DNV·GL

Certificate No:
TAP0000082

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Air Reservoir

with type designation(s)
MS1, MS2

Issued to
MASKINSPECIALISTEN A/S
OSLO, Norway

is found to comply with
Det Norske Veritas' Rules for Classification of Ships Pt.4 Ch.7, Pressure Vessels, 2012
Offshore Standard DNV-OS-D101, Marine and Machinery Systems and Equipment

Application :

Cylindrical pressure vessels with toripherical heads intended for use in air systems.

Type:	Temperature range:	Design pressure:	Sizes:
MS1	See cert.	10 bar	See cert.
MS2	See cert.	16 bar	See cert.

This Certificate is valid until **2016-12-31**.

Issued at **Høvik** on **2016-01-22**

for **DNV GL**

DNV GL local station: **Station Oslo Maritime and CAP**

Approval Engineer: **Simon Ratcliffe**

Marianne Spæren Marveng
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

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Job Id: **262.1-010467-6**
Certificate No: **TAP0000082**

Product description

Vertical air receivers designed to DNV GL Ship Pt.4 Ch.7 in the following shell sizes (external diameter mm);
Ø273, Ø400, Ø450, Ø500, Ø550, Ø600, Ø640, Ø800, Ø900, Ø1000, Ø1150, Ø1350, Ø1500, Ø1600, Ø1700, Ø1800, Ø1900, Ø2000.

Heads are torispherical to DIN 28013, formed from one piece.

Materials.

Shell and heads (depending on size/class)	P265GH EN 10028-2 P355NL EN 10028-3
Sockets/nozzles	ASTM SA-105
Forged flanges	P250GH EN 10273 ASTM SA-105

Medium: air
Corrosion allowance: 1 mm

Application/Limitation

Type MS1 – design pressure 10 bar
Type MS2 – design pressure 16 bar

Maximum design temperature: +100 °C
Minimum design temperature: -40 °C (P355NL) / -20°C (P265GH)

<table>
<tr><th rowspan="3">Diameter (mm)</th><th colspan="5">10 bar (Type MS1)</th><th colspan="5">16 bar (Type MS2)</th></tr>
<tr><th colspan="2">Plate thickness (mm)</th><th colspan="2">Material</th><th rowspan="2">DNV Class</th><th colspan="2">Plate thickness (mm)</th><th colspan="2">Material</th><th rowspan="2">DNV Class</th></tr>
<tr><th>Shell</th><th>Head</th><th>Shell</th><th>Head</th><th>Shell</th><th>Head</th><th>Shell</th><th>Head</th></tr>
<tr><td>Ø273</td><td>6,3</td><td>4</td><td rowspan="8">P265GH</td><td rowspan="8">P265GH</td><td rowspan="9">III</td><td>6,3</td><td>4</td><td rowspan="9">P265GH</td><td rowspan="6">P265GH</td><td rowspan="10">II</td></tr>
<tr><td>Ø400</td><td>4</td><td>4</td><td>6</td><td>4</td></tr>
<tr><td>Ø450</td><td>4</td><td>4</td><td>6</td><td>4</td></tr>
<tr><td>Ø500</td><td>6</td><td>4</td><td>6</td><td>6</td></tr>
<tr><td>Ø550</td><td>6</td><td>4</td><td>6</td><td>6</td></tr>
<tr><td>Ø600</td><td>6</td><td>4</td><td>8</td><td>6</td></tr>
<tr><td>Ø640</td><td>6</td><td>4</td><td>8</td><td>6</td></tr>
<tr><td>Ø800</td><td>6</td><td>6</td><td>8</td><td>6</td><td rowspan="3">P355NL</td></tr>
<tr><td>Ø900</td><td>6</td><td>6</td><td>8</td><td>6</td></tr>
<tr><td>Ø1000</td><td>8</td><td>6</td><td>P265GH</td><td>P355NL</td><td>8</td><td>7</td></tr>
<tr><td>Ø1150</td><td>8</td><td>6</td><td rowspan="9">P355NL</td><td rowspan="9">P355NL</td><td rowspan="9">II</td><td>8</td><td>8</td><td rowspan="9">P355NL</td><td rowspan="9">P355NL</td></tr>
<tr><td>Ø1350</td><td>8</td><td>8</td><td>10</td><td>8</td></tr>
<tr><td>Ø1500</td><td>8</td><td>8</td><td>10</td><td>10</td></tr>
<tr><td>Ø1600</td><td>8</td><td>8</td><td>12</td><td>10</td></tr>
<tr><td>Ø1700</td><td>8</td><td>8</td><td>12</td><td>10</td></tr>
<tr><td>Ø1800</td><td>8</td><td>10</td><td>12</td><td>12</td></tr>
<tr><td>Ø1900</td><td>8</td><td>10</td><td>12</td><td>12</td></tr>
<tr><td>Ø2000</td><td>10</td><td>10</td><td>13</td><td>12</td></tr>
</table>

All dimensions represent the minimum thickness after forming.

Nozzle loads have not been evaluated.
Additional external loads have not been evaluated (wind, blast etc.)

Materials shall be delivered with material certificates as outlined in DNV GL Ship Pt.4 Ch.7 Sec.2 Table A1.

The extent of NDT is dependent on the vessel class/joint efficiency. See DNV GL Ship Pt.4 Ch.7 Sec.8.

Each vessel produced shall be subject to hydrostatic pressure testing at 1.3 times the design pressure.

Each vessel shall be surveyed by a DNV GL surveyor and a product certificate issued.

P355NL shall be subject to Charpy V-notch impact testing and show 27 J at –45°C.

Type Approval documentation

Tests carried out

N/A

Marking of product

Each pressure vessel shall be permanently and legibly marked on the vessel or on a nameplate permanently attached to a principal pressure part to show its identity and origin.

The marking shall show the following particulars:

a) the name and domicile of the manufacturer
b) the manufacturer's type designation and serial number
c) the year of manufacture
d) the design pressure
e) the design temperature (s) in °C
f) the hydraulic test pressure
g) DNV's identifying mark.

Periodical assessment

This certificate is valid until the expiry date shown on the page 1. In order to maintain this type approval, periodical assessments shall be carried out every second year. When possible, this assessment may be harmonised with normal surveys for product certification and / or other surveys and audits carried out.

Unscheduled assessments for retention of the certificate may be carried out when there is reason to believe that the TA applicant has not adhered to the obligations stipulated in the TAC.

Renewal should be applied for in writing before the certificate expires.