INTRODUCTION
BBSS – Heavy Duty Horizontal Rolling Fire Shutter is a curtain that spans a floor opening to prevent the spread of fire vertically between floor levels in a building. It has become known as an Escalator shutter, although fire compartmentation with these shutters has also been achieved for vertical lift wells with crane hoists or certain horizontal openings in auditoriums allowing the passage of natural light.

Although generally provided as a fire compartmentation shutter it can also be designed to operate for security purposes where access between floors is provided by staircases or escalators.

DESCRIPTION
Fire shutter comprising of a series of rolled section lath spread out flat and generally horizontally across a floor / ceiling aperture. The lath shall be connected together along each edge by an interlocking roll form edge, providing a continuous hinge for the full width that will maintain integrity during fire test and withstand the deflection and deformation produced across the opening span without collapse or failure. The lath shall be permanently connected at each end to a single heavy duty conveyor type chain to make a curtain assembly that may be driven horizontally along side guides and may be contoured to suit the building structure such as curved end guides to close off to the floor level.

The curtain shall be prevented from disengaging from the side guides by profile shaped guides and interlocking curtain end locks / drive chain.

The opening operation shall be achieved by winding the curtain onto a horizontal roller barrel located within a Machinery Housing Enclosure at one end of the opening. The closing operation shall be achieved by driving the curtain out of the machinery housing by means of special conveyor chain and sprocket details.

Operation shall be automatically actioned by receipt of a fire alert signal to the shutter control panel.

The Machinery Housing shall be a stand alone fully contained unit that may be part of the fire separation around the floor opening or may be conveniently housed in an adjoining room with an access aperture for the curtain to pass through.

Although a maximum fire resistant period of four hours is the requirement the assembly shall be laboratory type tested for up to 6 hours to ensure degradation of materials under prolonged heat in the horizontal configuration does not take place.

PART 1 – GENERAL REQUIREMENTS
1.1 Supply and Install a horizontal fire roller shutter as manufactured by Bostwick Bo-Shan Shutter Company.

1.2 Optionally, where cast in-situ concrete side walls are not provided by others, supply side frame balustrades to provide supports for the horizontal guides and maintain the specified fire integrity to the floor level.

1.3 Structural opening preparation, surrounding cladding and access panels, electrical supply to isolator adjacent to the motor and the fire alert signal are outside the scope of this section.
PART 2 – PRODUCT SPECIFICATION

2.1 MANUFACTURER

Bostwick Bo-Shan Shutter Company (Hong Kong) or equal approved.

2.2 MATERIALS

2.2.1 CURTAIN

a) The curtain shall be assembled from cold rolled galvanized mild steel lath of nominal 75mm width and ‘high bridge’ (min 19mm) section to minimize deflection, incorporating curved shaped interlocking edge profile to both edges that are proven by fire test to withstand the deformation pressures at high temperatures.

b) Materials shall be hot dip cold rolled galvanized steel of minimum 20swg section that comply with BS 2989 Z2G275M

c) The interlocked lath shall be prevented from sideways movement relative to each other by specially pressed steel end locks attached to each lath and welded to the curtain conveyor chain.

d) The Conveyor chain shall be fitted with roller bearings at 75mm centers that provide a horizontal running support for the curtain and prevent disengagement from the profiled side guides.

e) The curtain shall be finished at the exposed end with a fire retardant mild steel bottom rail.

f) Alternatively Stainless Steel bottom rails may be specified to suit the architectural finishes.

g) The curtain assembly shall be bolt fixed at maximum 900 mm centers to the back of the barrel to ensure minimum stress is carried by the curtain to barrel fixings.

2.2.2 BOTTOM RAIL

a) A bottom rail consisting of a sheet steel strip profiled at one edge to interlock with the curtain and fitted with ‘back to back’ mild steel angles to each face.

b) Grade 316 Stainless steel angle shall be secured to the bottom of the curtain, as single, or back to back cold rolled forming an inverted ‘Tee’ shape, with specially pressed clamps connecting to the bottom tube of the curtain.

c) Angles of 3mm minimum thickness shall be used increasing to 5mm for opening widths above 5000.

2.2.3 BARREL

a) A seam welded (not helically welded) mild steel tube of minimum 200mm diameter and 6mm thickness to support the curtain weight without exceeding a centre deflection of 1/400 of length, shall be used.
b) The tube shall be supported by a dumbbell shaft at each end consisting of discs continuously welded to the shafts and to the inside of the tube at each end, with the rear disc plug welded through the tube for maximum torsional strength.

c) The extended barrel shafts shall have machined and key-wayed diameters to locate accurately in self aligning bearings at each end to take up any barrel deflection and be fitted at one end with machine cut roller chain sprocket.

d) Finish to be de-scaled and prime painted to prevent corrosion

2.2.4 GUIDE RAILS

a) The side guides shall be profiled channels that form an interlock with the curtain conveyor chain at each side to prevent pull out under deflection.

b) Guide material in 3mm minimum thickness heavy duty mild steel fabrication to withstand curtain pull out, in the event of fire.

c) Alternative exterior grade 316 stainless steel may be specified where required by architectural features.

d) The guides shall be attached to the balustrade with 5mm thick fixing cleats providing expansion allowance in the event of fire of 13mm per meter, with individual cleats at a maximum 450 mm centers distance and with at least four 10 mm diameter all steel fixings.

d) It is not recommended that the guides are cast into concrete as maintenance provision for the curtain is impaired.

e) Welding to structural reinforcement or driven in rods is unacceptable and only corrosion resistant, proprietary fixings of known and proven pull out strength shall be used. The bolts shall be minimum 8mm diameter high tensile.

f) The end of the guides shall extend horizontally to the structural face, such that the bottom rail maintains fire integrity with the structure, or shall drop to the floor at the end of the balustrade following a curved guide section of minimum 700 mm radius.

g) The floor, by others, shall be of fire resistant material.

2.2.5 BALLUSTRADE SIDE WALLS

The wide walls supporting the guide rails form the vertical fire integrity from floor level up to the guides and therefore must be constructed of approved materials.

a) A cast in concrete wall may form part of the structure, by other contractors.

b) Similarly a brick or block wall of adequate strength and resistance to fixing pull out may be provided by other contractors.

c) A steel frame construction of substantial, minimum 100mm x 50mm, channel sections may be fabricated and provided with sheeting to both faces as approved by the fire assessment for the shutter. This may be specified with or without a heat insulating infill, such as Rockwool, depending on the building department requirements for the shutter location.
2.2.6 MACHINERY HOUSING
   a) A housing, fabricated from structural ‘C’ channel sections of minimum 100 x 50mm and covered with galvanized sheet metal shall be provided to protect the mechanism and provide both structural strength and Fire resistant Integrity.
   b) Any face of the housing, exposed to a fire from below, shall have an inner lining of 50mm thick Rockwool insulating material.
   c) The ends of the roller barrel shall be located onto the framework supports into self aligning bearings, with locking grub screws to prevent sideways movement.
   d) The drive shaft, for closing the curtain, shall be a solid 25mm diameter mild steel shaft keyway at both ends to locate the conveyor chain drive sprocket and included a split connection to provide exact angular alignment of both side sprockets and compensate where necessary for torsional misalignment.
   e) The drive mechanism, motor, clutch, sprockets and drive chains shall be located as near as possible together and have easy access from one end of the housing and the rear or underside for convenient maintenance and necessary adjustment.
   f) The housing shall be provided with jacking bolts at each corner to enable exact alignment of the curtain and guides.
   g) Framework shall be of bolt together fabrication. Welding, of unpredictable strength and quality, shall not be permitted.
   h) A 1mm galvanized steel sheet shall be screw fixed to the frame to protect the mechanism. Any subsequent architectural shop fitting covers shall not prevent maintenance access or be permanently fixed to the housing without consulting with BBSS.

2.2.7 OPERATION
   a) Electrically driven motor operation is provided with a continuously rated motor of suitable horse power to move the curtain at a speed of between 100mm to 150mm per second.
   b) Only machine cut drive sprockets, gears and chain shall be used to provide smooth operation.
   c) A standard 380 volt three phase motor shall be provided depending on horse power required, running at 50 cycles (hertz) (Alternative special power supplies can be accommodated on request)
   d) The motor shall be provided with hand crank facility at the rear of the motor so that the curtain can be extended out or withdrawn, as an emergency over ride, in the event that electrical supply is unavailable.
   e) A Motor control panel shall be built into the machinery housing for maintenance access only and shall provide two key lockable Push button operation of outward, inward and stop buttons.
   f) The motor shall be provided with travel limits to cut out the drive at each end of the travel. Additionally positive contact limit switches will be provided on the curtain travel.
Note – It is recommended that the site electrical wiring is designed to stop the operation of escalators, from carrying people into the path of the shutter, whilst the shutter is in the closing cycle. This can be provisioned via the fire alarm signal, but safety in use during maintenance should also be considered. Fire shutters are not provided with safety bottom edges or photo electric beams that could malfunction and prevent a fire shutter from closing automatically. The motor shall therefore be supplied with a torque limiter / slipping clutch to prevent excessive force and damage in the event of an obstruction to the curtain movement.

Motor burn out shall be prevented by a thermal overload trip cut out switch inbuilt in the motor winding.

**g)** An automatic closing signal dry contact shall be provided within the control panel for the connection of the fire alert signal. (By other contractors) wired to give dead man control i.e. continuous pressure on the button to maintain shutter movement. Operation shall therefore always be under the direct control of the operator for safety in use.

**h)** For further safety in use by the operator only low voltage 24 volt supply circuit, independent of the main supply voltage, shall be permitted to the control buttons.

### 2.2.8 OPTIONAL FEATURES

a) Remote Controls

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