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# TECHNICAL REPORT

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## GMC HVAC AS

VERIFICATION OF  
SIMDUCT CLASS C/CLASS P  
FIRE INTEGRITY CLASS A-0 AND DUCT CLASS F  
AND  
WATER PRESSURE INTEGRITY

REPORT No. 2007-0816

REVISION No. 03

DET NORSKE VERITAS

# TECHNICAL REPORT

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Summary:

The objective of this report has been to determine if the product “**Simduct Class C**” can be considered an A-class ventilation duct equivalent to the safety level specified in IMO Res. A.754(18) and thereby also conform to Duct Class F in accordance with ISO 15138:2007(E).

The report has been further expanded to include the results from internal and external pressure testing in order to qualify the duct for use in areas where progressive flooding shall be avoided. The ducts to be used for ventilation of separate buoyancy volumes below the damage waterline are denoted “**Simduct Class P**” and will have special requirements for the joining and attachments.

Main conclusions:

- The tested specimens passed the fire test criteria for A-0 fire rating.
- Leakage testing in accordance with DW/143 test procedure before and after the test indicated no change in leakage rate at pressures exceeding 400 Pa.
- Pressure testing was performed at 7 bar for 30 minutes, both internally and externally. There was no deformation of the Simduct Class P ventilation ducts.

Main limitation:

- The application of these ducts should be verified in each case according to applicable rules and regulations.
- This technical report and the conclusions presented herein are not to be regarded as certification or approvals for specific project applications.

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Report title: Verification of Simduct class C/class P Fire integrity Class A-0 and Duct class F and Water pressure integrity		
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Work verified by: Morten Stensland		
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## 1 INTRODUCTION

### 1.1 Objective

The objective of this report has been to determine if the product “**Simduct Class C**” can be considered as an A-class ventilation duct, equivalent to the safety level specified in IMO Res. A.754(18) and thereby also conform to Duct Class F in accordance with ISO 15138:2007(E).

The report has been further expanded to include the results from internal and external pressure testing in order to qualify the duct for use in areas where progressive flooding shall be avoided.

### 1.2 Status of this Technical Report

This technical report and the conclusions presented herein are not to be regarded as certification or approvals for specific project applications.

### 1.3 Responsibilities and Project Specific Approvals

It is not DNV’s responsibility to suggest specific design solutions to be applied in any project. The buying project and the manufacturer of the product must in close cooperation ensure that specific design solutions are in line with test results and with frame conditions for the specific project.

In cases where DNV is formally appointed as the verifying authority in a project, it is DNV’s responsibility to verify and approve the proposed design solutions for the specific project in line with our contracted scope of work for the project.

## 2 BASIS FOR THE ASSESSMENT DOCUMENTED HEREIN

### 2.1 Description of the product

SIMDUCT Class C circular ducts with 160 mm and 1000 mm diameter, made from stainless steel with thickness 0.8 mm and 1.5 mm respectively.

The tested ducts were straight horizontal 3 meters pieces, incorporating joints and equipment flange fittings (SIMC), and made tight at both ends with end caps (SIMG). The ducts were fitted with T-bends (SIMT) at one end. Ducts of similar size as the horizontal part of the specimen were led from the T-bends through a steel deck by 3 mm steel sleeves and fitted with ordinary galvanised ducts on the “cold” side for leakage testing. The ducts were supported by the specially designed support system (SIMSUP) at intervals of 2 - 2.5 meters.

SIMDUCT Class P circular ducts with 200 mm, 315 mm and 500 mm diameters, made from stainless steel of thickness 0,8 mm, 1,0 mm and 1,25 mm respectively were hydrostatically pressure tested.

The ducts were straight 3 meter pieces, incorporating joints in accordance with drawing No. 51113-H-XD-001 (rev.2)/002(rev.2)/003(rev.1), and blinded off in both ends. Pressure was fed through a connection by a piston pump and monitored by pressure transmitters. For the external

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pressure testing the ducts were installed open ended inside larger size pipes. The pipes were blinded off by welded plates at each end and welded around the circumference of the ducts.

All tested ducts comply with the specifications of Duct Class F in accordance with ISO 15138:2007(E).

## **2.2 Test standard and Test reports**

No test standard acknowledged by DNV covers testing of fire integrity properties of ventilation ducts. The acknowledged test standard for fire determining the fire integrity of a fire division is IMO Res. A.754(18). Therefore the resolution has been selected as a reference document for determining A-class properties of the Simduct Class C.

The fire test was performed at SINTEF NBL test facilities at Tiller, in accordance with IMO Res. A.754(18) standard fire test procedure with a few modifications.

For description of the test and for further details and performance of the ducts in the fire test, reference is made to test report no. EA/22N008.05 from SINTEF NBL, Trondheim, dated 2000-08-28.

Leakage testing accordance with DW143 test procedure was performed before and after the fire test by SIMEX AS.

The waterpressure testing was performed by IKM Testing AS at their facilities at Forus. The pieces of ventilation ducts were pressurised to 7 bar and monitored and maintained for a duration of 30 minutes. The test results are described in IKM Testing AS report no. 277864.

## **3 CONCLUSIONS**

- The tested specimens passed the fire test criteria for A-0 fire rating. This implies that the duct construction, including the fire-rated expanding joints/gaskets, conform to Duct Class F in accordance with ISO 15138:2007(E).
- Leakage testing before and after the test indicated no change in leakage rate at pressures exceeding 400 Pa.
- The water pressure testing indicated that the ducts, including joints, can maintain the integrity at water pressures of 7 bar, both internally and externally.

## **4 LIMITATION**

- The application of these ducts should be verified in each case according to applicable rules and regulations.
- The ducts are not to be used where applicable requirements specify a different duct thickness.
- All joints and fittings should have a fire seal by way of "Fiberfrax Brannfugebånd" manufactured by Carborundum in addition to the standard EPDM rubber seal.

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