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SHIPBORNE HELICOPTER AND UAV HARPOON-GRID RAPID SECURING SYSTEM

Edition A Version 1

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NORTH ATLANTIC TREATY ORGANIZATION

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25 June 2014

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4. This publication shall be handled in accordance with C-M(2002)60.

Dr. Cihangir Aksit, TUR Civ
Director, NATO Standardization Agency

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TABLE OF CONTENTS

1. AIM

This NATO Standard is to enhance the safety of interoperations between Helicopter or UAV-VTOL (Unmanned Aerial Vehicles - Vertical Take off & Landing) and ships using the Harpoon-Grid Rapid Securing System, and to prevent the unnecessary development of future systems, which would not be interoperable with the existing Harpoon-Grid Rapid Securing Systems.

2. SCOPE

The present standard is designed in order to allow cross deck operation between Helicopters and Ships from different nations. Therefore it provides guidance for honeycomb design.

Its primarily intention is not to specify a grid for ship construction. Therefore parameters such as grid shape, dimensions and mechanical characteristics are to be described precisely by each nation when ordering grid construction and then send their national data for publication within the MPP-02.

3. DEFINITION/DESCRIPTION HARPOON-GRID RAPID SECURING SYSTEM

3.1. HARPOON-GRID RAPID SECURING SYSTEM

A system aimed at securing a VTOL aircraft (Helicopter or UAV) to the flight deck immediately after touchdown and before take-off by the engagement and lock of the helicopter harpoon onto a grid set in the flight deck (see Picture 6.1).

3.2. HARPOON

A device automatically activated or remotely operated by action on engagement/disengagement switches.

3.2.a. On the engagement mode, the harpoon jack telescopically extends vertically under the fuselage until its lower jaw engages into one of the grid holes. A prehension device is then closed and locked onto the grid, and the jack retracts to ensure the necessary securing tension.

3.2.b. On the disengagement mode, the prehension device unlocks from the grid and telescopically retracts under the fuselage.

3.3. HONEYCOMB GRID

A stainless steel grid machined to honeycomb display of calibrated holes, normally flush with the flight deck. The thick circular top plate is machined to form an omnidirectional network of isthmus on which the harpoon claws can secure.

The grid characteristics are conceived to optimise the instant engagement of the harpoon jaw and the securing of the prehension device.

4. GENERAL MANDATORY CHARACTERISTICS

4.1. HARPOON CHARACTERISTICS

The helicopter or UAV harpoon shall:

a. engage and disengage on an isthmus as defined in figure 6.3, with a 80 mm clearance height under the grid (see figure 6.4);

b. have the mechanical and metallurgic characteristics compatible with the grid ones

specified in paragraph 5;

c. have a built-in mechanical fuse that will break when reaching the tension specified in paragraph 5;

d. enable the engagement of the jaw regardless of the longitudinal helicopter axis.

4.2. HONEYCOMB DETAILED DIMENSIONS

The following dimensions refer to the figure 6.3:

4.2.a	Thickness of Honeycomb top plate	28 + 1,5/- 0,5 mm (1.102" + 0,059/- 0,020)
4.2.b	Extent of Harpoon Engagement	92 mm (3.622")
4.2.c	Honeycomb Hole Diameter	51 mm theoretical (2.008")
4.2.d	Distance in between 2 holes	66 ± 0,5 mm (2.598" ± 0,02)
4.2.e	Isthmus width	15 ± 0,5 mm (0.591" ± 0,02 inch)
4.2.f	Isthmus Height	< 27 mm (1.06")
4.2.g	Height between top plate & lower plate	Not less than 80 mm (3.15")

5. OPTIONAL MECHANICAL CHARACTERISTICS

The honeycomb grid should be at least capable of withstanding constraints in accordance with the heaviest helicopter likely to operate on the deck. Examples are given below:

	Mechanical characteristics	**UAV-VTOL**	**LIGHT HELICOPTER**	**MEDIUM HELICOPTER**
5.a	Harpoon tension without permanent distortion	3 000 daN	4 000 daN	8 500 daN
5.b	Landing gear reaction load	4 000 daN	7 100 daN	21 000 daN
5.c	Ultimate Tensile strength (UTS)	> 900 Mpa	> 900 Mpa	> 1300 Mpa
5.d	Core Rockwell hardness	≥ 28 Hrc	≥ 28 Hrc	> 40 Hrc

6. PICTURES AND FIGURES

6.1. HARPON/GRID SECURING ILLUSTRATION

Example of Harpoon locked into the grid for information only.

PICTURE 1

6.2. EXAMPLE OF LIGHT/MEDIUM HELICOPER GRID GENERAL DISPLAY

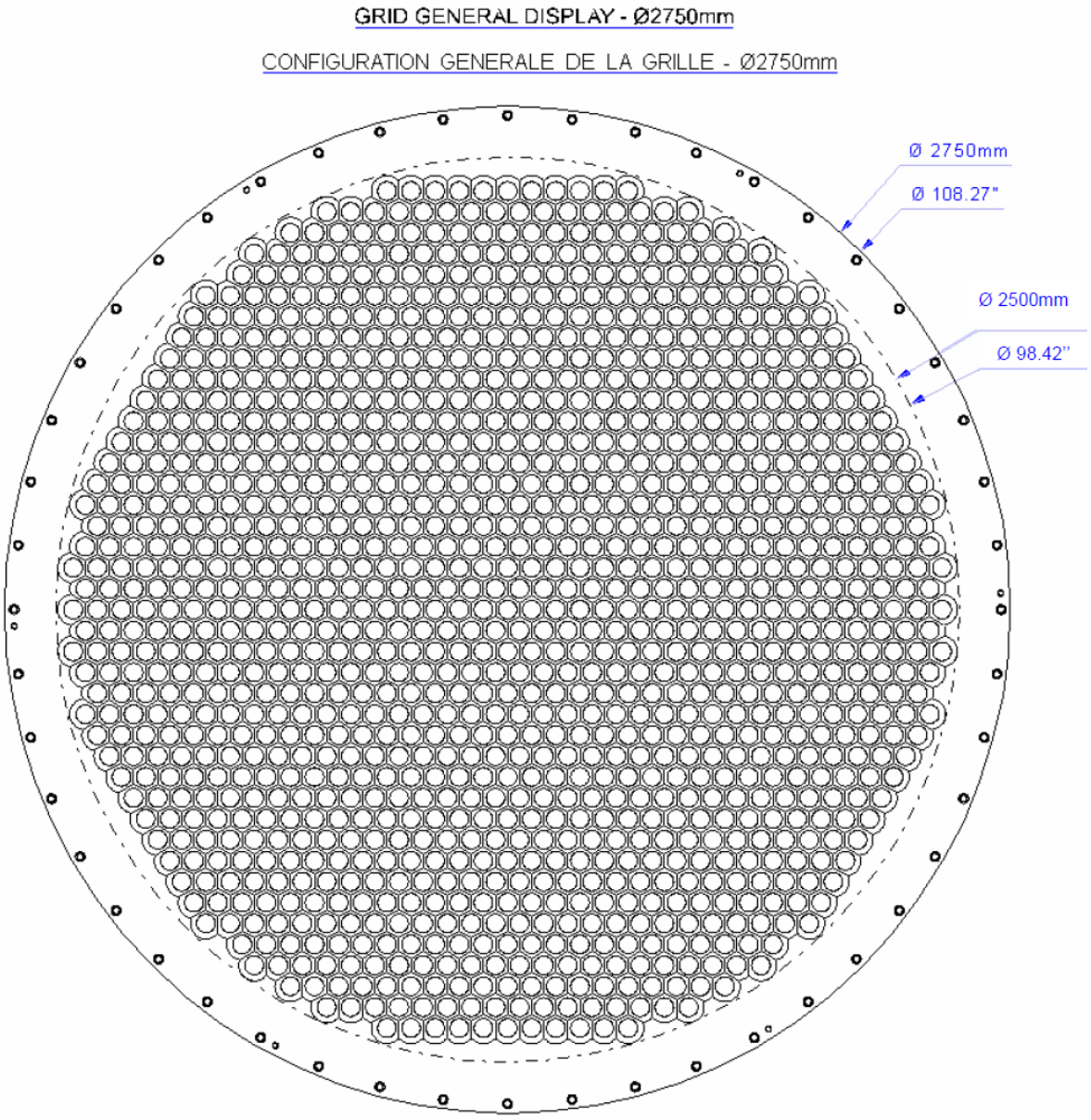

FIGURE 1

6.3. GRID DETAIL DIMENSIONS

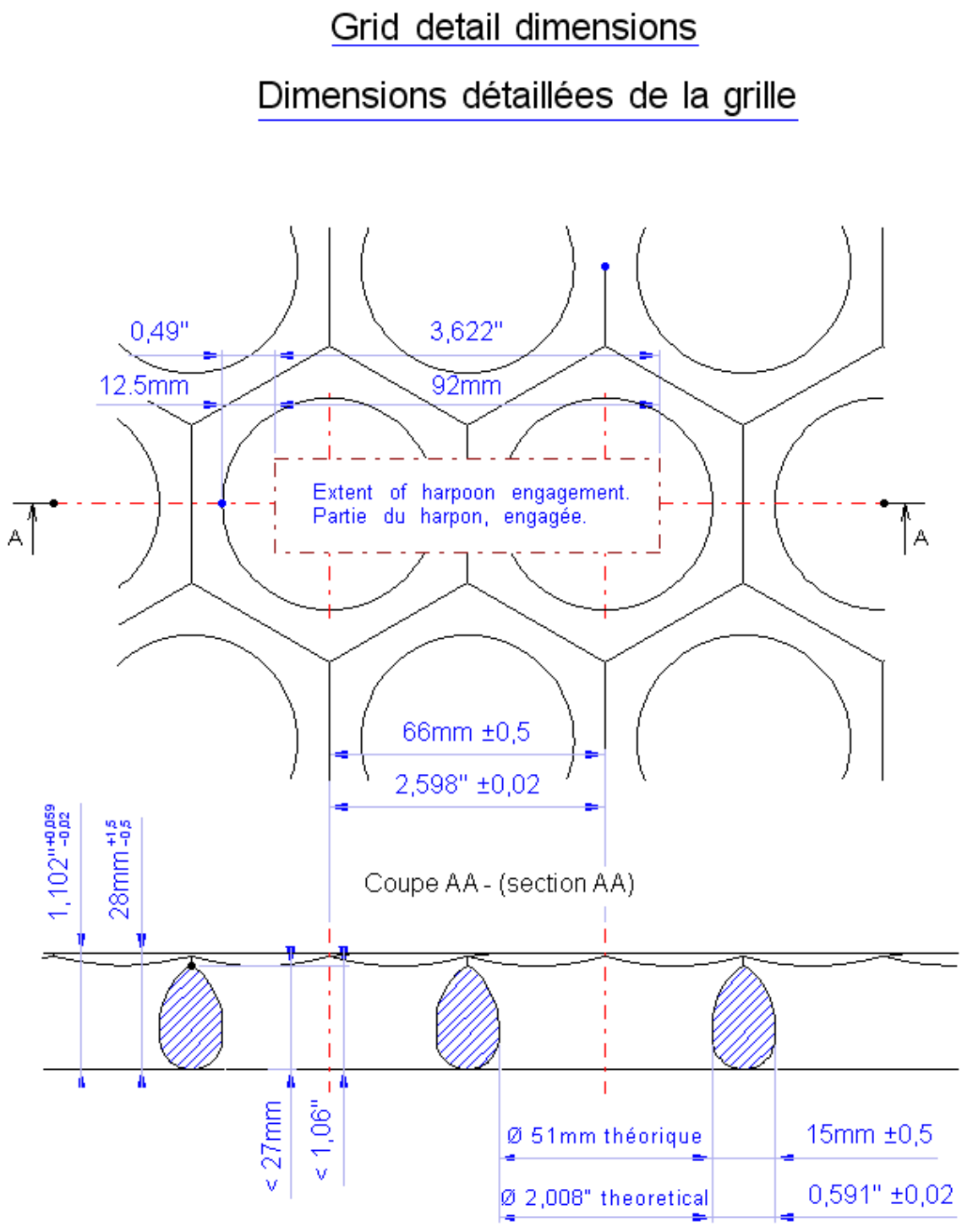

FIGURE 2

6.4. ENLARGEMENT OF THE GRID

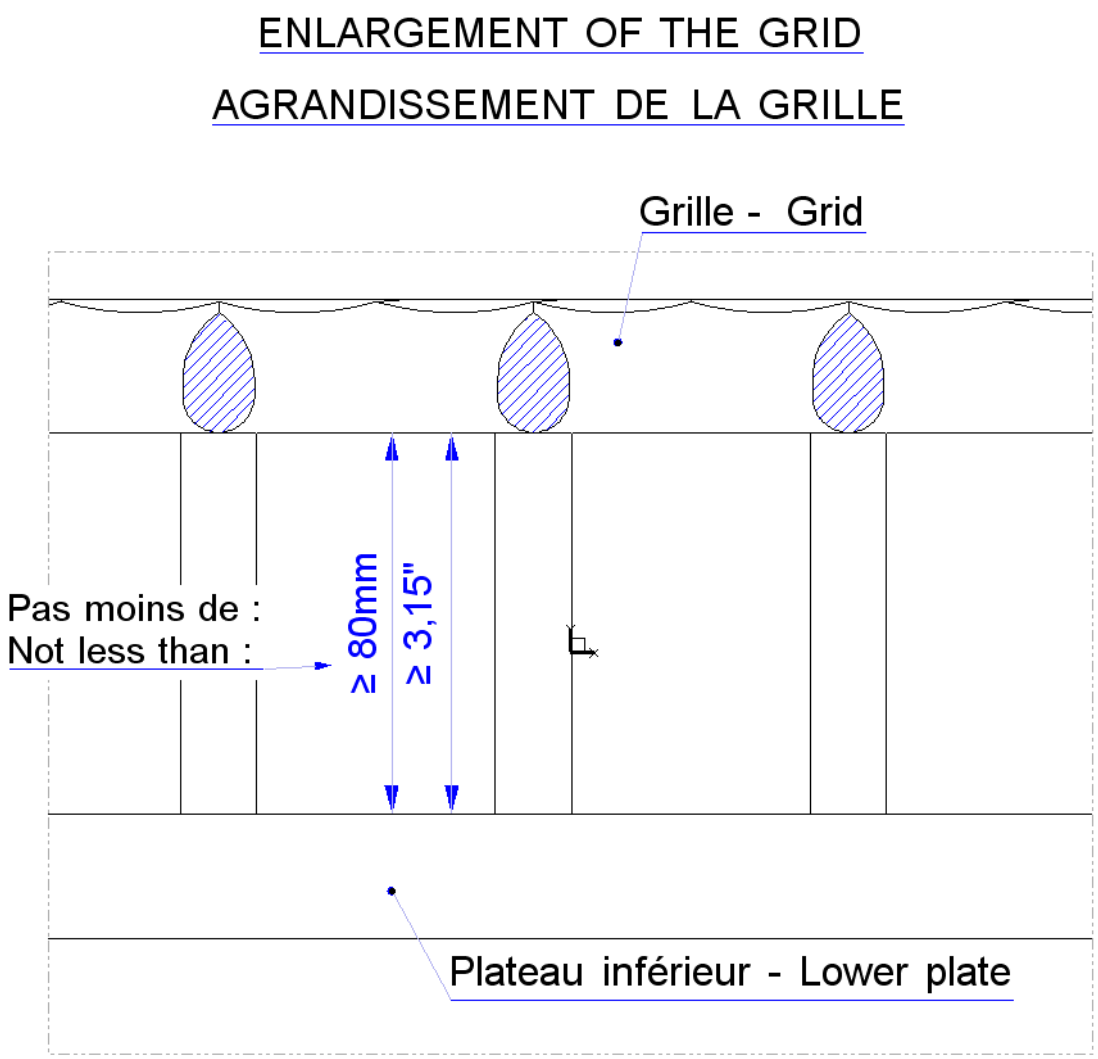

FIGURE 3