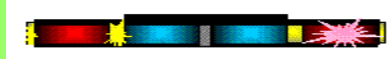
Sebuah ruang bukan industri dengan ukuran 10m x 10m dikehendaki dipasang sprinkler.

Apakah kategori hazard ruang ini ?

Berapakah anggaran kepala sprinkler diperlukan ?

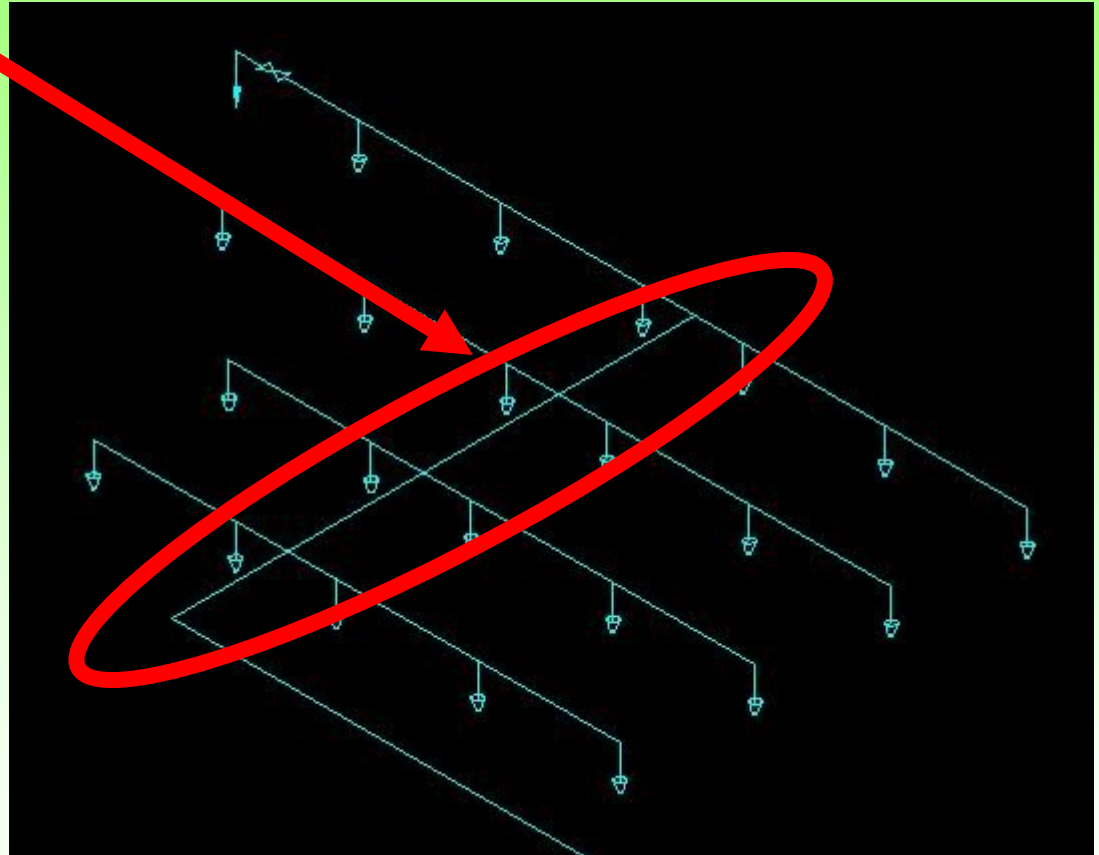


SPRINKLER

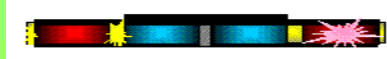


SISTEM & KOMPONEN : PAIP DISTRIBUTION

- paip utama
- T58 untuk saiz



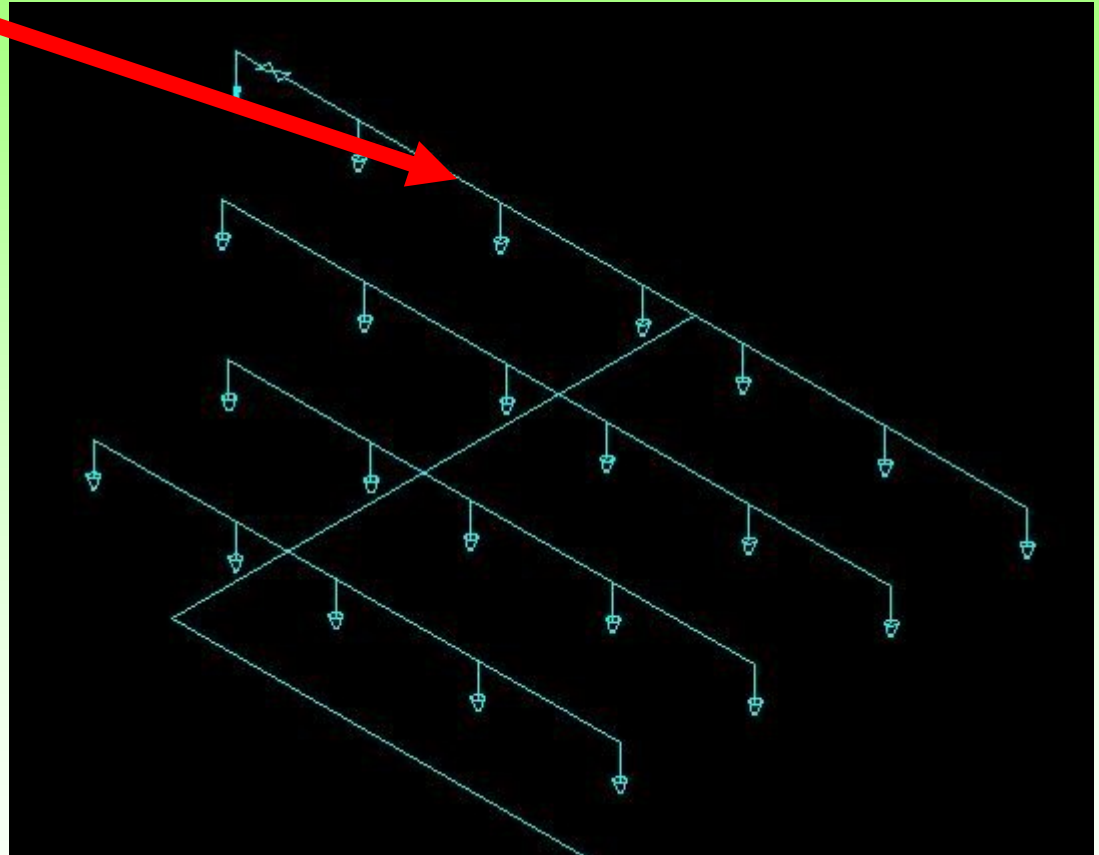
SPRINKLER

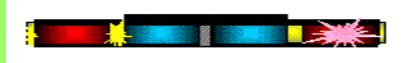


SISTEM & KOMPONEN : PAIP

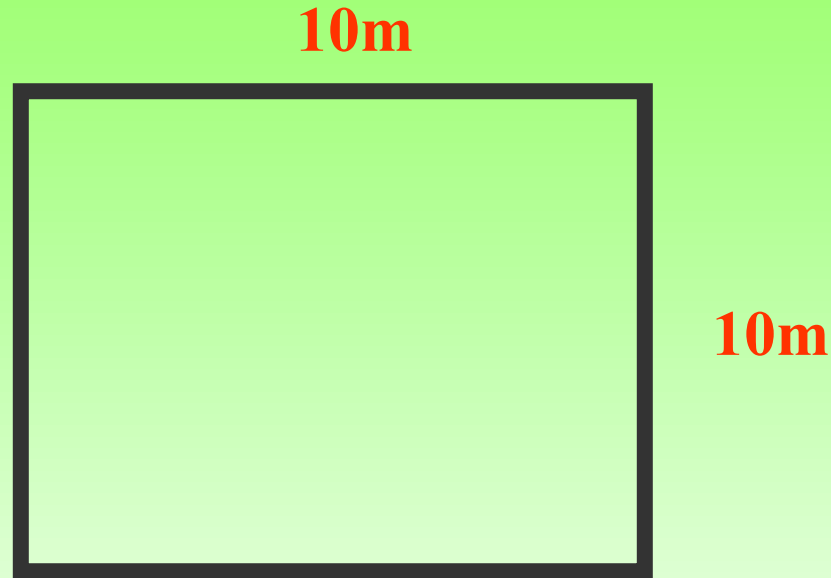
RANGE

- paip agihan
- T57 untuk saiz





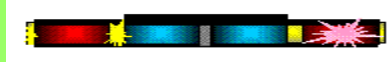
SISTEM & KOMPONEN : Latihan Bantuan Minda



Jika hazardnya adalah OH III. Berapakah anggaran kepala sprinkler diperlukan sekarang?

Boleh kita saizkan 'range & distribution pipe?

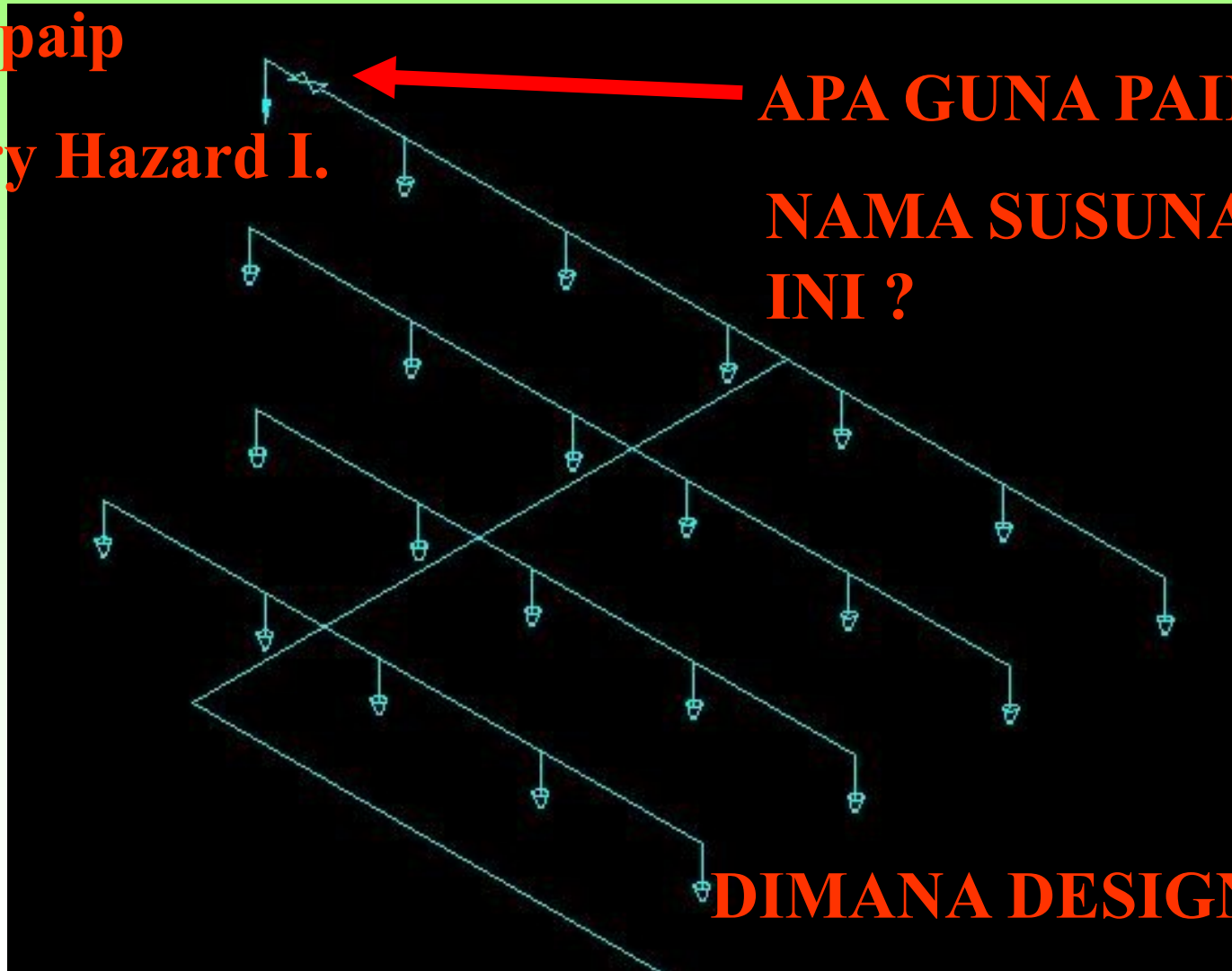
SPRINKLER



SISTEM & KOMPONEN : LATIHAN PAIP

Lukis rajah ini di atas kertas A4. Guna T57 & T58 dan saizkan paip

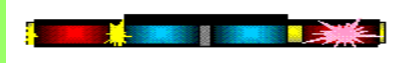
Ordinary Hazard I.



APA GUNA PAIP INI ?

NAMA SUSUNAN
INI ?

DIMANA DESIGN PT ?



TAJUK - TAJUK SESI :

PIAWAIAN & PERATURAN

SISTEM & KOMPONEN

UJIAN & UJITERIMA

PENYELENGGARAAN





UJIAN & UJITERIMA

- AKTIVITI PENTING
- PAIP TERSEMBUNYI, ROSAK SUKAR DIBAIKI

1. UJIAN HIDROSTATIK

1 ½ kali tekanan kerja (~ 15.5 bars) selama 24 jam
tiada penurunan tekanan

2. 'RANGE PIPE TEST'

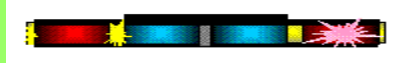
hujung 'range pipe' / paip ujian.
pastikan air sampai ke hujung.

3. UJIAN FUNGSI /PERFORMA

- pam, simulasi operasi, bacaan data

4. REKOD UJIAN

disimpan dengan baik dijilid dengan manual O & M.



TAJUK - TAJUK SESI :

PIAWAIAAN & PERATURAN

SISTEM & KOMPONEN

UJIAN & UJITERIMA

PENYELENGGARAAN





PENYELENGGARAAN

SERUPA GELUNG HOS SESI TERDAHULU

- tambahan item (kepala sprinkler, inst. valves)

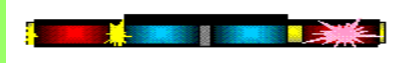
SISTEM DIPENUHI AIR

- buka injap 'range test pipe'

INJAP BAIK & TIDAK BOCOR

ALARM GONG BERFUNGSI

- buka injap 'alarm test valve'



TAJUK - TAJUK SESI :

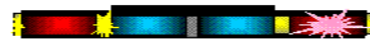
PIAWAIAAN & PERATURAN

SISTEM & KOMPONEN

UJIAN & UJITERIMA

PENYELENGGARAAN





**ADA
SOALAN ?**

**TERIMA
KASIH**

03 - 26967219



TAJUK - TAJUK SESI :

PIAWAIAN & PERATURAN

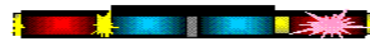
SISTEM & KOMPONEN

UJIAN & UJITERIMA

PENYELENGGARAAN



SPRINKLER



KEPALA SPRINKLER

PENDANT :

**Pemasangan bawah
siling**

SPRAY
PENDANT



UPRIGHT :

**Pemasangan dalam
siling / bumbung**



SPRINKLER



KEPALA SPRINKLER

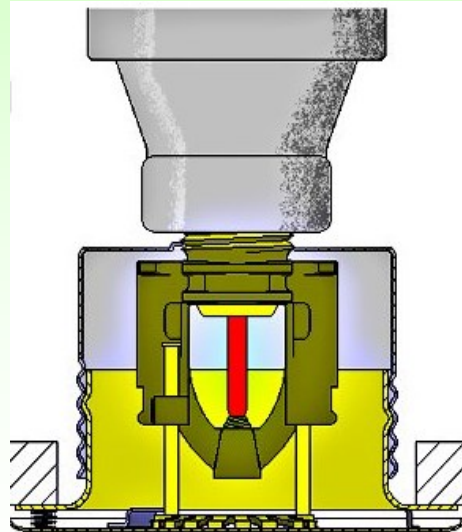
SIDEWALL :

Tepi dinding

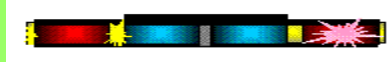


CONCEALED :

**Estatik,
tersembunyi**



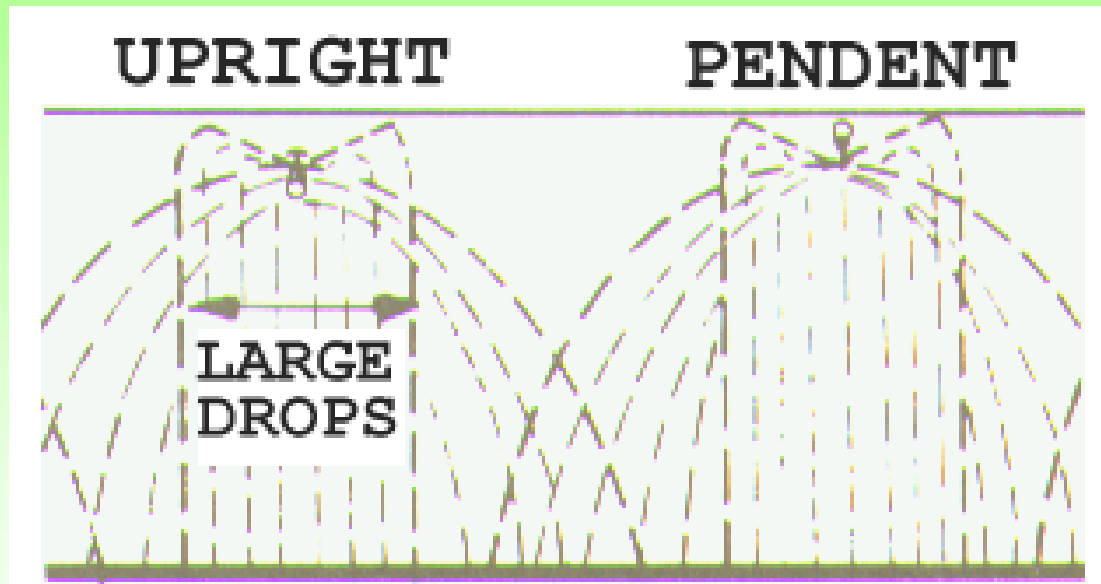
SPRINKLER



KEPALA SPRINKLER

FLOW PATTERN

CONVENTIONAL

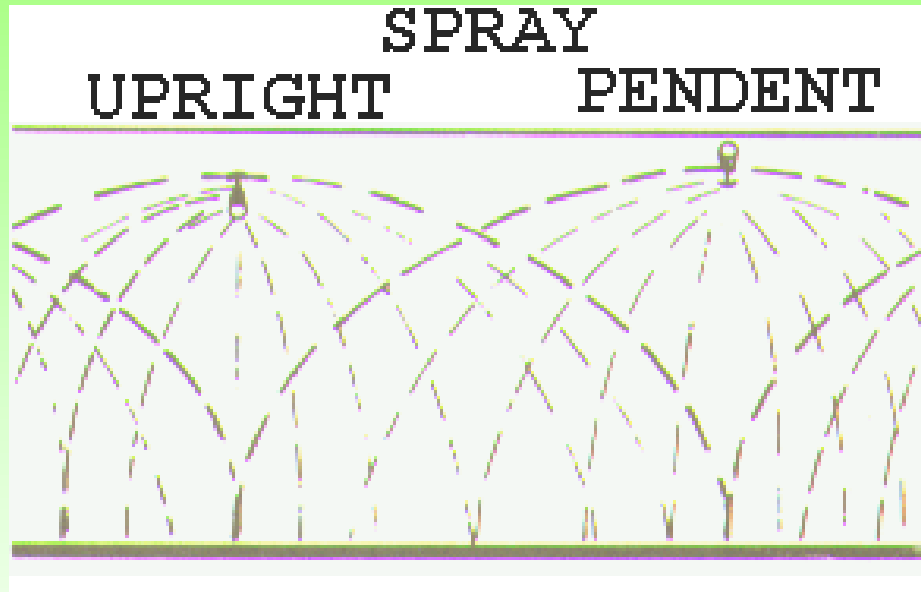


SPRINKLER

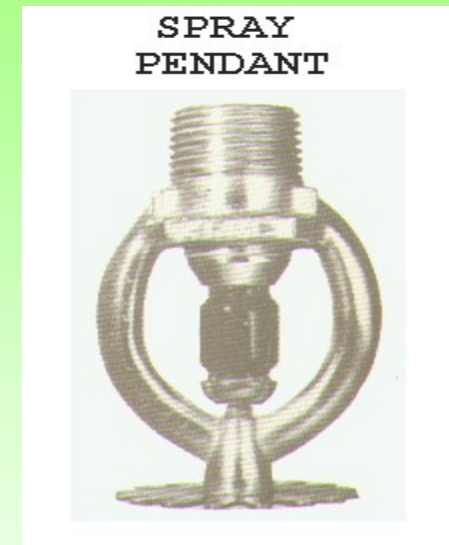


KEPALA SPRINKLER

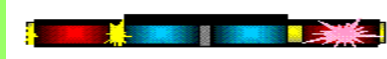
FLOW PATTERN



SPRAY



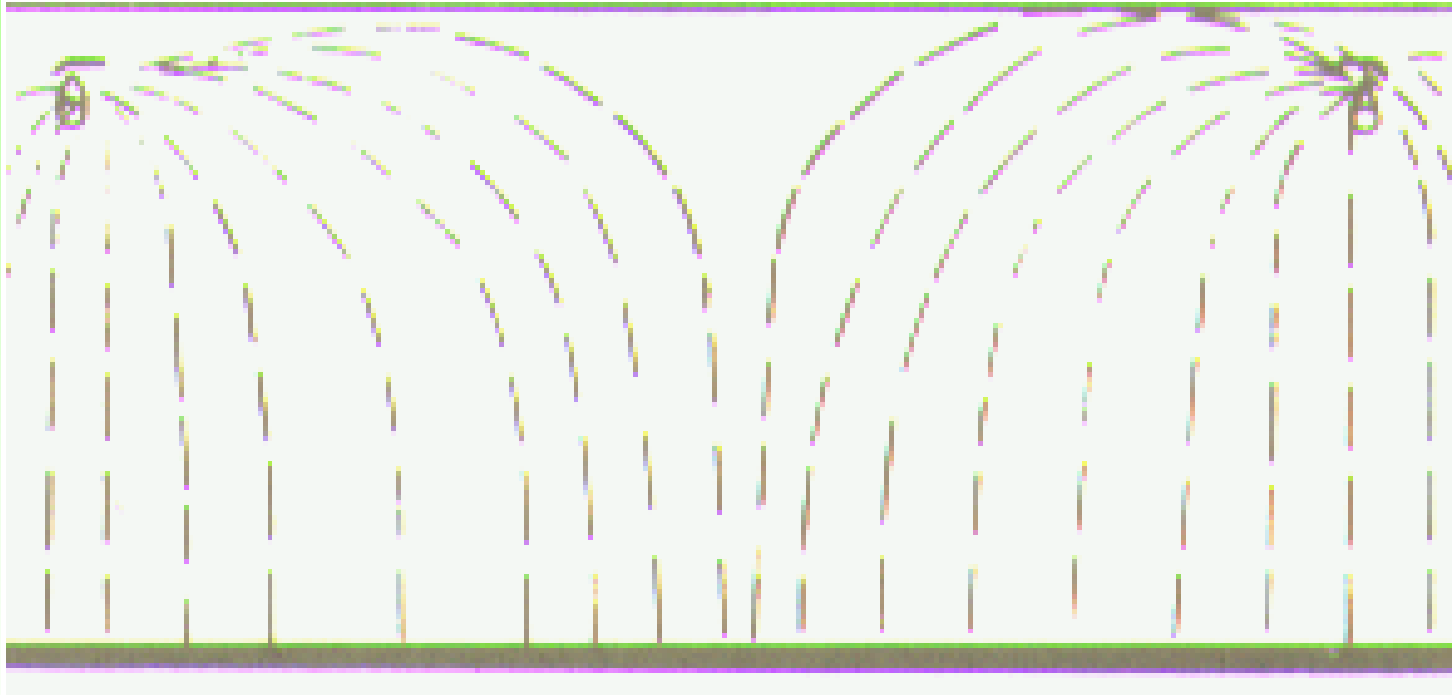
SPRINKLER



KEPALA SPRINKLER

FLOW PATTERN

SIDEWALL



SPRINKLER



KEPALA SPRINKLER

RATINGS °C.

FUSIBLE LINKS

55/77

80/107

121/141

163/191

204/246

260/302

320/343

UNCOLOURED

WHITE

BLUE

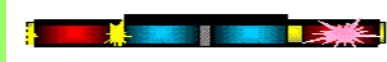
RED

GREEN

ORANGE

BLACK

SPRINKLER



KEPALA SPRINKLER

RATINGS ° C

GLASS BULB

57

ORANGE

68

RED

79

YELLOW

93

GREEN

141

BLUE

182

MAUVE

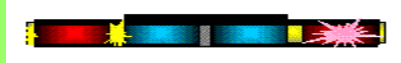
227/260

BLACK

APA RATING SAMPEL SPRINKLER KITA ?

BANDING DGN NFPA 13

SPRINKLER



KEPALA SPRINKLER

PEMILIHAN

SUHU : $> 30^{\circ}\text{C}$ above ambient

68

RED - normal

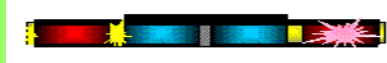
93

GREEN - roof

141

BLUE - pile storage

SPRINKLER



KEPALA SPRINKLER

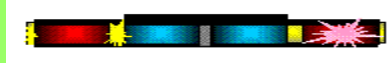
PEMILIHAN

SIDEWALL :

- WHERE PIPE MUST NOT CROSS ROOM
- NOT FOR HI-HAZARD OR SUSPENDED CEILING



SPRINKLER



KEPALA SPRINKLER

PEMILIHAN

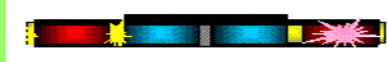
SPRAY :

- NOT FOR EXPOSED STRUC. STEELWORK
- NOT FOR ROOF, CEILING, SUPPORT OF COMBUSTIBLE MATERIAL

SPRAY
PENDANT



SPRINKLER

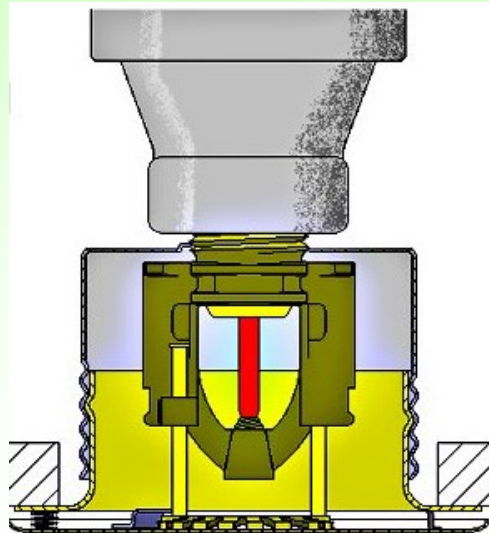


KEPALA SPRINKLER

PEMILIHAN

RECESSED / CONCEALED :

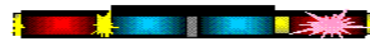
- LIGHT & ORDINARY HAZARD ONLY
- CEILING SLOPE $< 45^{\circ}$ FROM HORIZONTAL ...



SPRINKLER

KEPALA SPRINKLER

BAGAIMANA IA BEROPERASI

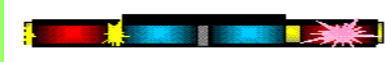


**KEADAAN BIASA
API, KACA PECAH
AIR DISEMBUR**



SPRINKLER

KEPALA SPRINKLER

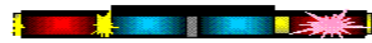


BAGAIMANA OPERASINYA – CONCEALED TYPE

KEADAAN BIASA
COVER JATUH
DEFLECTOR TURUN



SPRINKLER



ADA SOALAN ?



REHAT SEBENTAR