Engineering design project

Engineering

The specimen erected onto the test furnace with the brick wall constructed of ordinary bricks of nominal size mm x mm x mm, with mm side s the wall thickness, surrounding it. The specimen is a Fire Resistant Glass System (0. B) which the thickness Of the glass is 16 mm. B) Describe the fire performance and the fire behavior of the selected system. The observations foe the specimen behavior during the test is shown below: Time (min) Observations The test was started. The exposed glass cracked. 1. 5 The exposed glass fell off. The gel layer expanded entirely. 30 No significant change. 36 The gel layer partially cracked. 39 Both integrity and insulation failure did not occur and the test ceased. Fire Resistant Glass System (0. AH) has been subjected to fire resistance test in accordance with BASES: part 22: 1987, clause 10 for integrity only. The specimen satisfies the performance requirements specified in British Standards foe the periods stated below: Integrity: No less than 39 minutes Insulation: No less than 39 minutes c) Discuss the major factors affecting the fire performance.

In the test BET-NH-2010-1872, Fire Resistant Glass system (0. K) passed 39 minutes insulation and integrity test. The size of glass pane for Fire Resistant Glass System can be enlarged no more than 22% both in width and in height. So the maximal overall size of the glass pane can be 1550 mm x 1. 2 = 1891 mm (W) and 2600 mm x 1. 22 = 3239 mm (H). The overall area is 6. 12 mm. But refer to the BASES: part 22 & 22: 1987, the enlargement should be " Area" that the overall area of the glass pane should be (mamma x mamma) x 1. 2 - 4. 836 mm. 2.

Select one " structural fire protection" system (coating, painting or board) in local market and review its assessment reports. A) Describe the application and the method statement in details. Base on the catalogue of the " Nullifier SASS" - Inducement Backseat, SASS is supplied ready for use and must not be thinned but should be thoroughly stirred prior to use. The following methods and rates of application are available. Achieving maximum loadings will depend on site conditions. Method Maximum Loading WET per coat @ ICC Remarks SASS Airless spray finish 1500 g/mm 1. Mm m Fast application and best finish Lambastes Roller & Brush 750 g,'urn 0. Mm Roller -Textured finish brush - marks may remain Airless Spraying: A single spray built up with several quick passes allows greater control over quantities and finish. It may be possible to apply 2 coats of SASS in one day, particularly if the air temperature is above ICC and there is good air movement (mm/sec). However before doing this ensures that the previously applied coat is dry' particularly in the web/flange junctions.

Airless spray equipment is recommended and should match these guidelines: Operating Pressure: At least 3500 SSI (250 keg/CM) Tip Size: 19-23 thou (0. 48 - 0. Morn) Fan Angle: 200 - 400 Hose Diameter: 1 Mom (3/8") Hose Length: Max. 60 meters Brush / Roller Application: For brush application use a " laying-on" technique to avoid heavy brush marking. A short piled roller will produce a light textured finish. B) Describe the fire performance and the fire behavior of the selected system.

The loaded beam and column tests referred to above demonstrate the ability of the coating to remain attached to a deflecting section (beams) and free from slumping (columns) at elevated temperatures. The sections were loaded to produce the maximum perm Seibel stress for the steel grade. The following critical steel temperatures were derived from the loaded tests and were based on the temperature at which the steel section was no longer capable of satisfying the performance criteria for load bearing capacity defined by the test standard: For I-Section beams, The loaded beam with the nominal maximum coating thickness (5. M) failed laddering capacity after a period of testing of 124 minutes at a steel temperature of ICC. The temperatures of the other beams at laddering capacity failure were in the range ICC to ICC. Consequently the analysis for beams for a fire resistance period of 1 20 minutes was carried out at ICC while those of a lesser period were analyzed at ICC. As the loaded beam with the nominal maximum coating thickness maintained laddering capacity for a period in excess Of 120 minutes it is acceptable derive specifications for up to this period.

For I-Section Columns, the loaded column with the nominal maximum coating highness (6. Mm) failed laddering capacity after a period of testing of 1 29 minutes at a steel temperature in excess of ICC. The temperature of the other column at laddering capacity failure was in the region of ICC. Consequently the analysis for columns was earned out at ICC. As the loaded column with the nominal maximum coating thickness maintained laddering capacity for a period in excess of 1 20 minutes it is acceptable to derive specifications for up to this period.

The loaded steel beam and column sections provide evidence about the adhesive properties of the coating (commonly referred to as " stability') and he critical temperature at which structural instability occurs under standard fire test conditions. The details of each specimen, I. E. The section factor (the ratio of the heated perimeter to cross-sectional area - AN), the protection thickness and duration of heating required for the sections to reach the critical steel temperature derived from the testing of the loaded sections are used as input data for the analysis.

The fire resistance of a protected steel section can be approximated as follows over a limited range of values: FRR a V/A at a constant protection thickness or a AN at a constant fire resistance period where FRR - Fire resistance (in minutes) V- Cross-sectional area A- Heated perimeter of section d- Thickness of protection material (in mm) The required thickness of protection for a given steel section for a particular fire resistance period is therefore assessed by means of a graphical plot of inverse section factor (WA) against the time for the section 10 reach the critical steel temperature.