

## Calculations for Mastic / Sealant

- a = Hole Diameter in mm
- b = Depth of Sealant in mm / wet film thickness for spray material (See recommendations)
- c = Pipe or Bunched Cables diameter in mm
- d = Annular space in mm (See recommendations)
- l = Length of square opening / joint
- w = Width of square opening / joint
- h = Cartridge or spray bucket size in ml
- n = Number of holes
- e = Area of hole in mm<sup>2</sup> =  $\pi(a \div 2)^2$
- f = Area of pipe in mm<sup>2</sup> =  $\pi(a \div 2)^2$
- g = Amount of mastic needed per hole in ml =  $((e-f) \times b) \div 1000$

Round Holes	Square Hole	Linear Joints
No. of cartridges needed = $n \times (\frac{g}{h})$ Area of hole e = $\pi(a \div 2)^2$ mm <sup>2</sup> Area of pipe f = $\pi(c \div 2)^2$ mm <sup>2</sup> Mastic Volume = $g = ((e-f) \times b) \div 1000$ ml	No. of cartridges needed = $n \times (\frac{g}{h})$ Area of hole e = $l \times w$ mm <sup>2</sup> Area of pipe f = $\pi(c \div 2)^2$ mm <sup>2</sup> Mastic Volume = $g = ((e-f) \times b) \div 1000$ ml	No. of cartridges / buckets = $(\frac{g}{h})$ Area of Joint = $e = l \times w$ mm <sup>2</sup> Mastic Volume = $g = ((e-f) \times b) \div 1000$ ml = g
<b>Example:</b> a = 90mm b = 40mm c = 50mm h = 310ml n = 20  e = $3.14 \times 45^2 = 6361.73$ mm <sup>2</sup> f = $3.14 \times 25^2 = 1963.50$ mm <sup>2</sup> g = $((6361.73 - 1963.50) \times 40) \div 1000$ = 175.92 ml  No. of cartridges = $20 \times (\frac{175.92}{310})$ = 11.35 cartridges	<b>Example:</b> l = 90mm w = 100mm b = 40mm c = 50mm h = 310ml n = 20  e = $90 \times 100 = 9000$ mm <sup>2</sup> f = $3.14 \times 25^2 = 1963.50$ mm <sup>2</sup> g = $((9000 - 1963.50) \times 40) \div 1000$ = 281.46 ml  No. of cartridges = $20 \times (\frac{281.46}{310})$ = 18.1 cartridges	<b>Example for Mastic/Sealant:</b> w = 20mm l = 30meters = 30000mm b = 10mm h = 310ml e = $20 \times 30000 = 60000$ mm <sup>2</sup> g = $(60000 \times 10) \div 1000 = 6000$ ml No. of cartridges = $(\frac{6000}{310})$ = 19.4 cartridges  <b>Example of joint Spray:</b> w = 100mm, w1 = 125mm(with overspray) l = 300 meters = 300000 mm b = 1.5mm h = 19 liters = 19000 ml e = $125 \times 300000 = 37500000$ mm <sup>2</sup> g = $(37500000 \times 1.5) \div 1000 = 56250$ ml No. of buckets = $(\frac{56250}{19000}) = 2.96$ buckets

## Calculations for FireStop Block FBB

a = block length = 230mm = 0.23m	b = block width = 130mm = 0.13m	t = block thickness = 60mm = 0.06m
l = length of opening	w = width of opening	c = %penetrant Area
Area to be covered/filled by blocks	= $l \times b \times (1-c/100) = A$	Fire rating up to 120 minutes
No. of blocks required	= $\frac{A}{a \times t}$	$\frac{A}{b \times t}$
<b>Example :</b>		
l = 500mm = 0.5m    w = 500mm = 0.5m    c = 30%		
Area to be covered/filled by blocks = $0.5 \times 0.5 \times (1 - 0.3) = 0.175$ m <sup>2</sup>	Fire rating up to 60 minutes	Fire rating up to 120 minutes
No. of blocks required	= $\frac{0.175}{(0.23 \times 0.06)}$	$\frac{0.175}{(0.13 \times 0.06)}$
	12.68	22.4

### Calculations for Compound

l = length of the opening  
 b = width of the opening  
 d = depth as per required fire rating  
 C = Penetrant Area or cross sectional area of services  
 Y = coverage / yield of 1 bag in Liters  
 Volume of Compound Required = Volume of opening - Volume of services  

$$= [(l \times b \times d) - (C \times d)] \quad \text{m}^3$$

$$= [(l \times b \times d) - (C \times d)] \times 1000 \quad \text{liters}$$

$$= V$$

$$= \frac{V}{Y}$$

**Example :**

l = 1000mm = 1m  
 b = 500mm = 0.5m  
 d = 100mm = 0.1m  
 C = 20% of opening = l x b x 20% = 1x0.5x0.2 = 0.1  
 Y = 24 liters per 22 KG bag  
 Volume of Compound Required = [(1x0.5x0.1) - (0.1x0.1)] x 1000 liters  
 V = 40 liters  
 Numbers of bags required =  $\frac{40}{24}$   
 = 1.67 bags

### Calculations for Pillows FiP

Estimation of large and medium size pillows in walls and floors openings of size up to 1 sq. meter.

Width mm	Size →	Length mm											
		Large	Medium	Large	Medium	Large	Medium	Large	Medium	Large	Medium	Large	Medium
	Seal type	100		300		500		700		900		1000	
200	Wall	3	5	7	13	12	22	17	31	21	39	24	47
	Floor	2	3	4	7	6	12	9	17	11	22	12	27
400	Wall	5	9	14	26	24	44	33	61	42	78	47	95
	Floor	3	5	7	15	12	24	17	34	22	43	24	52
600	Wall	7	13	21	39	35	65	49	91	63	117	70	143
	Floor	4	7	11	22	18	36	25	51	33	65	36	79
800	Wall	9	18	28	52	47	87	66	122	84	157	94	192
	Floor	5	10	15	29	24	48	34	67	33	87	48	107
1000	Wall	10	22	35	65	59	109	82	152	105	196	117	217
	Floor	6	12	18	36	30	60	42	84	54	108	60	120

### Calculations for Fire Barrier Foam - FBS

Material use as reference value for 40% degree of seal use - number of cartridges for seal thickness 200mm and 100mm for 90 minutes and 30 minutes fire rating respectively

Seal Surface	Volume @ 200mm depth	Cartridge	Volume @ 100mm depth	Cartridge	Core boring	Volume @ 200mm depth	Cartridge	Volume @ 200mm depth	Cartridge	
m2	[m3]	180g	[m3]	180g	[mm]	[m3]	180g	[m3]	180g	
0.005	0.001	0.92	0.0005	0.48	50	0.0004	0.36	0.0002	0.18	
0.01	0.002	1.85	0.001	0.98	60	0.0006	0.52	0.0003	0.26	
0.02	0.004	3.69	0.002	1.85	70	0.0008	0.71	0.0004	0.36	
0.03	0.006	5.54	0.003	2.77	80	0.001	0.93	0.0005	0.47	
0.04	0.008	7.38	0.004	3.69	100	0.0016	1.45	0.0008	0.73	
0.048	0.0096	8.92	0.0048	4.46	120	0.0023	2.09	0.0011	1.05	
0.0625	-	-	0.0063	5.81	160	0.004	3.71	0.002	1.85	
						200	0.0062	5.8	0.0031	2.9

\* The above calculations do not consider wastage of material. Please consider an appropriate factor.