Certificates and test reports

series: Pumps and Booster systems
# Table of Contents

## 1 Introduction
1.1 General .................................................................................................................. 5
1.2 Series of certificates ............................................................................................... 5
1.3 EN 10204 ...
   1.3.1 2.1 Certificates of compliance with the order ......................................................... 7
   1.3.2 2.2 Test report ..................................................................................................... 7
   1.3.3 3.1 Inspection certificate ..................................................................................... 7
   1.3.4 3.2 Inspection report .......................................................................................... 7

## 2 General description of the test facility
2.1 Set-up of test facility .............................................................................................. 8
   2.1.1 Test loops ............................................................................................................ 8
   2.1.2 Power supply ...................................................................................................... 8
   2.2 Scope of tests ......................................................................................................... 9
   2.2.1 3.1 Certificates .................................................................................................. 9
   2.2.2 3.2 Certificates .................................................................................................. 9
   2.2.3 Internal tests ...................................................................................................... 9
2.3 Measurement procedures and sensors ................................................................. 9
   2.3.1 Measuring the flow rate Q .................................................................................. 9
   2.3.2 Measuring the static inlet pressure ..................................................................... 9
   2.3.3 Measuring the static outlet pressure ................................................................. 9
   2.3.4 Measuring the rotational speed .......................................................................... 9
   2.3.5 Measuring the mechanical power P2 ................................................................. 10
   2.3.6 Measuring vibrations Veff .................................................................................. 10
   2.3.7 Measuring the medium temperature ................................................................. 10
   2.3.8 Calibration ........................................................................................................ 10
   2.3.9 Evaluation of test values .................................................................................... 10

## 3 Certificates
3.1 2.1 Compliance with the order .............................................................................. 11
   3.1.1 2.1 Statement of compliance with the order ......................................................... 12
   3.1.2 2.1 Asbestos free ............................................................................................... 13
   3.1.3 2.1 ATEX ........................................................................................................... 14
   3.2 2.2 Test report ..................................................................................................... 15
   3.2.1 2.2 Test report ACS ......................................................................................... 16
   3.2.2 2.2 Test report Quality acceptance .................................................................... 17
   3.2.3 2.2 Test report WRAS ..................................................................................... 18
   3.2.4 2.2 Test report Specifications .......................................................................... 19
3.3 3.1 Inspection certificate ....................................................................................... 22
   3.3.1 3.1 Inspection certificate Hydraulic / hydrostatic / vibration performance test ...... 23
   3.3.2 3.1 Inspection certificate Coating / Visual test ................................................... 26
   3.3.3 3.1 Inspection certificate PTFE & Silicon free test ............................................. 30
   3.3.4 3.1 Inspection certificate Welding ..................................................................... 31
   3.3.5 3.1 Inspection certificate Unit test .................................................................... 32
3.4 3.2 Inspection report ............................................................................................ 34
   3.4.1 3.2 Inspection report Hydraulic and hydrostatic test witnessed by DNV GL Group .. 35

## 4 Appendix
4.1 Evaluation of test values ....................................................................................... 41
   4.1.1 Flow rate Q ....................................................................................................... 41
   4.1.2 Head H ............................................................................................................. 41
   4.1.3 Rotation speed n ............................................................................................. 41
1 Introduction

1.1 General

DP-Pumps can provide a series of certificates to proof the compliance of the product range of vertical and horizontal multi-stage centrifugal pumps and installations to the applicable standards, directives and documents, to meet the demands of the customer. Among other chapters, in this document you will find the available series of certificates.

1.2 Series of certificates

1.2.1 Non-specific

2.1 Non-specific certificates, represent the compliance with the order. You are free to use the available 2.1 certificates which we have provided in this document. You can download the latest version on; www.dp-pumps.com tab download centre.

1.2.2 Type/order specific

2.2 Certificates are the standard, type and/or order specific certificates which can be acquired by ordering the certificate of your choice at DP-Pumps. The certificates you will find in this document are examples of the possibilities of what can be ordered at DP-Pumps. For prices of the required standard certificates please contact DP-Pumps or your local contact/supplier. Pricelists are available.

1.2.3 On demand

3.1 and 3.2 inspection reports. The content and test data of these certificates is to be determined and agreed upon by the customer and DP-Pumps according to chapter 3; On demand testing. Prices fully depend on the required content and test data and are agreed upon between the customer and DP-Pumps.

3.1 Certificates are available in German, Dutch, French and English. The 3.2 certificates in English.

1.3 EN 10204

All certificates for the vertical and horizontal multi-stage centrifugal pumps and installations provided by DP-Pumps are according to EN 10204. This European standard defines the different types of inspection documents supplied to the purchaser, in accordance with the requirements of the order, for the delivery of all metallic products, but may also be used for other products like pumps. For your information we have explained the exact contents of the certificates and the method of testing in the sub chapters mentioned in the table.
<table>
<thead>
<tr>
<th>Type of Certificate</th>
<th>Provide by</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 A document confirming products’ compliance with the requirements specified in the order, not test results</td>
<td></td>
</tr>
<tr>
<td>2.1 Statement of compliance with the order ISO 9906</td>
<td>12</td>
</tr>
<tr>
<td>2.1 Asbestos free</td>
<td>13</td>
</tr>
<tr>
<td>2.1 ATEX</td>
<td>14</td>
</tr>
<tr>
<td>2.2 Statement of compliance with the order, indicating results of non-specific inspection</td>
<td></td>
</tr>
<tr>
<td>2.2 Quality acceptance</td>
<td>M 17</td>
</tr>
<tr>
<td>2.2 Specifications</td>
<td>M 19</td>
</tr>
<tr>
<td>2.2 ACS</td>
<td>M 16</td>
</tr>
<tr>
<td>2.2 WRAS</td>
<td>M 18</td>
</tr>
<tr>
<td>2.2 NSF</td>
<td>M</td>
</tr>
<tr>
<td>2.2 Spare parts</td>
<td>M</td>
</tr>
<tr>
<td>3.1 Statement of compliance with the order, indicating results of specific inspection</td>
<td></td>
</tr>
<tr>
<td>3.1 Hydraulic</td>
<td>M</td>
</tr>
<tr>
<td>3.1 Hydrostatic</td>
<td>M</td>
</tr>
<tr>
<td>3.1 Hydraulic + Hydrostatic</td>
<td>M</td>
</tr>
<tr>
<td>3.1 Hydraulic + Hydrostatic + Vibration</td>
<td>M 23</td>
</tr>
<tr>
<td>3.1 Hydrostatic + Vibration</td>
<td>M</td>
</tr>
<tr>
<td>3.1 Coating + Visual inspection</td>
<td>M 28</td>
</tr>
<tr>
<td>3.1 PTFE &amp; Silicone free</td>
<td>M 30</td>
</tr>
<tr>
<td>3.1 Unit inspection</td>
<td>M 32</td>
</tr>
<tr>
<td>3.1 Material inspection</td>
<td>M</td>
</tr>
<tr>
<td>3.1 Welding certificate</td>
<td>M 31</td>
</tr>
<tr>
<td>3.1 Silicone component free</td>
<td>M</td>
</tr>
<tr>
<td>3.1 Custom made inspection (ITPL for projects)</td>
<td>M</td>
</tr>
<tr>
<td>3.2 Statement of compliance with the order, indicating results of specific inspection</td>
<td></td>
</tr>
<tr>
<td>3.2 Hydraulic + Hydrostatic</td>
<td>*1</td>
</tr>
<tr>
<td>3.2 Hydraulic + Hydrostatic + Vibration</td>
<td>*1 35</td>
</tr>
<tr>
<td>3.2 Booster set or installation</td>
<td>*1</td>
</tr>
<tr>
<td>M Manufacturer</td>
<td></td>
</tr>
</tbody>
</table>

* *1 When the 3.2 certificate is requested the manufacturer will prepare a test report to present to the inspector

<table>
<thead>
<tr>
<th>List of notified bodies;</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNV-GL (Det Norske Veritas/Germanischer Lloyd)</td>
</tr>
<tr>
<td>ABS (American Bureau of Shipping)</td>
</tr>
<tr>
<td>BV (Bureau Veritas)</td>
</tr>
<tr>
<td>CCS (China Classification Society)</td>
</tr>
<tr>
<td>RINA (Registro Italiano Navale)</td>
</tr>
<tr>
<td>LR (Lloyd’s Register EMEA)</td>
</tr>
<tr>
<td>RMRS (Russian Maritime Register of Shipping)</td>
</tr>
<tr>
<td>Others on request</td>
</tr>
</tbody>
</table>
1.3.1 2.1 Certificates of compliance with the order

The certificate of compliance with the order is a document drawn up on the basis of non-specific inspection and testing which means that tests and inspections are carried out by the manufacturer in accordance with his own procedures to assess whether products made by the same manufacturing process meet the requirements.

1.3.2 2.2 Test report

Document in which the manufacturer certifies that the products supplied are in compliance with the specifications of the order and in which he supplies test results based on non specific testing and inspecting which means that tests and inspections are carried out by the manufacturer in accordance with his own procedures to assess whether products made by the same manufacturing process meet the requirements specified in the order. The products inspected and tested need not necessarily be the products actually supplied.

1.3.3 3.1 Inspection certificate

A document issued by the manufacturer which declares that the products supplied are in compliance with the requirements of the order and is supported by evidence of the manufacturer’s test results. The document is validated by the manufacturer’s authorized inspection representative, independent of the manufacturing department.

1.3.4 3.2 Inspection report

A document prepared by both the manufacturer and an independent third-party in which they declare that the products supplied are in compliance with the requirements of the order and in which test results are supplied.
2 General description of the test facility

2.1 Set-up of test facility

At the test facility of DP-Pumps all vertical and horizontal multistage pumps produced at DP-Pumps can be tested (DPV2 B up to DPVF 125 B, DPH(S)I)2 up to DPH(S)I)15. The test facility meets the requirement of ISO 9906:2012 grade 1.

2.1.1 Test loops

The facility consists of three separate loops:

<table>
<thead>
<tr>
<th>Loop</th>
<th>Pump types</th>
<th>Flow [m³/h]</th>
<th>Size flow meter</th>
<th>Tank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V2 - V15</td>
<td>0.2-25</td>
<td>DN40</td>
<td>Open, can be closed</td>
</tr>
<tr>
<td>2</td>
<td>VF25 - VF60, VF85 (50Hz)</td>
<td>2.8-110</td>
<td>DN65</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>VF85 - VF125</td>
<td>7-200</td>
<td>DN100</td>
<td>Open</td>
</tr>
</tbody>
</table>

Figure 2: Loop 3

Loop 1 and 2 are connected to the same set of tanks. During Q-H tests these loops have open connection to the outside atmosphere. For NPSH tests the loops can be closed. Loop 3 is connected to a tank. During Q-H test these loops have an open connection to the outside atmosphere.

See figure 1 and 2 of the test facility.

2.1.2 Power supply

The motor of the test pump has a dedicated electric power supply. This power supply provides a stable voltage and it can supply different output voltages and frequencies.

<table>
<thead>
<tr>
<th>Type</th>
<th>Generator which is driven by an electrical motor. The electrical motor is fed by a frequency inverter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output voltage</td>
<td>Adjustable around 110, 230 and 400 Volt</td>
</tr>
<tr>
<td>Output power</td>
<td>Maximum 100 kVA (~90 kW)</td>
</tr>
<tr>
<td>Frequency</td>
<td>50 Hz or 60 Hz</td>
</tr>
</tbody>
</table>
2.2 Scope of tests

The following tests are performed at the test facility.

2.2.1 3.1 Certificates

These tests are performed in order to check the performance of a produced pump or installation. The tests are performed according to ISO 9906:2012 grade 3B. Q-H values and hydrostatic results are evaluated.

2.2.2 3.2 Certificates

These tests are performed in order to check the performance of a produced pump or installation in the presence of a notified body. The test are performed according to ISO 9906:2012 grade 3B. Q-H values and hydrostatic results are evaluated.

2.2.3 Internal tests

These tests are performed in order to investigate the pump performance of a pump design (mainly during development of a new pump type) and to generate pump performance data.

The following performance data is hereby evaluated:

- Q-H
- Q-P
- Q-\(\eta_{\text{hydraulic}}\) (hydraulic efficiency)
- Q-NPSH\(\text{R}\)
- \(V_{\text{RMS}}\) (vibrations)

2.3 Measurement procedures and sensors

2.3.1 Measuring the flow rate Q

The flow rate is measured with electromagnetic flow meters. The following flow meters are used:

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Output</th>
<th>Accuracy(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Siemens MAG3100 DN40 / MAG6000 transmitter</td>
<td>Display and 4-20 mA signal</td>
<td>0.2 [% of read value] + 4.5x10(^{-3}) [m(^3)/h]</td>
</tr>
<tr>
<td>Siemens MAG3100 DN65 / MAG6000 transmitter</td>
<td>Display and 4-20 mA signal</td>
<td>0.2 [% of read value] + 1.2x10(^{-2}) [m(^3)/h]</td>
</tr>
<tr>
<td>Siemens MAG3100 DN100 / MAG6000 transmitter</td>
<td>Display and 4-20 mA signal</td>
<td>0.2 [% of read value] + 2.8x10(^{-2}) [m(^3)/h]</td>
</tr>
</tbody>
</table>

1. According to specification of equipment. At calibrations higher accuracies are found

2.3.2 Measuring the static inlet pressure

At the inlet side of the pump the pressure is measured with the following sensor:

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Output</th>
<th>Accuracy(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endress+Hauser Cerabar S PMC71 2 Bar absolute</td>
<td>Display and 4-20 mA signal</td>
<td>Total performance 0.15 [% of full range]</td>
</tr>
</tbody>
</table>

1. According to specification of equipment. At calibrations higher accuracies are found

2.3.3 Measuring the static outlet pressure

At the outlet side of the pump the pressure is measured with the following sensors:

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Output</th>
<th>Accuracy(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endress+Hauser Cerabar S PMC71 10 Bar absolute</td>
<td>Display and 4-20 mA signal</td>
<td>Total performance 0.15 [% of full range]</td>
</tr>
<tr>
<td>Endress+Hauser Cerabar S PMC71 40 Bar absolute</td>
<td>Display and 4-20 mA signal</td>
<td>Total performance 0.15 [% of full range]</td>
</tr>
</tbody>
</table>

1. According to specification of equipment. At calibrations higher accuracies are found

The used sensor depends on the pressure of the pump, whereby the smallest possible range is used in order to have the highest accuracy.

2.3.4 Measuring the rotational speed

The rotation speed can be measured with two different devices:
• an optical hand device which is read from its display
• optical photoelectric sensor in combination with a Gantner data acquisition system with a frequency measurement module (A109)

2.3.5 Measuring the mechanical power $P_2$

The input power (mechanical power supplied to the pump shaft) is measured with torque transducers. Different torque transducers are available depending on the torque range to be measured.

2.3.6 Measuring vibrations $V_{eff}$

Vibrations are measured at different locations at the pump and in different horizontal directions. Hereby a Brüel & Kjaer AS-085 sensor with Vibrotest 60 device is used.

2.3.7 Measuring the medium temperature

The temperature of the water in the tank of Loop 1 and 2 is measured with the following sensor:

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endress+Hauser Thermometer TSM487-C FE (loop 1 and 2)</td>
<td>Display and 4-20 mA signal</td>
</tr>
</tbody>
</table>

2.3.8 Calibration

The aforementioned sensors are calibrated at third parties.

2.3.9 Evaluation of test values

The evaluation of the test values is according to the NEN-EN-ISO 9906:2012. More details about this can be found in Appendix chapter 4.
3 Certificates

3.1 2.1 Compliance with the order

These 2.1 certificates, which represent the compliance with the order.

The following test reports have been added to this document:

- Statement of compliance with the order ISO 9906
- Asbestos free
- ATEX
3.1.1 2.1 Statement of compliance with the order

DECLARATION OF COMPLIANCE WITH THE ORDER (2.1)
9906/9001
according to EN 10204:2004

We, the undersigned,

DP Industries B.V.
Kalkovenweg 13
2401 LJ Alphen aan den Rijn
The Netherlands

certify and declare under our sole responsibility that the following product:

_Vertical multi-stage centrifugal pumps type(s):
DPV(-/C/S/M)(-,F,V,T,E,I)

to which this certificate relates is (are) in conformity with:
Performance curves as published in
catalogues and technical documentation
representing the mean performance of a series of pumps of the same type
as determined in the following standard(s) or normative document(s):
ISO 9906:2012 (Grade 3B)
with selection made from typical performance curves
according to the provisions of (when applicable):
ISO 9906:2012 Table 8 / ISO 9001:2015

DP Industries B.V.
Alphen aan den Rijn,
7-5-2019

signature of the authorised person
DECLARATION OF COMPLIANCE WITH THE ORDER  
(2.1)  
Asbestos free  
according to EN 10204:2004

We, the undersigned,

DP Industries B.V.  
Kalkovenweg 13  
2401 LJ Alphen aan den Rijn  
The Netherlands

certify and declare under our sole responsibility that the following product:

*Vertical multi-stage centrifugal pumps type(s):*
DPV(-C/S/M)(-,F,V,T,E,I)

to which this certificate relates is (are) produced with materials of which the chemical composition is:

Asbestos free
and in conformity with the following standard(s) or normative document(s):

Certificates provided by the suppliers,  
Internal inspections  
according to the provisions of (when applicable):

ISO 9001:2015

DP Industries B.V.  
*Alphen aan den Rijn,*  
7-5-2019

signature of the authorised person
DECLARATION OF COMPLIANCE WITH THE ORDER
(2.1)
ATEX
according to EN 10204:2004

We, the undersigned,

DP Industries B.V.
Kalkovenweg 13
2401 LJ Alphen aan den Rijn
The Netherlands

certify and declare under our sole responsibility that the following product:

*Vertical multi-stage centrifugal pumps type(s):*  
DPV(-/C/S/M)(,-F,V,T,E)

to which this certificate relates is (are) in conformity with

the following standard(s) or normative document(s):

EN 13463-1:2009
EN 13463-5:2009
EN 60079-14:2003

**Filing nr.:**  
20110775 / 11 ATEX D048

according to the provisions of (when applicable):

Directive 94/9/EC respectively 2014/34/EC

DP Industries B.V.
Alphen aan den Rijn,
7-5-2019

signature of the authorised person
3.2 2.2 Test report

On the next pages you will find the standard, type and/or order specific certificates which can be acquired by ordering the certificate of your choice at DP-Pumps. The certificates you will find in this document are examples of the possibilities what can be ordered at DP-Pumps. The certificate themselves you can download on our site; www.dp-pumps.com tab download centre. For prices of the required certificates please contact DP-Pumps or your local contact/supplier.

The following examples have been added to this document:

- 2.2 ACS
- 2.2 Quality acceptance
- 2.2 Specifications
- 2.2 WRAS

ATTENTION
See www.dp-pumps.com tab download centre for the pdf-versions of the certificates itself
TEST REPORT 2.2
ACS
according to EN 10204:2004

We, the undersigned,

DP Industries B.V.
Kalkovenweg 13
2401 LJ Alphen aan den Rijn
The Netherlands

certify and declare under our sole responsibility that the following product:

Vertical multi-stage centrifugal pumps type(s):
DPV(-/C/S/M)(-F,V,T,E,I)

to which this certificate relates is (are) in conformity with
the following standard(s) or normative document(s):
ACS certificate:
Order number

DP Industries B.V.
Alphen aan den Rijn,
7-5-2019

signature of the authorised person
3.2.2 2.2 Test report Quality acceptance

TEST REPORT 2.2
Quality acceptance
according to EN 10204:2004

We, the undersigned,
DP Industries B.V.
Kalkovenweg 13
2401 LJ Alphen aan den Rijn
The Netherlands
certify and declare under our sole responsibility that the following product:

Vertical multi-stage centrifugal pumps type(s):
Pumptype

to which this certificate relates is (are) in conformity with the following standard(s) or normative document(s):
Quality acceptance report no.:
Order number

Certified material specifications provided by the suppliers
according to the provisions of (when applicable):
ISO 9001:2015 / ISO 9006:2012 (Grade 3B)

DP Industries B.V.
Alphen aan den Rijn,
7-5-2019

signature of the authorised person
3.2.3 2.2 Test report WRAS

TEST REPORT 2.2
WRAS
according to EN 10204:2004

We, the undersigned,

DP Industries B.V.
Kalkovenweg 13
2401 LJ Alphen aan den Rijn
The Netherlands

certify and declare under our sole responsibility that the following product:

Vertical multi-stage centrifugal pumps type(s):
DPV(-/S/M)(-/F/V/T/E)

to which this certificate relates is (are) in conformity with the following standard(s) or normative document(s):
WRAS certificate:

Order number

DP Industries B.V.
Alphen aan den Rijn,
14-5-2019

signature of the authorised person
3.2.4 2.2 Test report Specifications

TEST REPORT 2.2
Specifications
according to EN 10204:2004

We, the undersigned,

DP Industries B.V.
Kalkovenweg 13
2401 LJ Alphen aan den Rijn
The Netherlands
certify and declare under our sole responsibility that the following product:

Vertical multi-stage centrifugal pumps type(s):
Pumptype

to which this certificate relates is (are) in conformity with
the following standard(s) or normative document(s):
Specifications report nr.:
Order number

deciding to the provisions of (when applicable):

ISO 9001:2015

DP Industries B.V.
Alphen aan den Rijn,
7-5-2019

signature of the authorised person
# Specifications report

## Pump model:

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
</tr>
</thead>
<tbody>
<tr>
<td>00 00 0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Frequency:

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Motor poles:

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Rated power [kW]:

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Report n.:

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Motor label:

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Rated voltage [V]:

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Rated current [A]:

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Frequency class:

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Rated speed [rpm]:

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Inspection class:

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

## Date of issue:

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
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</table>

### Mechanical seal specifications (Part. nr. 433)

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
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<tbody>
<tr>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

### Colour specifications

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Material specifications

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
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<tbody>
<tr>
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</tbody>
</table>

### Motor/Fanhood (800/901/802/832)

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
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</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

### Flanged taper piece (722)

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Motor sturl (341)

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Pump casing (101)

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

### Baseplate (890)

<table>
<thead>
<tr>
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<th>Description</th>
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<th>Worked part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Stainless steel RAL9011

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Description</th>
<th>Material costs</th>
<th>Worked part</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

---

**SPECIMEN**

**SPECIMEN**

**SPECIMEN**
<table>
<thead>
<tr>
<th>Material</th>
<th>Description</th>
<th>Code and material no.</th>
<th>Standard</th>
<th>ASTM / AISI</th>
</tr>
</thead>
<tbody>
<tr>
<td>JL1040</td>
<td>Cast iron</td>
<td>GJL-250</td>
<td>EN 1561</td>
<td>A48:40B</td>
</tr>
<tr>
<td>JS1030</td>
<td>Cast iron</td>
<td>GJS-400</td>
<td>EN 1563</td>
<td></td>
</tr>
<tr>
<td>1.4057</td>
<td>Chromium-nickel steel</td>
<td>X17CrNi16-2–QT800</td>
<td>EN 10088-3</td>
<td>A276:431</td>
</tr>
<tr>
<td>1.4300</td>
<td>Chromium-nickel steel</td>
<td>X12CrNi18-8</td>
<td>EN 10088</td>
<td>A276:302</td>
</tr>
<tr>
<td>1.4301</td>
<td>Chromium-nickel steel</td>
<td>X5CrNi18-10</td>
<td>EN 10088</td>
<td>A276:304</td>
</tr>
<tr>
<td>1.4305</td>
<td>Chromium-nickel steel</td>
<td>X6CrNi5Ti-9</td>
<td>EN 10088</td>
<td>A276:303</td>
</tr>
<tr>
<td>1.4308</td>
<td>Chromium-nickel cast steel</td>
<td>GX15CrNi19-10</td>
<td>EN 10283</td>
<td>A743:CF8</td>
</tr>
<tr>
<td>1.4401</td>
<td>Chromium-nickel-molybdenum steel</td>
<td>X5CrNiMo 17-12-2</td>
<td>EN 10088</td>
<td>A276:316</td>
</tr>
<tr>
<td>1.4404</td>
<td>Chromium-nickel-molybdenum steel</td>
<td>X2CrNiMo 17-12-2</td>
<td>EN 10088</td>
<td>A276:316L</td>
</tr>
<tr>
<td>1.4408</td>
<td>Chromium-nickel-molybdenum cast steel</td>
<td>GX15CrNiMo 19-11-2</td>
<td>EN 10213</td>
<td>A743:CF3M</td>
</tr>
<tr>
<td>1.4460</td>
<td>Chromium-nickel-molybdenum steel</td>
<td>X5CrNiMoN 27 5 2</td>
<td>EN 10088</td>
<td>A276:329</td>
</tr>
<tr>
<td>1.4571</td>
<td>Chromium-nickel-molybdenum steel</td>
<td>X6CrNiMoTi17-12-2</td>
<td>EN 10088</td>
<td>A276:316Ti</td>
</tr>
</tbody>
</table>
3.3 3.1 Inspection certificate

Following certificates are standard, type and/or order specific certificates which can be acquired by ordering the certificate of your choice at DP-Pumps. The certificates you will find in this document are examples of the possibilities what can be ordered at DP-Pumps. For prices of the required certificates please contact DP-Pumps or your local contact/supplier.

The following examples have been added to this document:

• 3.1 Inspection certificate Hydraulic / hydrostatic / vibration performance test
• 3.1 Inspection certificate Coating / Visual test
• 3.1 Inspection certificate PTFE & Silicon free test
• 3.1 Inspection certificate Welding
• 3.1 Inspection certificate Unit test
3.1 Inspection certificate Hydraulic / hydrostatic / vibration performance test

INSPECTION CERTIFICATE 3.1

according to EN 10204:2004

We, the undersigned,

DP Industries B.V.
Kalkovenweg 13
2401 LJ Alphen aan den Rijn
The Netherlands

certify and declare under our sole responsibility that the following product:

*Vertical multi-stage centrifugal pump, type:*
DPVSF 4/20 B 50Hz 2P

to which this certificate relates is in conformity with the following standard(s) or other
normative document(s):

Hydraulic performance test number
1401259-3
according to the provisions of (when applicable):
ISO 9906:2012 (Grade S3)

Hydrostatic test number
1401259-3
according to the provisions of (when applicable):
EN 809+A1/C1:2010

Vibration test number
1401259-3
according to the provisions of (when applicable):
ISO 10816-7:2009 (Category II)

DP Industries B.V.
Alphen aan den Rijn
5-3-2019

signature of the authorised person
# HYDRAULIC testreport

<table>
<thead>
<tr>
<th>Test/prodution nr.</th>
<th>Testdate</th>
<th>Manufact. order number</th>
<th>Customer/projekt</th>
</tr>
</thead>
<tbody>
<tr>
<td>1401259-3</td>
<td>5-03-2019</td>
<td>700156744</td>
<td></td>
</tr>
</tbody>
</table>

**Pump model:** DPVSF 4/20 B  
**Freq/motorpols:** 50Hz 2P  
**Production yr:** 2019  
**Motor brand:** Siemens  
**Motor serial nr.:** Y

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9-101A 122.51</td>
<td>3,7</td>
<td>7,30</td>
<td>400</td>
<td>2954</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Test liquid:** Water  
**Temperature [°C]:** 18  
**Chloride level [%]:** 0  
**Density [kg/m³]:** 1000  
**Vapour pressure [Bar]:** 0.27

**Guarantee point:**  
**Requested** | 4,00 [m³/h]  
**Actual**    | 154,7 [m H₂O]

**Testresults:**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(0,0)</td>
<td>0,00</td>
<td>0,00</td>
<td>0,090</td>
<td>18,98</td>
<td>192,94</td>
<td>4,09</td>
<td>3007</td>
<td>403</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>(1,0)</td>
<td>1,00</td>
<td>0,28</td>
<td>0,090</td>
<td>16,31</td>
<td>180,10</td>
<td>3,43</td>
<td>3033</td>
<td>403</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>(2,0)</td>
<td>2,10</td>
<td>0,58</td>
<td>0,085</td>
<td>17,73</td>
<td>180,33</td>
<td>5,06</td>
<td>2937</td>
<td>403</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>(3,0)</td>
<td>3,00</td>
<td>0,83</td>
<td>0,080</td>
<td>17,06</td>
<td>173,43</td>
<td>5,64</td>
<td>2990</td>
<td>403</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>(4,0)</td>
<td>4,00</td>
<td>1,11</td>
<td>0,072</td>
<td>15,93</td>
<td>161,97</td>
<td>6,12</td>
<td>2985</td>
<td>403</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>(5,0)</td>
<td>5,00</td>
<td>1,39</td>
<td>0,062</td>
<td>13,82</td>
<td>140,52</td>
<td>6,53</td>
<td>2979</td>
<td>403</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>(6,5)</td>
<td>6,50</td>
<td>1,81</td>
<td>0,042</td>
<td>8,11</td>
<td>82,41</td>
<td>6,65</td>
<td>2976</td>
<td>403</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Date of issue:** 5-3-2019  
**Tested by:** ArBa  
**Approved by:** WiMo  
**Notified body:**

**Purchase order number:** 123456

Tested in conformity with standard ISO 9906:2012 (Grade 3B)
# HYDROSTATIC test report

<table>
<thead>
<tr>
<th>Test/production nr:</th>
<th>Testdate:</th>
<th>Manufact. order number:</th>
<th>Customer/project:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1401259-3</td>
<td>5-03-2019</td>
<td>700156744</td>
<td></td>
</tr>
</tbody>
</table>

- **Pump model:** DPVSF 4/20 B 50Hz 2P
- **Motor type:** 9-101A 122.51
- **Rated power:** 3.7 [kW]
- **Rated current:** 7.3 [A]
- **Maximum current:** 400
- **Rated speed:** 2954 [rpm]
- **Nr. of phases:** 3

<table>
<thead>
<tr>
<th>Test liquid:</th>
<th>Temperature: [°C]</th>
<th>Chloride level: [%]</th>
<th>Density: [kg/m³]</th>
<th>Vapour pressure: [Bar]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tests results:</th>
<th>Pressure class:</th>
<th>Hydrostatic test pressure:</th>
<th>Duration of test: [min]</th>
<th>Result</th>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PN40</td>
<td>60.0</td>
<td>30</td>
<td>Passed</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

- **Date of issue:** 5-3-2019
- **Tested by:** J.B.
- **Approved by:** Wille
- **Noodle body:**

**Purchase order number:** 123456

Tested in conformity with standard EN 809+A1/1/C1:2010 and EN12162:2010
# Testreport

## Vibrations

<table>
<thead>
<tr>
<th>Testproduction nr.</th>
<th>Testdate</th>
<th>Manufact. order number</th>
<th>Customer/project</th>
</tr>
</thead>
<tbody>
<tr>
<td>1401259-3</td>
<td>5-03-2019</td>
<td>700156744</td>
<td>0</td>
</tr>
</tbody>
</table>

**Pump model:** DPVSF 4/20 B 50Hz 2P

**Motor type:** 9-101A 122.51

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9-101A 122.51</td>
<td>3.7</td>
<td>0</td>
<td>7.3</td>
<td>400</td>
<td>2954</td>
<td>3</td>
</tr>
</tbody>
</table>

**Test fluid:** Water

<table>
<thead>
<tr>
<th>Temperature [°C]</th>
<th>Chloride level [%]</th>
<th>Density [kg/m³]</th>
<th>Vapour pressure [Bar]</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>0</td>
<td>1000</td>
<td>0.27</td>
</tr>
</tbody>
</table>

**Vibration limit:**

<table>
<thead>
<tr>
<th>Category</th>
<th>POR</th>
<th>AOR</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMS</td>
<td>4.20</td>
<td>5.10</td>
<td>POR = Preferred operation range</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AOR = Allowed operation range</td>
</tr>
</tbody>
</table>

## Testresults:

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Setpoint [m³/h]</th>
<th>Flow [m³/h]</th>
<th>Flow [l/s]</th>
<th>Range</th>
<th>RMS X</th>
<th>RMS Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(0.0)</td>
<td>0.00</td>
<td>0.00</td>
<td>-</td>
<td>2.41</td>
<td>0.53</td>
</tr>
<tr>
<td>1</td>
<td>(1.0)</td>
<td>1.00</td>
<td>0.28</td>
<td>POR</td>
<td>1.96</td>
<td>0.49</td>
</tr>
<tr>
<td>2</td>
<td>(2.0)</td>
<td>2.10</td>
<td>0.58</td>
<td>AOR</td>
<td>2.11</td>
<td>0.61</td>
</tr>
<tr>
<td>3</td>
<td>(3.0)</td>
<td>3.00</td>
<td>0.83</td>
<td>POR</td>
<td>2.41</td>
<td>0.66</td>
</tr>
<tr>
<td>4</td>
<td>(4.0)</td>
<td>4.00</td>
<td>1.11</td>
<td>POR</td>
<td>2.31</td>
<td>0.66</td>
</tr>
<tr>
<td>5</td>
<td>(5.0)</td>
<td>5.00</td>
<td>1.39</td>
<td>POR</td>
<td>2.41</td>
<td>0.51</td>
</tr>
<tr>
<td>6</td>
<td>(6.5)</td>
<td>6.50</td>
<td>1.81</td>
<td>AOR</td>
<td>3.36</td>
<td>0.76</td>
</tr>
</tbody>
</table>

**Additional information:**

- **Date of issue:** 5-03-2019
- **Tested by:** ArBa
- **Approved by:** WIlMo
- **Notified body:**

Tested in conformity with standard ISO 10816-7:2009 (Category III)
INSPECTION CERTIFICATE 3.1
Coating thickness and visual inspection
according to EN 10204:2004

We, the undersigned,

DP Industries B.V.
Kalkovenweg 13
2401 LJ Alphen aan den Rijn
The Netherlands

certify and declare under our sole responsibility that the following product:

Product type

to which this certificate relates is (are) in conformity with
the following standard(s) or normative document(s):
Quality acceptance report nr.: 

Product number
Motor Stool : Cataphoretic coating + wetpaint RAL ...... μm
Pumpcasing : Cataphoretic coating ...... μm
Motor : Wetpaint RAL ...... μm

according to the provisions of (when applicable):
ISO 9001:2015

DP Industries B.V.
Alphen aan den Rijn,
8-3-2019

signature of the authorized person
INSPECTION CERTIFICATE 3.1

We, the undersigned,

DP Industries B.V.
Kalkovenweg 13
2401 LJ Alphen aan den Rijn
The Netherlands

Customer ......
Purchase Order ......
Pump types DPVCF 10/13 B Serial No;

have been Visual inspection and final inspection before shipping both have been performed by our Quality Control

DP Industries B.V.
Alphen aan den Rijn,
26-2-2019

signature of the authorized person

Quality Control
3.3.3 3.1 Inspection certificate PTFE & Silicon free test

INSPECTION CERTIFICATE 3.1
PTFE & Silicon free
according to EN 10204:2004

We, the undersigned,

DP Industries B.V.
Kalkovenweg 13
2401 LJ Alphen aan den Rijn
The Netherlands

certify and declare under our sole responsibility that the following product:

Vertical multi-stage centrifugal pumps type(s):
DPVF 6/8 B 50Hz
order number

to which this certificate relates is (are) free of:
significant traces of PTFE, silicon and other pint wetting impairment substances
(no PTFE and silicon components are used and specific assembly and cleaning procedures are applied)
and is(are) in conformity with the following
standard(s) or normative document(s):
Certificates provided by the suppliers,
Internal inspections
according to the provisions of (when applicable):
ISO 9001:2008

DP Industries B.V.
Alphen aan den Rijn,
14-3-2019

signature of the authorised person
3.3.4 3.1 Inspection certificate Welding

INSPECTION CERTIFICATE 3.1
Certified welding
according to EN 10204:2004

We, the undersigned,

DP Industries B.V.
Kalkovenweg 13
2401 LJ Alphen aan den Rijn
The Netherlands

certify and declare under our sole responsibility that the following products:

Product type

to which this certificate relates is (are) in conformity with
the following standard(s) or normative document(s) as described at:

according to the provisions of (when applicable):

ISO 9001:2015

DP Industries B.V.
Alphen aan den Rijn,
8-3-2019

signature of the authorised person
3.3.5 3.1 Inspection certificate Unit test

INSPECTION CERTIFICATE 3.1
Booster set
according to EN 10204:2004

We, the undersigned,

DP Industries B.V.
Kalkovenweg 13
2401 LJ Alphen aan den Rijn
The Netherlands

certify and declare under our sole responsibility that the following product:

HU2 DPVF25/3 B GIJ NW65 AISI304 NW80 PN16

to which this certificate relates is (are) in conformity with
the following standard(s) or normative document(s):

Test report nos.: 123456 20140261

according to the provisions of (when applicable):

ISO 9001:2015

DP Industries B.V.
Alphen aan den Rijn,
29-3-2019

signature of the authorised person
**Inspection report Booster set**

**Booster set model:** HU2 DPV/F253 B GIJ NW65 AISI304 NW80 PN16  
**Item number:** HU26C309L13C  
**Tasted by:** AnSL  
**Report nr.:** 41/18

<table>
<thead>
<tr>
<th>Rated power per pump: [kW]</th>
<th>Rated voltage: [V]</th>
<th>Phases</th>
<th>Main freq: [Hz]</th>
<th>MCB pump: [A]</th>
<th>Rated speed: [rpm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>5,5</td>
<td>400</td>
<td>3</td>
<td>50</td>
<td>11</td>
<td>2893</td>
</tr>
</tbody>
</table>

**Set point: [kPa]** | **Suction head: [kPa]** | **Run dry protection type:** | **Standard unit:** | **Date of issue:** | **Checked by:**
<table>
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<tr>
<td>460</td>
<td>0</td>
<td>Contact</td>
<td>Yes</td>
<td>29-3-2019</td>
<td>AnSL</td>
</tr>
</tbody>
</table>

**Test results**

1. **Common data**
   - Wiring diagram present: OK  
   - Operating instructions present: OK

2. **Check**
   - Shut off head, per pump, according to list: OK  
   - Non return valve, per pump: OK  
   - Check unit specific parameters: OK
     - Clockwise, seen from the fan hood
   - Values motor circuit breaker (MCB) according to motor freq, converter data: OK  
   - Activate the MCB’s, one by one, and check if the correct alarm contact light will be activated (OK)
   - Pressure test during 5 minutes with system pressure 1,5 x set point (130 kPa) min: OK  
   - When run dry protection becomes active, the unit must shut down after this preset run dry delay: OK
   - Test of the Level Control, with respect to all levels stated below: OK  
     - Low level alarm + reset  
     - 30% alarm + reset  
     - Valve open + closed  
     - Valve closed + open  
     - High level alarm
   - All markings and type plates applied: OK
   - All pipes sealed for transportation: OK

3.1 **Pressure control check**
   - Outlet-valve open: a pump is switched on immediately when reaching cut-in pressure; OK  
   - Outlet-valve closed: the pumps switch off when reaching the cut-out pressure and the minimum running time has been expired: OK

3.2 **Frequency control (if applicable)**
   - When, at an unspecified capacity, an increase or decrease of 50% of the capacity is simulated, the deviation of the desired value must stay within the required margin of 20 [kPa] within the set time (considering the pump delay / ramp up with larger pumps): OK
3.4 3.2 Inspection report

Following certificate is standard, type and/or order specific certificate which can be acquired by ordering the certificate of your choice at DP-Pumps. The certificate you will find in this document is an example of the possibilities what can be ordered at DP-Pumps. For prices of the required certificates please contact DP-Pumps or your local contact/supplier.

List of notified bodies

- DNV-GL (Det Norske Veritas/Germanischer Lloyd)
- ABS (American Bureau of Shipping)
- BV (Bureau Veritas)
- CCS (China Classification Society)
- RINA (Registro Italiano Navale)
- LR (Lloyd’s Register EMEA)
- RMRS (Russian Maritime Register of Shipping)

The following example have been added to this document:

- Hydraulic and hydrostatic inspection report and the DNV-GL certificate.
3.4.1 3.2 Inspection report  Hydraulic and hydrostatic test witnessed by DNV GL Group

INSPECTION REPORT 3.2

according to EN 10204:2004

We, the undersigned,

DP Industries B.V.
Kalkovenweg 13
2401 LJ Alphen aan den Rijn
The Netherlands

certify and declare under our sole responsibility that the following product:

*Vertical multi-stage centrifugal pump, type:*

*DPVF 25/5 B  50Hz 2P*

to which this certificate relates is in conformity with the following standard(s) or other normative document(s):

Hydraulic performance test number

0

according to the provisions of (when applicable):

ISO 9906:2012 (Grade 3B)

Hydrostatic test number

according to the provisions of (when applicable):

EN 809+A1/C1:2010, EN12162:2010 and DNVGL-RU-Pt.4 Ch.6 Manufacturing Survey Arrangement: MSA0000AWR

DP Industries B.V.
Alphen aan den Rijn
6-3-2019

signature of the authorised person
# HYDRAULIC test report

<table>
<thead>
<tr>
<th>Testproduction nr.:</th>
<th>Testdate:</th>
<th>Manufact. order number:</th>
<th>Customer/project:</th>
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<tbody>
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<td>06-03-2019</td>
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</table>

<table>
<thead>
<tr>
<th>Pump model:</th>
<th>Freq/motopoles:</th>
<th>Production wh/yr:</th>
<th>Standard:</th>
<th>Motor brand:</th>
<th>Motor serial no.:</th>
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<tbody>
<tr>
<td>DPVF 25/5 B</td>
<td>50Hz 2P</td>
<td>09/2019</td>
<td>Y</td>
<td>Cantonni</td>
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<tr>
<td>m3Kg 160M-2A</td>
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<td>24,30</td>
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<td>400 / 690</td>
<td>2940</td>
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<table>
<thead>
<tr>
<th>Test liquid:</th>
<th>Temperature [°C]</th>
<th>Chloride level [%]</th>
<th>Density [kg/m³]</th>
<th>Vapour pressure [Bar]</th>
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<tbody>
<tr>
<td>Water</td>
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<td>0</td>
<td>1000</td>
<td>0.27</td>
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<table>
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<th>Notes:</th>
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<td>Requested</td>
<td>Actual</td>
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<tr>
<td>27,80 [m³/h]</td>
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<tr>
<td>78,3 [m³/h]</td>
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<table>
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<td>24,90</td>
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</table>

<table>
<thead>
<tr>
<th>Date of issue:</th>
<th>Tested by:</th>
<th>Approved by:</th>
<th>Notified body:</th>
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<tbody>
<tr>
<td>6-3-2019</td>
<td>RuEn</td>
<td>WiMo</td>
<td>DNV GL</td>
</tr>
</tbody>
</table>

Tested in conformity with standard ISO 9906:2012 (Grade 3B)
# HYDROSTATIC test report

**Test/production nr.:** 06-03-2019  
**Test date:**  
**Manufact. order number:**  
**Customer/project:**  

**Pump model:** DPVF 25/5 B  
**Freq./motor poles:** 50Hz 2P  
**Production wk/yr:** 09/2019  
**Standard:** Y  
**Motor brand:** Cantonl  
**Motor serial nr.:**  

<table>
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<tbody>
<tr>
<td>mSkg 160M-2A</td>
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<td>24.3</td>
<td>24.3</td>
<td>400 / 690</td>
<td>2940</td>
<td>3</td>
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</table>

**Test liquid:** Water  
**Temperature [°C]:** 18  
**Chloride level [%]:** 0  
**Density [kg/m³]:** 1000  
**Vapour pressure [Bar]:** 0.27  

### Test results:

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Pressure class:</th>
<th>Hydrostatic test pressure: P1.5 [Bar]</th>
<th>Duration of test [min]</th>
<th>Result</th>
<th>Additional information</th>
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<td>37.5</td>
<td>10</td>
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**Notes:**  

Date of issue: 6-3-2019  
Tested by: RuEn  
Approved by: WiMo  
Notified body: DNV GL  

Tested in conformity with standard EN 809+A1/C1:2010, EN12162:2010 and DNVGL-RU-Pl.4 Ch.6
CERTIFICATE
FOR PUMP - CENTRIFUGAL

This is to certify

that the product: Vertical Multi-stage Centrifugal Pump
Type designation: DPVSF 15/2 B
Application/context: Water
Serial/tag no:

Has been found to comply with relevant requirements in:

The product is intended for
Yard:
Yard No:
Name of vessel:
DNV GL Id No:

The product / material has been marked: Serial number, Vgl on: Pump Housing

Particulars of Vendor and Purchaser

Vendor: DP Industries B.V.
Vendor reference:
Purchaser:
Purchaser reference:

Issued at Rotterdam, Product Certification / Verification on

for DNV GL

This document has been digitally signed and will therefore not have handwritten signatures

Surveyor
Certificate No:

### Product parameters:

<table>
<thead>
<tr>
<th>Parameter name</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>19.8</td>
<td>m³/h</td>
</tr>
<tr>
<td>Delivery head</td>
<td>32.5</td>
<td>m</td>
</tr>
<tr>
<td>Rotational speed</td>
<td>3495</td>
<td>rpm</td>
</tr>
<tr>
<td>Input power</td>
<td>3</td>
<td>kW</td>
</tr>
<tr>
<td>Fluid type</td>
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<tr>
<td>Fluid density</td>
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<td>kg/m³</td>
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<tr>
<td>Fluid viscosity</td>
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<td>cSt</td>
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<tr>
<td>Fluid temperature</td>
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<td>°C</td>
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<td>Pressure Class</td>
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</tr>
<tr>
<td>Motor serialnumber</td>
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<tr>
<td>Motor Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>400 / 690</td>
<td>V</td>
</tr>
<tr>
<td>Frequency</td>
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<td>Hz</td>
</tr>
<tr>
<td>Motorpoles</td>
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<td></td>
</tr>
<tr>
<td>Test pressure</td>
<td>15</td>
<td>Bar</td>
</tr>
<tr>
<td>Test date</td>
<td>2019-02-13</td>
<td></td>
</tr>
</tbody>
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4 Appendix

4.1 Evaluation of test values

4.1.1 Flow rate Q

The flow rate is determined directly by the sensor [m$^3$/hour].

4.1.2 Head H

\[ H = \frac{p_2 - p_1}{\rho \cdot g} + \frac{U_2^2 - U_1^2 + z_2 - z_1 + H_{J2} + H_{J1}}{2g} \] [m]

The pressure reading can be corrected for the height difference between the meter and the measure plane.

\[ p_1' = p_{M1'} + \rho \cdot g \cdot (z_{M1'} - z_1) \] [Pa]

\[ p_2' = p_{M2'} + \rho \cdot g \cdot (z_{M2'} - z_2) \] [Pa]

Because the static pressure at inlet and outlet are both measured at the same height and at a pipe with the same cross sectional area it is not necessary to determine height and velocity difference at both measuring positions. Also the pipe loses are small and can according to ISO 9906:2012 be neglected. The formula can then therefore be reduced to:

\[ H = \frac{p_{M2'} - p_{M1'}}{\rho \cdot g} \] [m]

4.1.3 Rotation speed n

The rotations speed is directly determined by the sensor [rpm].

4.1.4 Mechanical power P

The calibrated electrical motor is assembled on the pump. The supplied voltage is adjusted to the value used at the motor calibration. The electrical input power $P_1$ is measured with the Yokogawa WT230 and with the polynomial, determined on basis of the motor calibration, the mechanical power is deduced.

\[ P_2 = f(P_1) \] [kW]

f polynomial function of $P_1$, determined on basis of the motor calibration

4.1.5 Pump efficiency

\[ \eta = \frac{Q \cdot H \cdot \rho \cdot g}{P_2 \cdot 10^3 \cdot 3600} \] [-]

4.1.6 NPSH

The water tank is closed (loop 1 and 2). The initial head of the pump is measured. The pressure in the tank is gradually decreased with a vacuum pump while the NPSH, the pump head and the percentage decrease of pump head are evaluated and registered.

\[ NPSH = \frac{p_1 + p_{amb} - p_v + U_1^2}{\rho \cdot g} \cdot \frac{2g}{z_D + z_{1'}} \] [m]

The NPSH3 is determined. This is the inlet head whereby the total head of 1 stage has decreased by 3 [%]. This point is deduced from the registered data.

4.1.7 Vibrations $V_{RMS}$

The sensor is fixed (magnetic) on the pump and the vibration is read from the display. The measurement is performed on different pump parts (motor stool, pump casing and motor) and in different horizontal directions (in line with the flow and normal to the flow). The vibration Veff are evaluated on basis of ISO 10816-7:2009 (Category II).
### 4.1.8 Conversion of test speed values to nominal speed conditions

**Flow Rate**

\[
Q_T = \frac{n_{sp}}{n} \cdot Q \quad \text{[m}^3\text{/h]}
\]

**Head**

\[
H_T = \left(\frac{n_{sp}}{n}\right)^2 \cdot H \quad \text{[m]}
\]

**Pump input power**

\[
P_{2T} = \left(\frac{n_{sp}}{n}\right)^3 \cdot P_2 \quad \text{[kW]}
\]

**NPSH**

\[
\text{NPSH}_T = \left(\frac{n_{sp}}{n}\right)^2 \cdot \text{NPSH} \quad \text{[m]}
\]

### 4.1.9 Used symbols

<table>
<thead>
<tr>
<th>Name</th>
<th>Unit</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A_1')</td>
<td>(\text{m}^2)</td>
<td>area of the inlet measuring section</td>
</tr>
<tr>
<td>(A_2')</td>
<td>(\text{m}^2)</td>
<td>area of the outlet measuring section</td>
</tr>
<tr>
<td>(D_1')</td>
<td>(\text{m}^2)</td>
<td>diameter of the inlet measuring section</td>
</tr>
<tr>
<td>(D_2')</td>
<td>(\text{m}^2)</td>
<td>diameter of the outlet measuring section</td>
</tr>
<tr>
<td>(g)</td>
<td>(\text{m/s}^2)</td>
<td>gravitational constant</td>
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<tr>
<td>(H)</td>
<td>(\text{m})</td>
<td>discharge head</td>
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<td>(H_{J1})</td>
<td>(\text{m})</td>
<td>losses at suction side</td>
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<tr>
<td>(H_{J2})</td>
<td>(\text{m})</td>
<td>losses at discharge side</td>
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<td>(\text{m})</td>
<td>discharge head at nominal speed converted</td>
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<td>(\text{m})</td>
<td>NPSH of the pump</td>
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<tr>
<td>(\text{NPSH}_T)</td>
<td>(\text{m})</td>
<td>NPSH at nominal speed converted</td>
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<tr>
<td>(n)</td>
<td>(\text{min}^{-1})</td>
<td>speed of pump shaft</td>
</tr>
<tr>
<td>(n_{sp})</td>
<td>(\text{min}^{-1})</td>
<td>nominal speed / specified speed of pump</td>
</tr>
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<td>(\text{kW})</td>
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<tr>
<td>(P_2)</td>
<td>(\text{kW})</td>
<td>mechanical pump input power</td>
</tr>
</tbody>
</table>
dp pumps

P.O. Box 28
2400 AA Alphen aan den Rijn
The Netherlands

t +31 172 48 83 25

dp@dp-pumps.com
www.dp-pumps.com

03/2019

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