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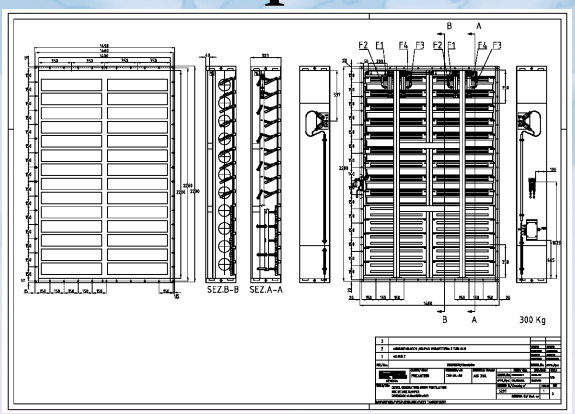
Pecol 2012- SNBC – Low & Medium Pressure

NBC DAMPERS

Antishock, Antimagnetic,
50 ÷ 1.500 mmH2O column Water Tight
New version: up to 6.000 mm H2O



Made in Italy Pneumatic Electrohydraulic COntrols

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PECOL ltd since 1978 designs, builds and installs on board of naval military units, NBC dampers, anti shock, anti magnetic, 50÷1.500 mm H2O water tight. Divided in two types

- **fixed dampers**
- **swivel dampers**

FIXED DAMPERS

The fixed dampers can be housed either inside a ventilation duct, both at its root, in the vicinity of the air intakes, NBC filters , or directly on the superstructure according to the characteristics of radar protection of the ship.

SWIVEL DAMPERS

The swivel dampers are pre-arranged in factory with female clevis, both on left than right side, for installation on a frame welded to the superstructure, through male hinges.

They can rotate either towards the external or to the inner of the ship.

MAIN CHARACTERISTICS

MATERIAL: AISI 316 L, AISI 316, Galvanized Steel
ANTISHOCK: dampers are tested to the Shock machine according to standard NAV-30-A001, ”Rules for the implementation of impact tests on machinery and equipment on board” in accordance with the requirements of shock, category A, grade 3 (A3).

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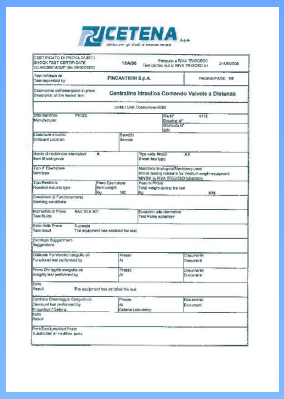
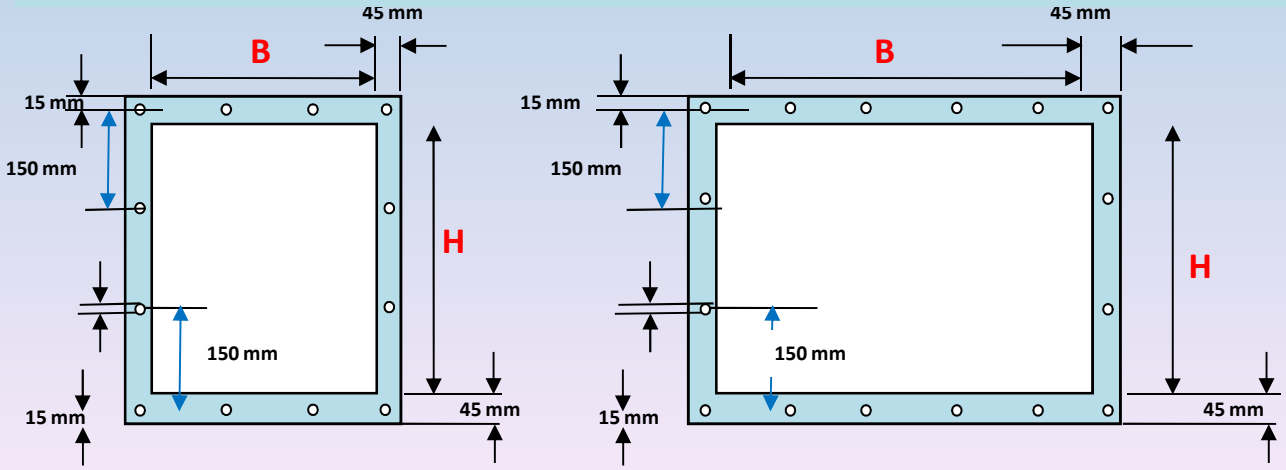


AIR WATER COLUMN: 50 mm H2O as specified by the area of the ship called Citadel
MEDIUM PRESSURE HYDROSTATIC WATER COLUMN:
-Up to 1.000 mm H2O. Pressure test: 1.500 mm H2O, in the event of flooding of the air duct.
-HIGH PRESSURE HYDROSTATIC WATER COLUMN:
- 3.000 mm H2O. Pressure test: 4.500 mm H2O , in the event of flooding of the air duct.
- 6.000 mm H2O. Pressure test 9.000 mm H2O, in the event of flooding of the air duct.
For the above mentioned 3.000 and 6.000 mm H2O, please refer to catalog :

Pecol 2011- SNBC- High Pressure- r00

STANDARD DIMENSIONS – FIXED AND SWIVEL DAMPERS



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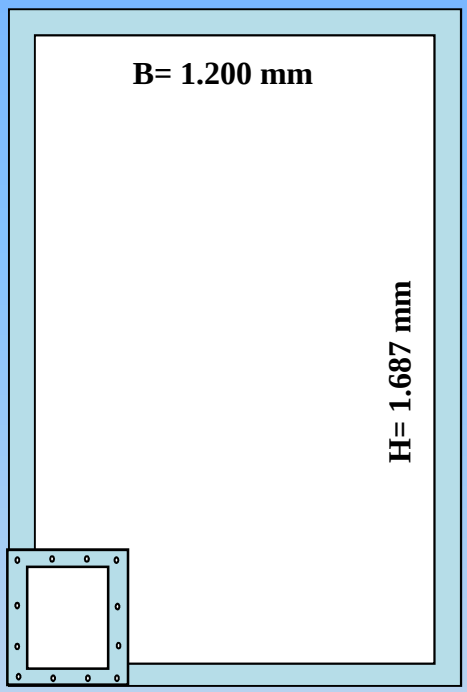
Below is an example of sizing:
The standard width B (mm) of the damper is variable from a minimum of 300 mm to a maximum of 1200 mm.
The standard height H (mm) varies depending on the number of flaps (150 mm height each) from a minimum of 337 mm to a maximum of 1.687 mm
Other sizes are available on request up to a B width of 2.300 mm and to an H height of 2,700 mm, as a single damper with proper precautions, both as a modular damper.

B (mm)	H (mm)	Number of flaps	Number of holes flange	Numero of holes flange
			B	H
300	337	2	4	4
400	487	3	4	5
500	637	4	5	6
600	787	5	6	7
700	937	6	6	8
800	1.087	7	7	9
900	1.237	8	8	10
1.000	1.387	9	8	11
1.100	1.537	10	9	12
1.200	1.687	11	10	13



Note: dimensions for high pressure hydrostatic water column (3,000 to 6,000 mm H2O) see catalog "Pecol 2011 - SNCB-High Pressure-r00"

TECHNICAL CHARACTERISTICS

CLEAR AREA
Data:
B(mm) = nominal width
H(mm) = nominal height
n = number of flaps
A (mq) = nominal Area
The following diagrams allows to calculate:
A1 (mq) = clear area of air passage as a function of the width and of the number of flaps

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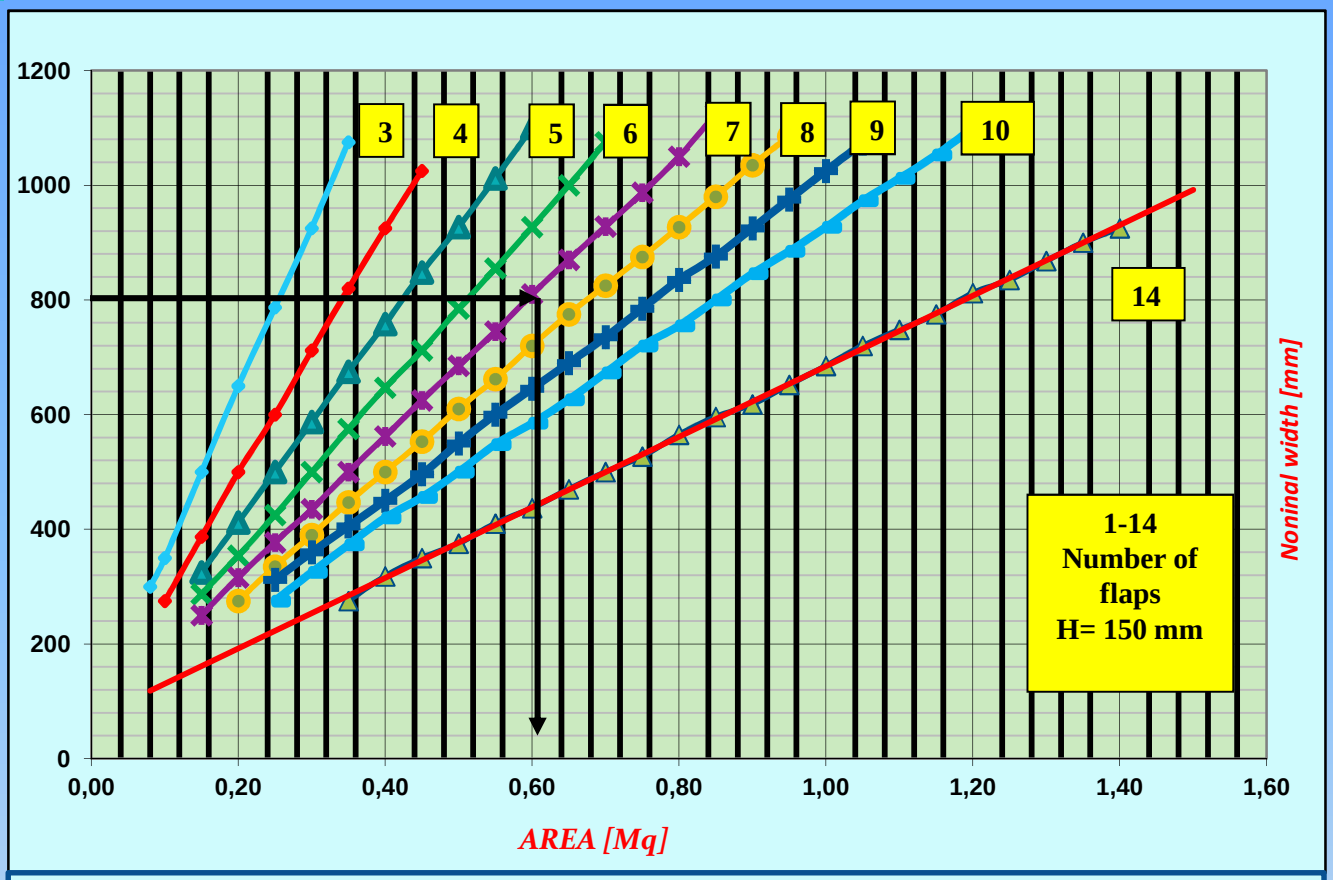

3 flaps x 150 mm (H= 487 mm)

4 flaps x 150 mm (H= 637 mm)

5 flaps x 150 mm (H= 787 mm)

6 flaps x 150 mm (H= 987 mm)

7 flaps x 150 mm (H= 1.087 mm)

8 flaps x 150 mm (H= 1.237 mm)

9 flaps x 150 mm (H= 1.387 mm)

10 flaps x 150 mm (H= 1.537 mm)

11 flaps x 150 mm (H= 1.687 mm)

12 flaps x 150 mm (H= 1.827 mm)

13 flaps x 150 mm (H= 1.927 mm)

14 flaps x 150 mm (H= 2.137 mm)

Example: for a damper with B = 800mm and H = 1.087 mm, 7 flaps and nominal Area = 0,8696 mq. Entering in the ordinate with the value 800, we cross the violet line 7 x 150 mm, and the x-axis at the value A1 = 0, 60 square meters, where:
Nominal A = 0,8696 mq→ Clear A1 = 0,60 mq

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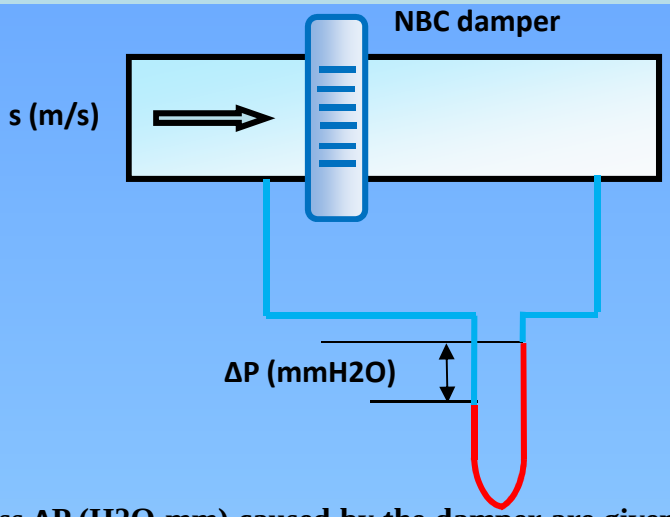
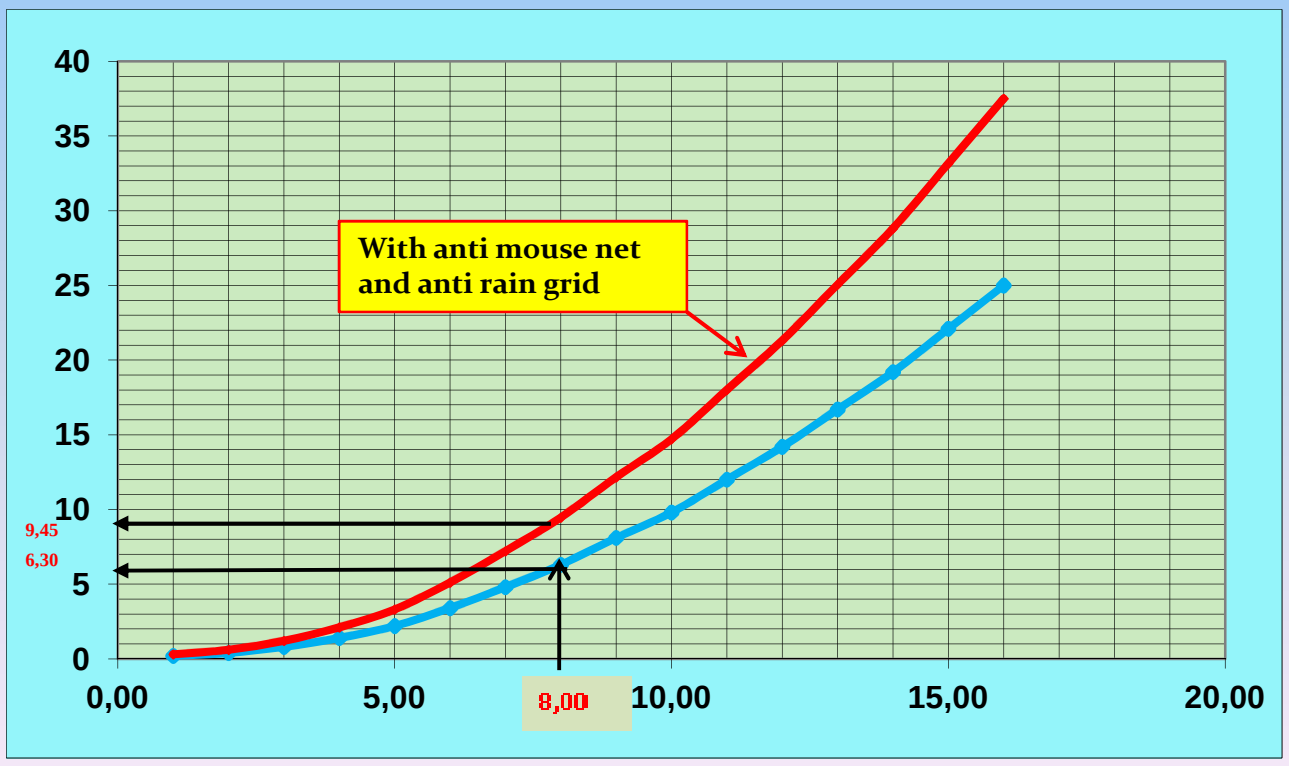
PRESSURE LOSS



The pressure loss ΔP (H2O mm) caused by the damper are given in the attached diagram in which entering in the abscissa with the speed of the air 's' in m/s, we obtain on the ordinate the value of its loss.
Example: for the air speed of 8 m/s the pressure loss is 6,30 mmH2O (Blue line)
If the damper is protected by an anti mouse net or a anti rain grid, the loss of pressure increases of the 50% : 9,45 mmH2O for the air speed of di 8 m/s. (Red line)



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V [m/s]	ΔP [mm H_2O]	ΔP+ 50 % [mm H_2O]
1,0	0,20	0,30
1,1	0,22	0,33
1,2	0,24	0,36
1,3	0,26	0,39
1,4	0,28	0,42
1,5	0,30	0,45
1,6	0,32	0,48
1,7	0,34	0,51
1,8	0,36	0,54
1,9	0,38	0,57
2,0	0,40	0,60
2,1	0,44	0,66
2,2	0,48	0,72
2,3	0,52	0,78
2,4	0,56	0,84
2,5	0,60	0,90
2,6	0,64	0,96
2,7	0,68	1,02
2,8	0,72	1,08
2,9	0,76	1,14
3,0	0,80	1,20
3,1	0,86	1,29
3,2	0,92	1,38
3,3	0,98	1,47
3,4	1,04	1,56
3,5	1,10	1,65
3,6	1,16	1,74
3,7	1,22	1,83
3,8	1,28	1,92
3,9	1,34	2,01
4,0	1,40	2,10
4,1	1,48	2,22
4,2	1,56	2,34
4,3	1,64	2,46
4,4	1,72	2,58
4,5	1,80	2,70
4,6	1,88	2,82
4,7	1,96	2,94
4,8	2,04	3,06
4,9	2,12	3,18

V [m/s]	ΔP [mm H_2O]	ΔP+ 50 % [mm H_2O]
5,0	2,20	3,30
5,1	2,32	3,48
5,2	2,44	3,66
5,3	2,56	3,84
5,4	2,68	4,02
5,5	2,80	4,20
5,6	2,92	4,38
5,7	3,04	4,56
5,8	3,16	4,74
5,9	3,28	4,92
6,0	3,40	5,10
6,1	3,54	5,31
6,2	3,68	5,52
6,3	3,82	5,73
6,4	3,96	5,94
6,5	4,10	6,15
6,6	4,24	6,36
6,7	4,38	6,57
6,8	4,52	6,78
6,9	4,66	6,99
7,0	4,80	7,20
7,1	4,95	7,43
7,2	5,10	7,65
7,3	5,25	7,88
7,4	5,40	8,10
7,5	5,55	8,33
7,6	5,70	8,55
7,7	5,85	8,78
7,8	6,00	9,00
7,9	6,15	9,23
8,0	6,30	9,45
8,1	6,48	9,72
8,2	6,66	9,99
8,3	6,84	10,26
8,4	7,02	10,53
8,5	7,20	10,80
8,6	7,38	11,07
8,7	7,56	11,34
8,8	7,74	11,61
8,9	7,92	11,88

V [m/s]	ΔP [mm H_2O]	ΔP+ 50 % [mm H_2O]
9,0	8,10	12,15
9,1	8,27	12,41
9,2	8,44	12,66
9,3	8,61	12,92
9,4	8,78	13,17
9,5	8,95	13,43
9,6	9,12	13,68
9,7	9,29	13,94
9,8	9,46	14,19
9,9	9,63	14,45
10,0	9,80	14,70
10,1	10,02	15,03
10,2	10,24	15,36
10,3	10,46	15,69
10,4	10,68	16,02
10,5	10,90	16,35
10,6	11,12	16,68
10,7	11,34	17,01
10,8	11,56	17,34
10,9	11,78	17,67
11,0	12,00	18,00
11,1	12,22	18,33
11,2	12,44	18,66
11,3	12,66	18,99
11,4	12,88	19,32
11,5	13,10	19,65
11,6	13,32	19,98
11,7	13,54	20,31
11,8	13,76	20,64
11,9	13,98	20,97
12,0	14,20	21,30
12,1	14,45	21,68
12,2	14,70	22,05
12,3	14,95	22,43
12,4	15,20	22,80
12,5	15,45	23,18
12,6	15,70	23,55
12,7	15,95	23,93
12,8	16,20	24,30
12,9	16,45	24,68

V [m/s]	ΔP [mm H_2O]	ΔP+ 50 % [mm H_2O]
13,0	16,70	25,05
13,1	16,95	25,43
13,2	17,20	25,80
13,3	17,45	26,18
13,4	17,70	26,55
13,5	17,95	26,93
13,6	18,20	27,30
13,7	18,45	27,68
13,8	18,70	28,05
13,9	18,95	28,43
14,0	19,20	28,80
14,1	19,49	29,24
14,2	19,78	29,67
14,3	20,07	30,11
14,4	20,36	30,54
14,5	20,65	30,98
14,6	20,94	31,41
14,7	21,23	31,85
14,8	21,52	32,28
14,9	21,81	32,72
15,0	22,10	33,15
15,1	22,39	33,59
15,2	22,68	34,02
15,3	22,97	34,46
15,4	23,26	34,89
15,5	23,55	35,33
15,6	23,84	35,76
15,7	24,13	36,20
15,8	24,42	36,63
15,9	24,71	37,07
16,0	25,00	37,50

The results are summarized in the table up to 16 m/s

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EQUIPMENT

The dampers can be supplied complete with:
E1: anti mouse net in AISI 316
E2: anti rain grid in AISI 316
E3: anti sand filtering panels
E4:flaps heating system

DRIVE EQUIPMENT

A1: the dampers are pneumo- hydraulic driven by Hydraulic Power Pack and Cylinders


A1: Hydraulic Control Cabinet


A1: Feed back by Limit switches


A1 : D.A. Cylinder

A2: the dampers are electrically driven by a 3 phases Asinchronous electric motors


A2: motorized jacks (recirculating ball)


A2: 3 Phases Asyncronous motor


A2: 9.000 mmH20 W.C. Test

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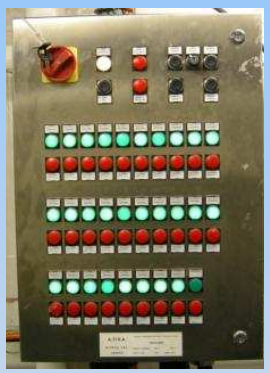
A3 : the dampers are electrically driven by a Step by Step electric motors

A2.: Emergency hand wheel

A2.:8 Newton step by step electrimotor

CONTROL SYSTEMS

The dampers' control system is delegated to dedicated Control Cabinets:
L1: Electromechanic type , hardwired , provided with selector switches, push buttons, lamps and LEDs



L2: Computerized type, linked by serial line (RS 232, RS485, Ethernet), provided with Touch Screens

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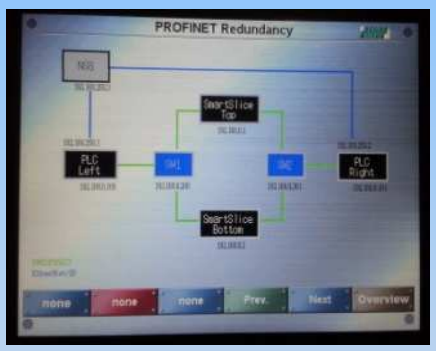
MONITORING SYSTEMS

The position of damper OPEN/CLOSED is displayed :

M1: by lamps or LEDs on the Control Cabinet

M2: by Graphic Page on suitable Touch Screens



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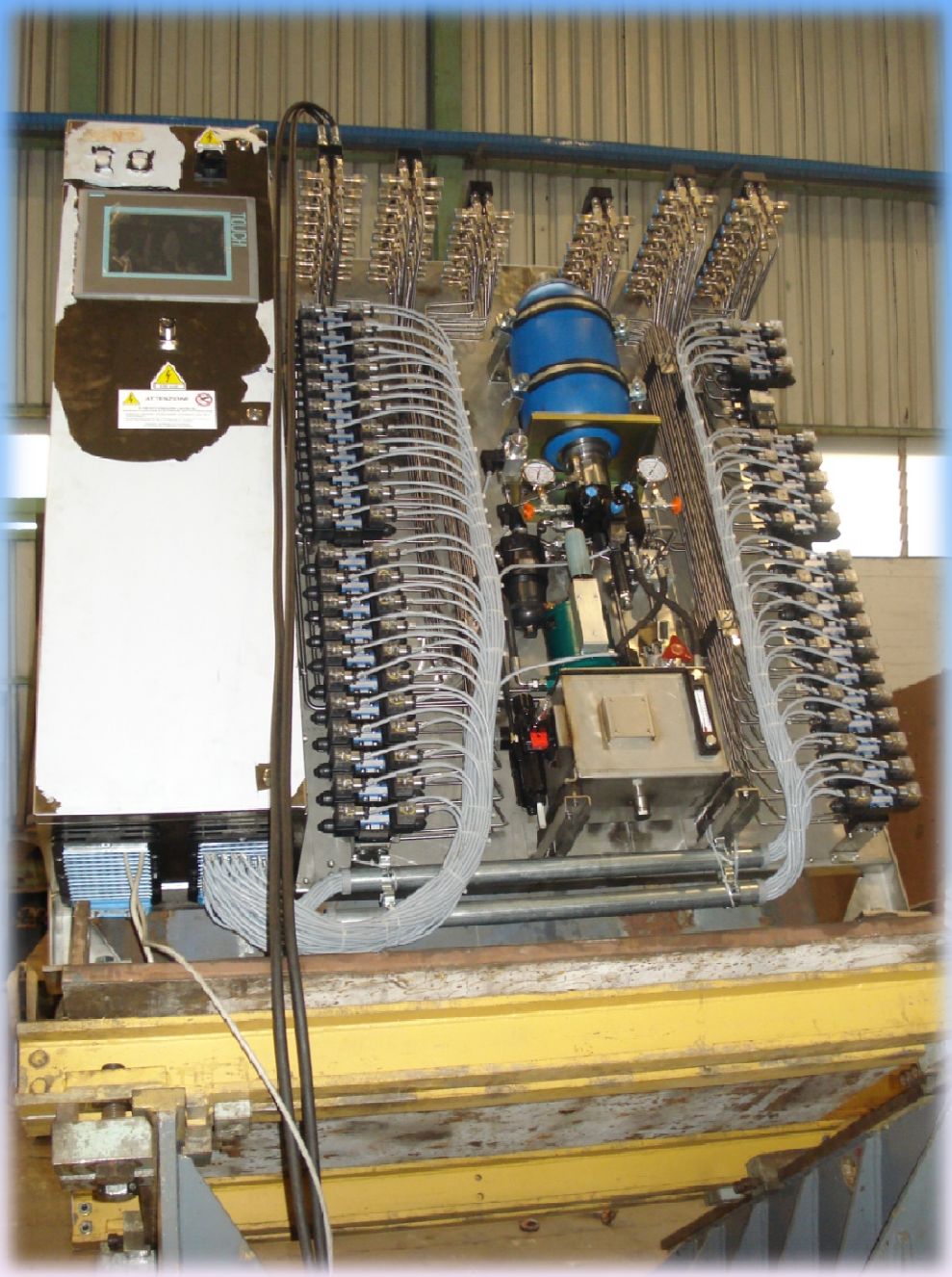
ANTI SHOCK MACHINE

An Hydraulic Contro Cabinet - Computerized type for the FREMM CLASS FRIGATES tested at : 100g Vertical – 75 g Atranswarship – 50g Alongitudinal at the ANTI SHOCK MACHINE.



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CODES FOR INQUIRY

SNBC	FIX/E1	1.000 x 2.137	A1-L1-M1
NBC Damper	Type: FIX= Fixed PIVe= Pivoting outside ship PIVi= Pivoting inside ship E1= with anti mouse net E2= with anti rain grid See Pag. 8/14	Standard Dimension: B x H in mm	Drive & monitoring system See Pag. 8-9-10/14

CODES FOR ORDER

SNBC	PIVi/E21	1.000 x 2.137	A1-L1-M1
NBC damper	Type: FIX= Fixed PIVe= Pivoting outside ship PIVi= Pivoting inside ship E1= with anti mouse net E2= with anti rain grid See Pag. 8/14	Standard dimesion: B x H in mm	Drive & monitoring system See Pag. 8-9-10/14

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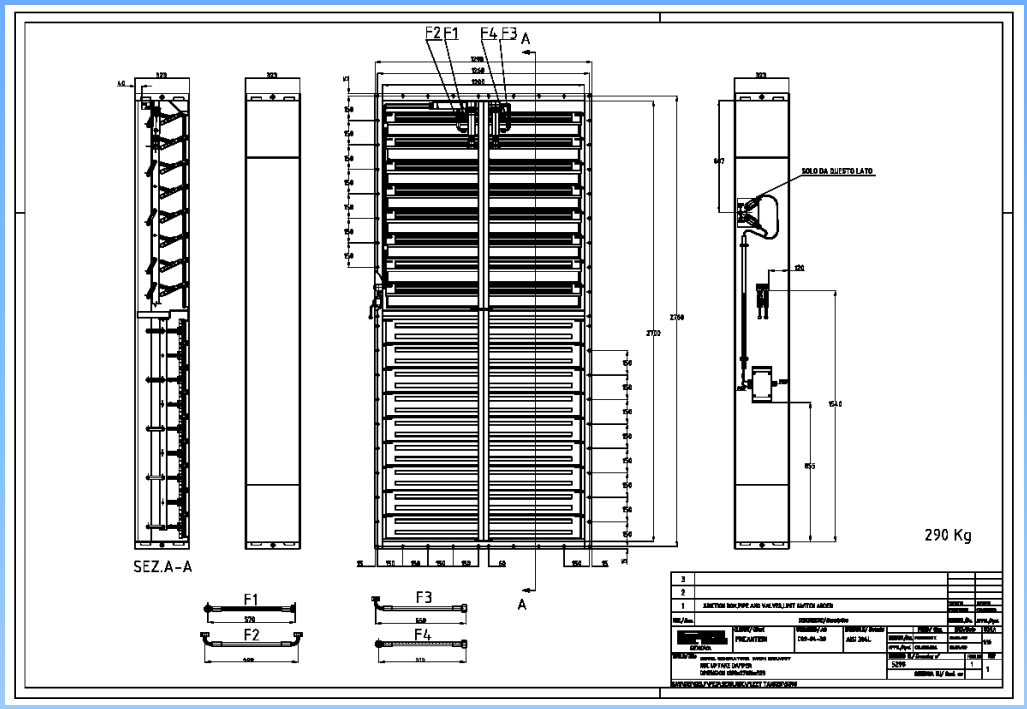
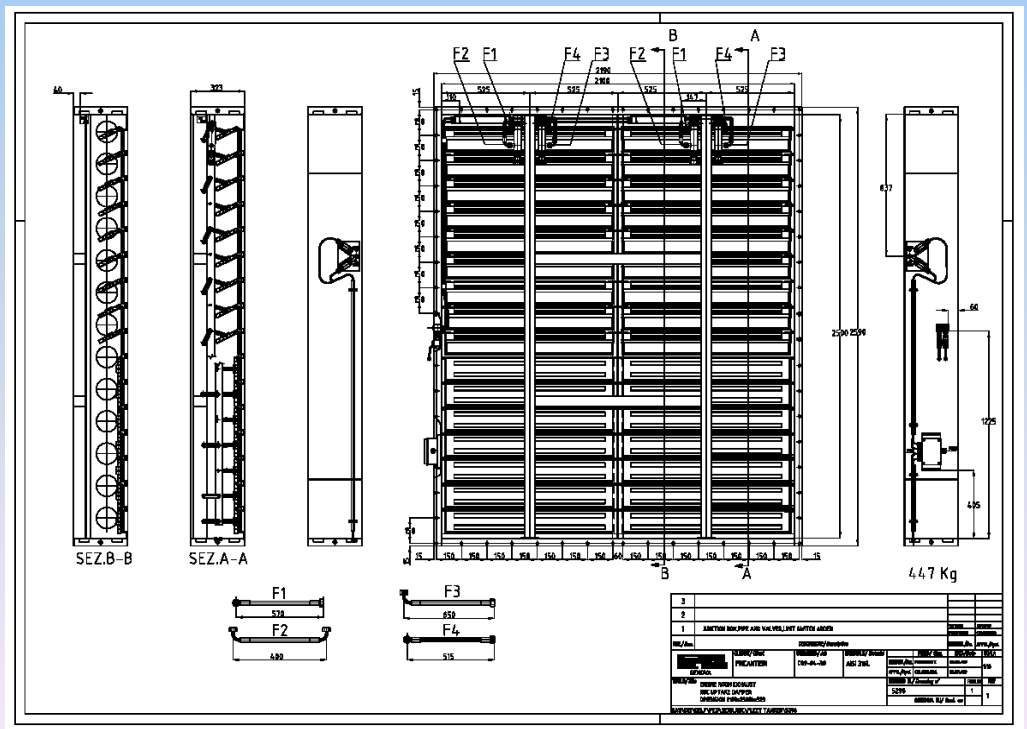
Sample of NBC damper (1.200 x 2.700) mm S-FIX-1.200x2.700- A1



Sample of NBC damper (2.100 x 2.500) mm S-FIX-2.100x2.500- A1



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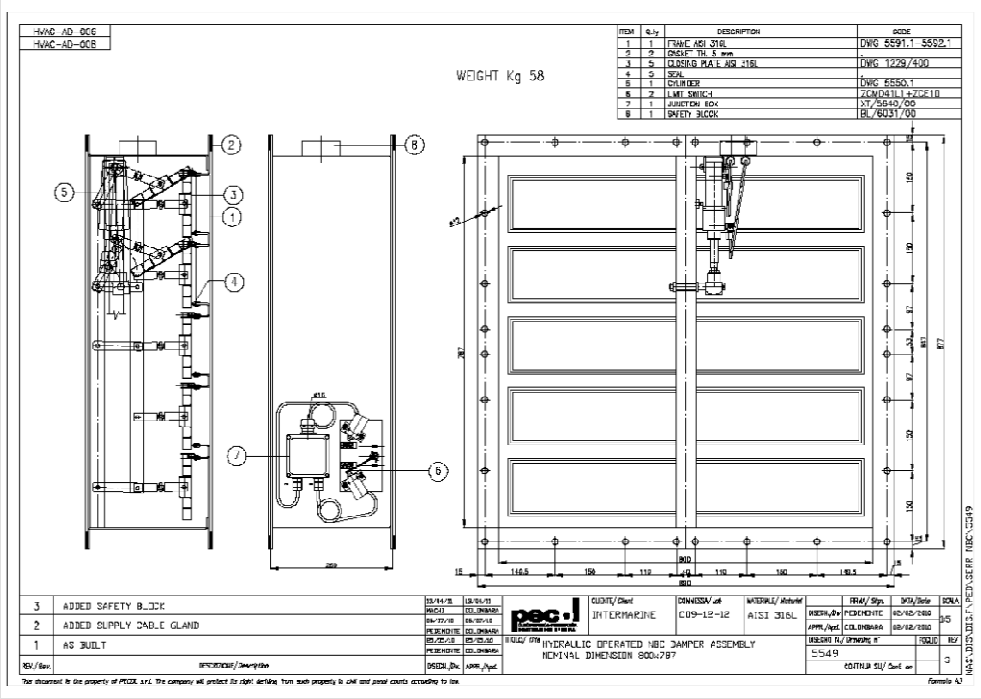
Sample of NBC damper (1800 x 787) mm S-FIX-800 x 787- A1



Tipeof NBC dampers - coamings