

**A1**

**NON-COMBUSTIBLE MATERIALS**

No contribution to fire.

**A2**

**LIMITED COMBUSTIBILITY**

No significant contribution to fire.

**B**

**COMBUSTIBLE MATERIALS**

Very limited contribution to fire. Very limited heat release and flame spread during growth stage of a fire.

**C**

**COMBUSTIBLE MATERIALS**

Limited contribution to fire. Limited heat release and flame spread during the growth stage of a fire.

**D**

**COMBUSTIBLE MATERIALS**

Medium contribution to fire.

**E**

**COMBUSTIBLE MATERIALS**

High contribution to fire.

**F**

**COMBUSTIBLE MATERIALS**

Unacceptable fire behaviour.

**s = smoke propagation / emission level**

**S1** = emission absent or very little



**S2** = emission with average volume intensity



**S3** = emission with high intensity



**d = flaming droplets and particles during the first 10 minutes of exposure**

**d0** = no burning droplets



**d1** = slow dripping droplets



**d2** = high dripping droplets



**Example of fire classes and criteria - in addition: smoke and droplets**

The main part of the classification is its letter - A1, A2, B, C, D, E and F

A1 is the highest level of performance, with F the lowest performance level.

**A2 - s1, d0**

There is a smoke classification of s1 (absent/weak), s2 or s3 (high).

There is a classification of flaming droplets of d0, d1 or d2. d0 is the best level of performance (absent) and d2 is the worst performance level (high).



| SANS 53501-1 REACTION TO FIRE CLASS OF BUILDING OCCUPANCY |                                   | SINGLE STOREY                            | DOUBLE STOREY | 3 STOREYS OR MORE |
|-----------------------------------------------------------|-----------------------------------|------------------------------------------|---------------|-------------------|
|                                                           |                                   | Performance requirements equal or better |               |                   |
| A1                                                        | Entertainment & public assembly   | A2-s1,d0                                 | A2-s1,d0      | A2-s1,d0          |
| A2                                                        | Theatrical & indoor sport         | D-s3,d2                                  | C-s3,d2       | A2-s1,d0          |
| A3                                                        | Places of instruction             | D-s3,d2                                  | C-s3,d2       | B-s3,d2           |
| A4                                                        | Worship                           | D-s3,d2                                  | C-s3,d2       | A2-s1,d0          |
| A5                                                        | Outdoor sport                     | E-s3,d2                                  | D-s3,d2       | A2-s1,d0          |
| B1                                                        | High risk commercial              | A2-s1,d0                                 | A2-s1,d0      | A2-s1,d0          |
| B2                                                        | Moderate risk commercial          | D-s3,d2                                  | C-s3,d2       | A2-s1,d0          |
| B3                                                        | Low risk commercial               | E-s3,d2                                  | D-s3,d2       | A2-s1,d0          |
| C1                                                        | Exhibition hall                   | D-s3,d2                                  | C-s3,d2       | a2-S1,D0          |
| C2                                                        | Museum                            | D-s3,d2                                  | C-s3,d2       | A2-s1,d0          |
| D1                                                        | High-risk industrial              | A2-s1,d0                                 | A2-s1,d0      | A2-s1,d0          |
| D2                                                        | Moderate-risk industrial          | D-s3,d2                                  | C-s3,d2       | A2-s1,d0          |
| D3                                                        | Low-risk industrial               | E-s3,d2                                  | D-s3,d2       | A2-s1,d0          |
| D4                                                        | Plant room                        | A2-s1,d0                                 | A2-s1,d0      | A2-s1,d0          |
| E1                                                        | Place of detention                | A2-s1,d0                                 | A2-s1,d0      | A2-s1,d0          |
| E2                                                        | Hospital                          | A2-s1,d0                                 | A2-s1,d0      | A2-s1,d0          |
| E3                                                        | Other institutional (residential) | A2-s1,d0                                 | A2-s1,d0      | A2-s1,d0          |
| E4                                                        | Health care                       | A2-s1,d0                                 | A2-s1,d0      | A2-s1,d0          |
| F1                                                        | Large shop                        | D-s3,d2                                  | C-s3,d1       | A2-s1,d0          |
| F2                                                        | Small shop                        | D-s3,d2                                  | C-s3,d2       | A2-s1,d0          |
| F3                                                        | Wholesalers' store                | D-s3,d2                                  | C-s3,d2       | A2-s1,d0          |
| G1                                                        | Offices                           | E-s3,d2                                  | D-s3,d2       | A2-s1,d0          |
| H1                                                        | Hotel                             | A2-s1,d0                                 | A2-s1,d0      | A2-s1,d0          |
| H2                                                        | Dormitory                         | A2-s1,d0                                 | A2-s1,d0      | A2-s1,d0          |
| H3                                                        | Domestic residence                | D-s3,d2                                  | D-s3,d2       | A2-s1,d0          |
| H4                                                        | Dwelling house                    | E-s3,d2                                  | D-s3,d2       | A2-s1,d0          |
| H5                                                        | Hospitality                       | D-s3,d2                                  | C-s3,d2       | A2-s1,d0          |
| J1                                                        | High-risk storage                 | A2-s1,d0                                 | A2-s1,d0      | A2-s1,d0          |
| J2                                                        | Moderate-risk storage             | C-s3,d2                                  | B-s3,d2       | A2-s1,d0          |
| J3                                                        | Low-risk storage                  | E-s3,d2                                  | D-s3,d2       | A2-s1,d0          |
| J4                                                        | Parking garage                    | D-s3,d2                                  | C-s3,d2       | A2-s1,d0          |

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| SANS 53501-1 (EN 13501-1) REACTION TO FIRE FIRE CLASSES & PERFORMANCE CRITERIA |                                                                 |                                                                                                                                           |                                                                           |
|--------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| CLASS                                                                          | TEST METHODS                                                    | CLASSIFICATION CRITERIA                                                                                                                   | ADDITIONAL CLASSIFICATION                                                 |
| A1                                                                             | SANS 11820 <sup>a</sup><br>(EN ISO 1182)                        | $\Delta T \leq 30^\circ \text{C}$ ; and $\Delta m \leq 50\%$ ; and $t_f = 0$<br>(i.e. no sustained flaming, $t_r \leq 5 \text{ s}$ )      |                                                                           |
|                                                                                | SANS 1743<br>(EN ISO 1716)                                      | $PCS \leq 2.0 \text{ MJ/kg}^a$<br>$PCS \leq 2.0 \text{ MJ/kg}^{b,c}$<br>$PCS \leq 1.4 \text{ MJ/m}^2^d$<br>$PCS \leq 2.0 \text{ MJ/kg}^e$ |                                                                           |
| A2                                                                             | SANS 11820 <sup>a</sup>                                         | $\Delta T \leq 50^\circ \text{C}$ ; and $\Delta m \leq 50\%$ ; and $t_r \leq 20 \text{ s}$                                                |                                                                           |
|                                                                                | SANS 1743<br>(EN ISO 1716)                                      | $PCS \leq 3.0 \text{ MJ/kg}^a$<br>$PCS \leq 4.0 \text{ MJ/m}^2^b$<br>$PCS \leq 4.0 \text{ MJ/m}^2^d$<br>$PCS \leq 3.0 \text{ MJ/kg}^e$    |                                                                           |
|                                                                                | SANS 53823<br>(EN 13823)                                        | $FIGRA \leq 120 \text{ W/s}$ ; and $LFS < \text{edge of specimen}$ ; and $THR_{600s} \leq 7.5 \text{ MJ}$                                 | Smoke production <sup>f</sup> and flaming droplets/particles <sup>g</sup> |
| B                                                                              | SANS 53823<br>(EN 13823)                                        | $FIGRA \leq 120 \text{ W/s}$ ; and $LFS < \text{edge of specimen}$ ; and $THR_{600s} \leq 7.5 \text{ MJ}$                                 | Smoke production <sup>f</sup> and flaming droplets/particles <sup>g</sup> |
|                                                                                | SANS 11925-2 <sup>1</sup><br>(EN ISO 11925-2)<br>Exposure = 30s | $F_s \leq 150 \text{ mm}$ within 60s                                                                                                      |                                                                           |
| C                                                                              | SANS 53823                                                      | $FIGRA \leq 250 \text{ W/s}$ ; and $LFS < \text{edge of specimen}$ ; and $THR_{600s} \leq 15 \text{ MJ}$                                  | Smoke production <sup>f</sup> and flaming droplets/particles <sup>g</sup> |
|                                                                                | SANS 11925-2 <sup>1</sup><br>Exposure = 30s                     | $F_s \leq 150 \text{ mm}$ within 60s                                                                                                      |                                                                           |
| D                                                                              | SANS 53823                                                      | $FIGRA \leq 750 \text{ W/s}$                                                                                                              | Smoke production <sup>f</sup> and flaming droplets/particles <sup>g</sup> |
|                                                                                | SANS 11925-2 <sup>1</sup>                                       | $F_s \leq 150 \text{ mm}$ within 60s                                                                                                      |                                                                           |
| E                                                                              | SANS 11925-2 <sup>1</sup><br>SANS 10177-11                      | $F_s \leq 150 \text{ mm}$ within 20 s                                                                                                     | Flaming droplets/particles <sup>f</sup>                                   |
| F                                                                              | No performance determined (Fail)                                |                                                                                                                                           |                                                                           |

| EXPLANATORY INFORMATION |                                |        |                                                        |
|-------------------------|--------------------------------|--------|--------------------------------------------------------|
| $\Delta T$              | Temperature rise (K)           | SMOGRA | Smoke growth rate                                      |
| $\Delta m$              | Mass loss (%)                  | TSP    | Total smoke production                                 |
| FIGRA                   | Fire growth rate               | THR    | Total heat release (MJ)                                |
| $F_s$                   | Flame spread (mm)              | PCS    | Gross calorific potential (MJ/kg / MJ/m <sup>2</sup> ) |
| LFS                     | Lateral flame spread (m)       | PCI    | Net calorific potential (MJ/kg / MJ/m <sup>2</sup> )   |
| $t_r$                   | Duration sustained flaming (s) |        |                                                        |