AUTOMATIC SPRINKLER SYSTEMS – CATEGORIES OF PROTECTION

Introduction

A sprinkler system is designed to discharge a specified quantity of water per minute over a predetermined floor area. This is known as the ***design density*** of the system. The design density relates directly to the contents of a building, the height of goods storage and the type of process involved. It is therefore imperative that the risk presented by the occupancy or contents of a building be carefully evaluated before determining design densities.

Since sprinkler systems are fixed installations and their upgrading, through increasing water densities and reducing sprinkler head spacing is impractical, specifications have been provided to discriminate between installations protecting varying risks. These specifications appear in SABS 0287 and the following installations cater for most occupancies:

1. Ordinary hazard systems
2. High hazard systems

The following definitions refer to the terms used in the tables which follow:

Heads/valve - the maximum number of sprinkler heads supplied by one set of main valves.

Assumed Maximum Area of Operation (***AMAO)*** – the maximum area in m² expected to be involved in any one fire situation.

Floor area – the maximum floor area coverage provided by each sprinkler head.

Design density – the minimum amount of water per minute, discharged from each sprinkler head at any point below it and within the floor area coverage.

Flow – the minimum quantity of water per minute discharged through the maximum number of heads for which the system is designed. **Note**: 1 dm³/min equals 1 λ/min.

Reservoir – usually used as a secondary water supply or as a primary supply particularly for high hazard systems where design densities can seldom be met by mains. The minimum capacity of the reservoir excludes any inflow of water through ball valves etc.

Ordinary Hazard

Ordinary hazard systems are used to protect commercial and industrial occupancies where the combustibility of the contents or the process hazards are considered to be moderate.

eg: accumulator manufacturers
printing works
department stores
paper mills
saw mills, etc
hotels
offices

Ordinary hazard design criteria

Heads/valve	AMAO	Floor area	Design density	Valve pressure	Flow
1 000	216 m²	12 m²	5 mm/min	1 100	2500 dm³/min

High hazard systems

High hazard systems are used to protect occupancies where the combustibility of the contents or the process hazards are considered to be high

eg: polish manufacturing
cotton mill preparatory processes
fire lighter manufacturers
flax, jute and hemp mills
match factories
paint and varnish manufacturers, etc.

Heads/valve	AMAO	Floor area	Design density**	Flow	Reservoir
1 000	260m²	9 m²	7,5 mm/min	2 300 dm²/min	225 m³
			10,0 mm/min	3 050 "	275 m³
			12,5 mm/min	3 800 "	350 m³
			15,0 mm/min	4 550 "	425 m³
			17,5 mm/min	4 850 dm³/min	450 m³
	400 m²		20,0 mm/min	6 400 dm³/min	575 m³
			22,5 mm/min	7 200 "	650 m³
			25,0 mm/min	8 000 "	725 m³
			27,5 mm/min	8 800 "	800 m³
			30,0 mm/min	9 650 "	875 m³

* The design area can vary between 260 m² and 400 m² according to varying conditions.
** The design density of discharge relates directly to the height to which stored goods are stacked.
*** Actual flow rates are determined by hydraulic calculation.

Conclusion

The design criteria outlined in this bulletin should be construed as being a guideline only and it is advised that the Automatic Sprinkler Inspection Bureau be consulted for detailed information on the interpretation of specific protection problems.

Published buy
Fire Protection Association of Southern Africa
(Incorporated Associati0on not for Gain)
(Reg.No. 1973/000022/08)
P O Box 15467
Impala Park
1472