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| Datasheet | Bullet Resistant Door | date | 07/07/2021 |
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BULLET RESISTANT DOOR

NAAMM HMMA 810/820/862 © SECTION 08 34 02



**Design • Development • Manufacturing • Assembling • Validation Shipping •
Installation • Qualification**
by SOPHIA HIGH TECH

DESCRIPTION AND TECHNICAL CHARACTERISTICS



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|--------------------------|---|
| ITEM | <u>Bullet Resistant Door</u> |
| Total Dimensions | 2300 mm height and 1100 mm large |
| Partial Dimensions | 925 mm large x 2150 mm height |
| Type | Single Hinged Door on Structural frame |
| Total Weight | 350 Kg |
| Actuation System | <ul style="list-style-type: none"> ▪ The door is actuated manually ▪ The locking system is manually operated |
| Features | Door designed and manufactured acc. to: <ul style="list-style-type: none"> ▪ AAMM HMMA 810/820/862 ▪ SECTION 08 34 02 - BULLET-RESISTANT COMPONENTS ▪ Corrosion resistance ▪ Relative humidity: 30% - 80% ▪ Sealing: not included ▪ Door Code/ Serial Number Marking ▪ Warranty Period: 24 months ▪ Bullet Resistance: verified by FEM Analysis |
| Engineering | <ul style="list-style-type: none"> ▪ CAD Design and Digital Mock Up of the structure ▪ Static Analysis certified by FEM software: Leaves, Frame |
| Procurement | EN 10204 type 3.1 Material Certification |
| Manufacturing & Shipping | <ul style="list-style-type: none"> ▪ Manufacturing of Part and Assembly according to drawings approved by the Client; ▪ Internal and external inspections and tests required to ensure the quality of the products and the certification needed; ▪ Packaging - ITEMS in ExWorks mode (Incoterms2020) |

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|---------------------|--|
| Documentation | <ul style="list-style-type: none"> ▪ CE certification ▪ Use and Maintenance Manual ▪ Numerical Validation Report |
| Output File | <ul style="list-style-type: none"> ▪ Technical Dossier: <ul style="list-style-type: none"> ○ Material quality certifications ○ Accessories quality certifications ▪ 3D model (*.STP) ▪ 2D Drawing (*.PDF) ▪ Digital Mock Up file (i.e. *.Avi and *.mpeg) ▪ Technical Reports (Hand calculations and FEA) |
| Quality Requirement | <ul style="list-style-type: none"> ▪ Quality Management System EN 9100:2009; ▪ Welding Quality Requirements ISO 3834; ▪ Welding Procedure Qualification Record ISO 15614; ▪ Welders with approved test certificated in accordance with EN ISO 9606-1:2013 ▪ NDC Operators qualified at the level 2 according to EN ISO 9712:2012 |

| FRAME | |
|-------------------------------|---|
| Material | Structure made of low carbon steel according to the requirements (preliminary) |
| Surface Treatment & Finishing | <ul style="list-style-type: none"> ▪ Sandblasting grade SA 2,5 ▪ Epoxi-polyamide two-component layer (i.e. Intergard 475HS) thickness layer 50:75µm |
| Fixing Type | <ul style="list-style-type: none"> ▪ Bolted on building wall ▪ Sections welding according to: ISO 3834; EN ISO 9606-1:2013; EN ISO 9712:2012 |

| DOOR | |
|-------------------------------|---|
| Material | <ul style="list-style-type: none"> ▪ Steel (Type according to the requirements) |
| Weight | 350 Kg |
| Surface Treatment & Finishing | <ul style="list-style-type: none"> ▪ Double layer of protective paint (RAL as needed); min thickness 50:75µm |
| Fixing Type | <ul style="list-style-type: none"> ▪ Hinged |

1. GENERAL INFORMATION OF BULLET RESISTANT DOOR

Objects of the supply is the design, development, manufacturing, assembly, validation of the Bullet Resistant Doors. Below, the image of the ITEM supply

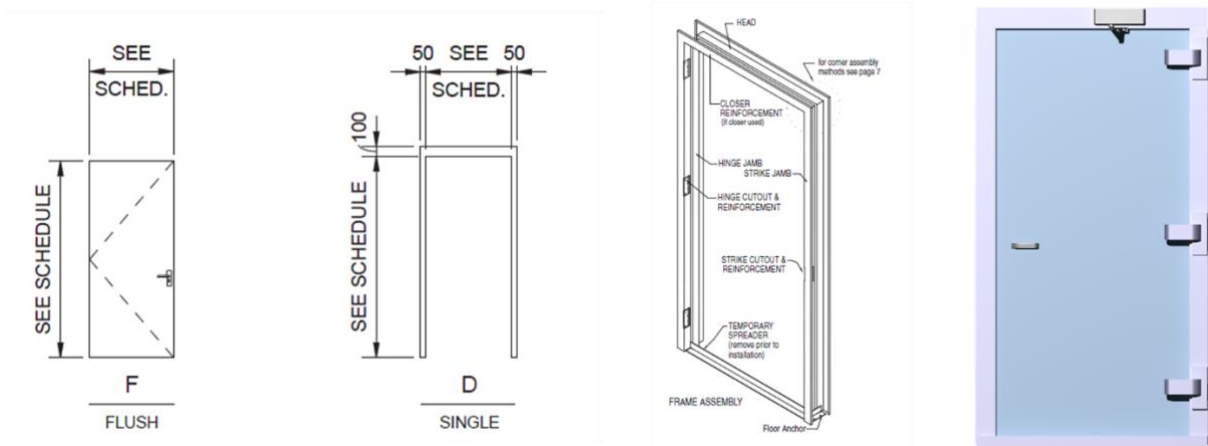


Figure 1 Bullet Resistant Door - Design

The Doors are designed custom by the Engineering Team of SÒPHIA and manufactured, according to the following Standards rules:

- AAMM HMMA 810, NAAMM HMMA 820, NAAMM HMMA 862
- SECTION 08 34 02 - BULLET-RESISTANT COMPONENTS.

2. MANAGEMENT

SÒPHIA shall prepare and keep updated the master planning of supply. After the KoM (Kick off Meeting), the planning will be processed with the Contractor to allow a full control of supply WPs. Furtherly, the master planning shall be monthly reviewed by the Project Manager of SÒPHI, who will issue a synthetic progress report.

In the management activities (WP1) are provided the main documents process control and product quality related, including the FEM specification. After the KoM the mechanical design will be started.

The Design Lead will provide:

- The first revision of assembly drawings, installation drawings and the datasheet of auxiliary components;
- The first revision of detailed drawings and structural inspections reports;
- The first revision of the provision in the field of instrumentation;
- Reports of structural Analysis;

After the design approval, received by the Customer, SÒPHIA will purchase raw materials and standard parts, provided by BOM and Drawing set. Meanwhile the Production Manager will compile the working cycles for the production of the items. The following step provide the production of the doors. Manufacturing phase implies monitoring and testing of quality as specified by the Quality Manager.

Before the delivery, the Design department will provide the installation procedures and all files necessary to complete the final assembly. Preparation of operation and maintenance manual are provided before ITEM delivery.

3. DESIGN PHASE

The first phase of the project consists in designing the door with all its sub-components. A first attempt CAD design, using data from SÒPHIA experience and Standards Rules, is performed. 3D model will be verified in further steps, but through the first attempt design the parts needed to accomplish the functional requirements are designed.



Figure 2 Bullet Resistant Door - designed by SÒPHIA HIGH TECH

Door is made of the following main components:

- **DOOR FRAME STRUCTURE**, realized in STEEL material tuned on the requested technical requirements. They are mainly composed by profiles directly bolted on the wall armor.

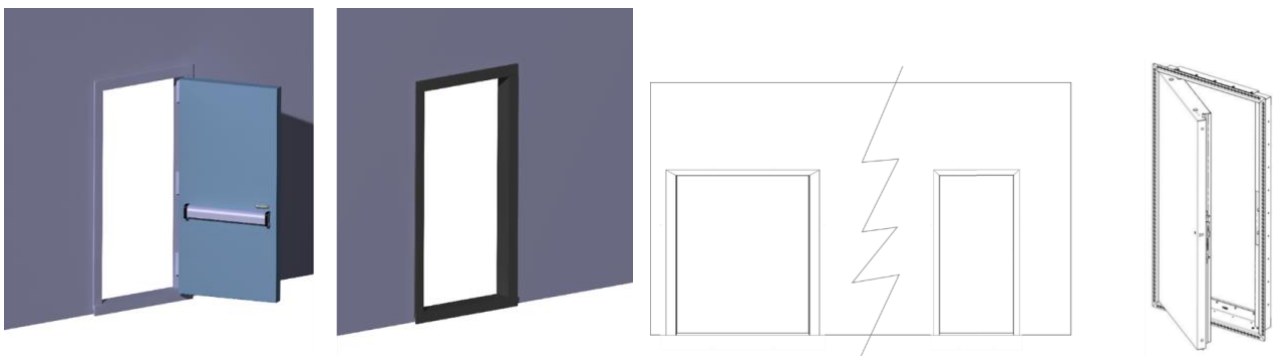


Figure 3 Frame structure - by SÒPHIA HIGH TECH

- **HINGES**, sized on the door weight, in order to permit the manual handling of the door and according to SECTION 08 34 02 - BULLET-RESISTANT COMPONENTS. Material: SS316



Figure 4 - High Load Hinge

- **CYLINDER LOCK:** Each door is equipped with High Security Cylinder Block



Figure 5 - Cylinder Lock

- **LEVER HANDLE:** Each door is equipped with Fire Resistance Lever Handle.



Figure 6 - Lever Handle

- **KINEMATIC/DYNAMIC SIZING OF THE STRUCTURE:** Output of the kinematic design is the type and number of the connections between door and frame. In order to evaluate the correct number and type of hinges, the correct weight of the door is needed.
- **STATIC AND DYNAMIC ANALYSIS OF THE METAL FRAMEWORK:** After the definition of all the components, the behaviour of the structure under the working load is verified through numerical FE analysis. The analysis performed are two types:
 - Static Gravitational Analysis in order to verify the correct structural sizing of sliding beam, trolley connection lugs and to select the correct trolley components.
 - Kinematics Analysis, in order to verify the kinematics during the operational phase.

Static analysis, in the FEM environment, verifies the integrity of the door and the distribution of stress/displacements when the structures is under the working load.

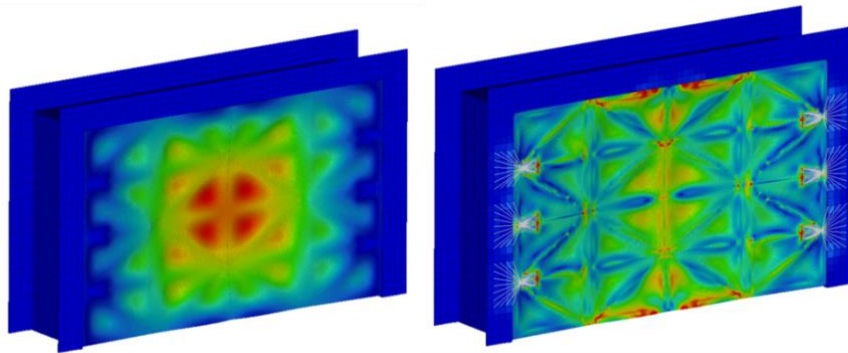


Figure 7 Von Mises stress distribution on Door hinged, performed by SÒPHIA HIGH TECH

Bullet numerical simulation are realized according to ASTM F2927 with the pressure and time peak required.

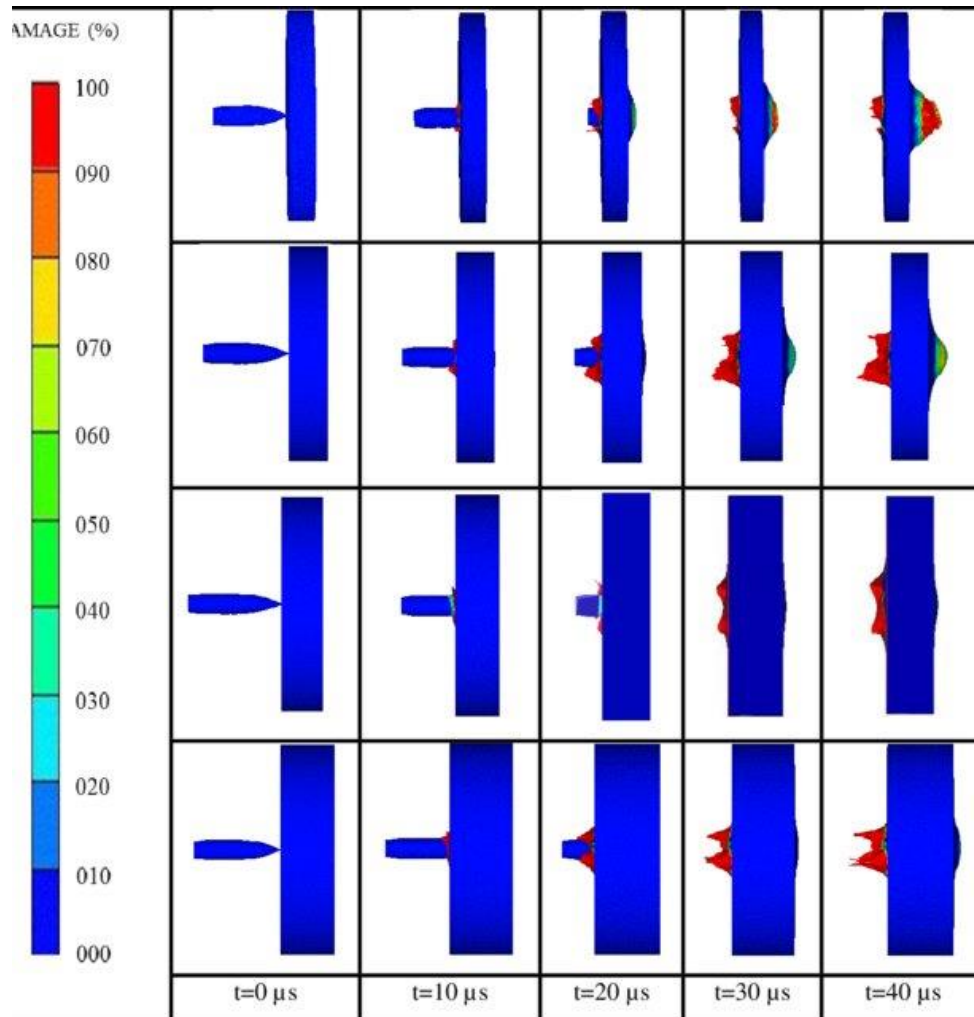


Figure 8 Von Mises stress distribution on Door, during a dynamic bullet analysis performed by SÒPHIA HIGH TECH

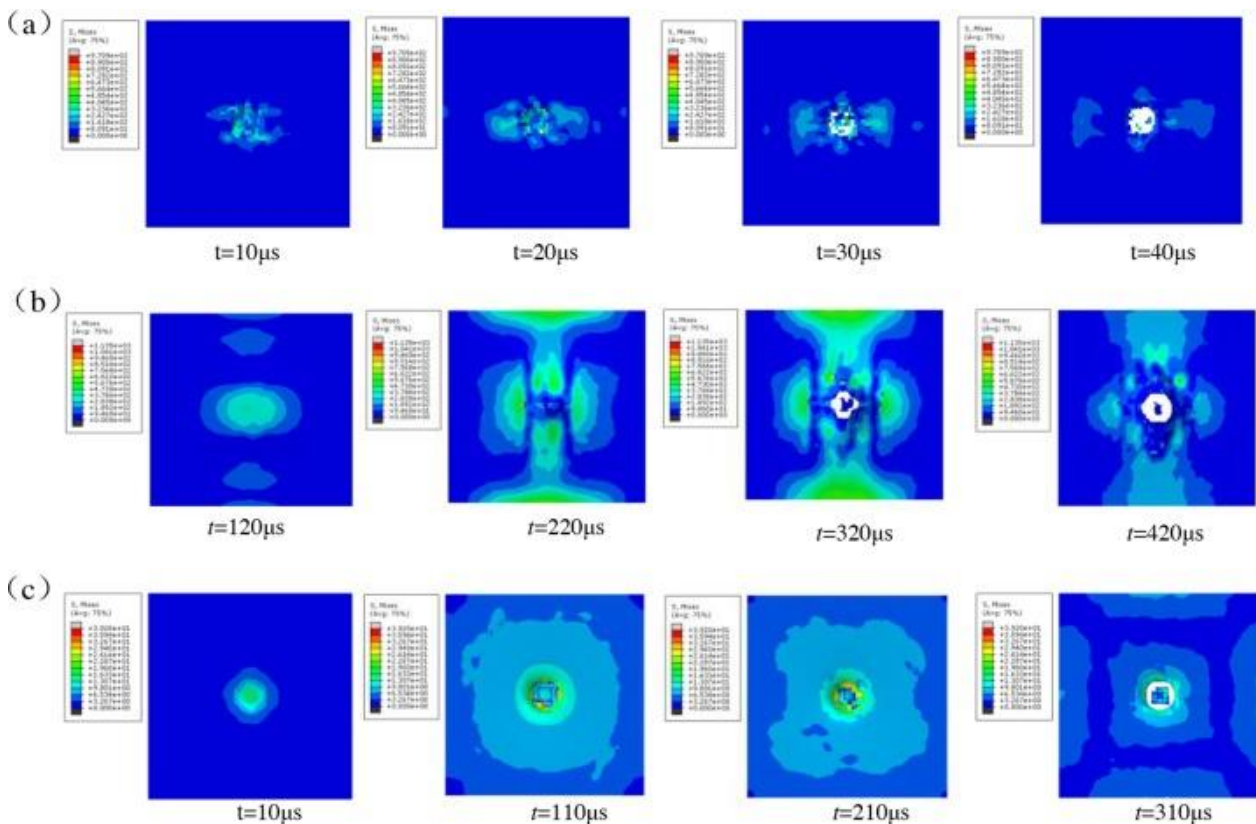


Figure 9 - Displacement Distribution during Bullet Analysis

The FEM analyses will be performed using following software:

- MSC Software PATRAN (pre-processing and post-processing)
- MSC Software NASTRAN/MARC (static/dynamic processing)
- LS-DYNA (dynamic processing)

Use and Maintenance Manual is an instructional book, supplied with all technologically advanced consumer products such as vehicles, home appliances and computer peripherals. Information contained in this manual includes:

- Safety instructions; for liability reasons these can be extensive, often including warnings against performing operations that are ill-advised for product longevity or overall user safety reasons.
- Setup instructions; for devices that keep track of time or which maintain user accessible state.
- Instructions for use.
- Maintenance instructions.
- Troubleshooting instructions; for when the product does not work as expected.
- Service locations; for when the product requires repair by a factory authorized technician.
- Regulatory code compliance information; for example, with respect to safety or electromagnetic interference.
- Product technical specifications.
- Warranty information.

4. MANUFACTURING AND SHIPPING

In this WP, SÒPHIA performs the construction of details and assembly parts according to:

- Assembly drawing approved by the Client;
- Production cycle drawn by Production Manager;

- Planning of supply.

Mechanical machining and surface treatments will be carried out in accordance with the technical specifications.

In the manufactory WP it will be built the necessary number of doors for the delivery to the Clients.

The manufacturing Process is transferred to the mechanical construction area and then to the mechanical workshop area. The mechanical construction area uses specialized workers that, starting from the geometrical information concerning the parts to be made, process the optimal sequence of operations that must be performed by metal machining. The sequence is then translated into a series of instructions that are transmitted and used by machines for the automatic production of the piece.

The Workshop area is equipped with a room with instrumentations and precision equipment which ensure the compliance of the product during the production process.

The company employs the following skilled workers:

- crimping machines operator,
- pre-testing and testing benches operator,
- pallet assembly operator,
- welding and prototyping operator with International Welding Institute and TUV Qualification.

After the Client approval of the documentation, SÒPHIA will send the packaging and delivery it to the site including all constituent parts of supply in ExWorks mode (Incoterms2020). Shipping and Installation are not included.

5. CHECKS, INSPECTIONS AND TESTS

SÒPHIA performs all inspections and tests required to ensure the quality of the products and the qualification needed.

In particular, the following checks are performed:

- visual inspection and dimensional checks;
- testing of materials and treatments used;

checks on welds;

The Quality Manager writes the "Test specifications" documents, which will be submitted to the Customer.

6. DOCUMENTATION

SÒPHIA Project Manager, in course of execution, will create and manage all specified documentation.

At the end of the activities SÒPHIA shall collect in a "Dossier of End Manufacturing" all the documents produced in the course of the activities:

- Test reports;
- Installation drawings;
- Material quality report;
- Use and Maintenance Instructions.
- Use and Maintenance Manual

7. PLANNING

The activities will begin downstream of the KoM (Kick of Meeting), at the Customer's or the operational headquarters of Sòphia. The KoM aims to verify the delivery times requested by the Customer, the exhaustiveness of the information provided and to highlight any technical problems. Downstream of the KoM will begin the design activities. After the design, the constructive drawings will be submitted to the Customer, the approval will be obtained, the necessary raw materials will be procured. After the manufacturing, the QCP (Quality Control Plan) will be sent to the Customer for approval, after this phase the door frame will be sent first and then the different sub-sections of the door that will be assembled on site. On-site intervention will be agreed with the Customer. The activity without installation will be performed, for single Door, in 10-12 CWs after the Purchase Order.

8. PROGRESS MEETING

During the working activities are convened updating / monitoring meetings at the Customer or Sòphia offices, or by using call conference.

9. SOFTWAREs

For the carrying out of the activities the following CAD / CAE software are used:

- MSC PATRAN, NASTRAN, ADAMS and LS-DYNA for FEM Analysis
- CATIA V5 for CAD Design activities and for Kinematic DMU analysis, maintainability and assistance
- 3D VIA COMPOSER for video realization of operation, assembly and disassembly, and for realization Use and Maintenance Manual
- Microsoft EXCEL, WORD and POWER POINT: for release reports, presentations and spreadsheets used during the analysis.

10. INPUT OF THE ACTIVITIES

All the files transmitted will be the exclusive property of the Customer and no use will be made of them outside the scope of the Activities covered by this Technical Annex.

The activities described in this attachment will begin with the Client's delivery of all the architectural details (actual size of the windows, thickness of the walls, etc). It will also be necessary to provide all the information necessary for the installation of the fixtures on the construction site.

11. TERMS OF WARRANTY

The foregoing Limited Warranty is conditioned upon User's compliance of the User and Maintenance Manual and used under normal conditions. As provided herein, the product is warranted to be free of defects in material and workmanship for a period of Two (2) Years from the date of the functional test.

Items Not Covered By Warranty

This warranty does not cover damage or defect caused by misuse, improper application, wrong or inadequate electrical current or connection, negligence, inappropriate on site operating conditions, repair by non-authorized personnel, accident in transit, tampering, alterations, a change in location or operating use, exposure to the elements, water, or other corrosive liquids or gases, theft. only in this case (extraordinary maintenance), warranty does not cover shipping costs, installation costs, labor costs or transportation charges. Repair or replacement of a defective product or part thereof does not extend the original warranty period.

12. QUALITY AND SAFETY REQUIREMENTS

All activities will be carried out according to the procedures described in the quality manual MQ0 of SÒPHIA HIGH TECH QMS (Quality Management System), certified by EN 9100:2009 (Aerospace Quality Management).