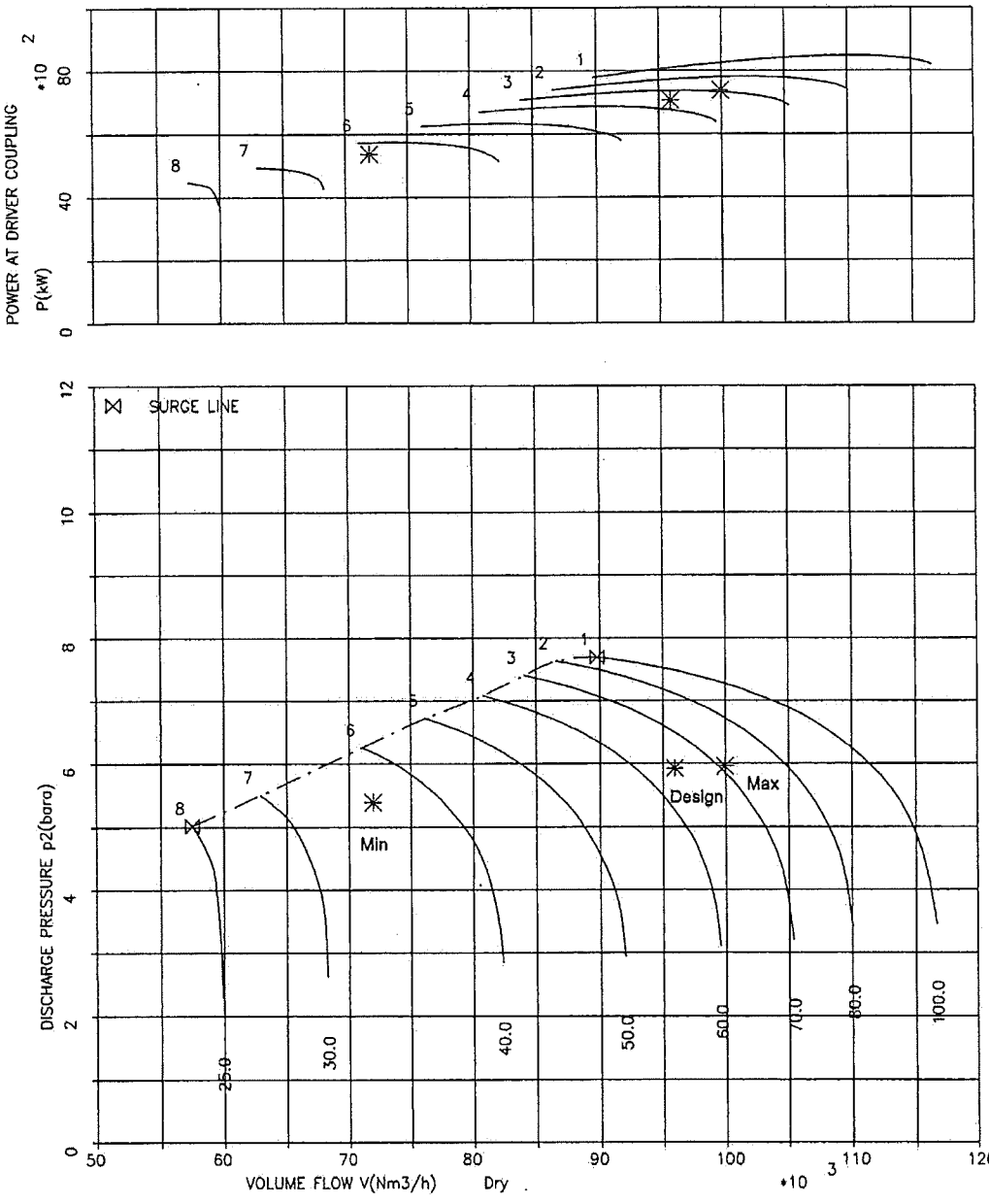
# 12. Machinery Data

# Kosice RIK 80-1+1+1+1 cold

| REFERENCE CURVE No | | 1 | CURVE | p1 (bara) | T1 (°C) | R.H. | MW Dry | TW1 (°C) | N/No | ANGLE (°) |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1/min) | 7297 | 1 | 0.985 | 12.0 | 0.650 | 28.963 | 16.0 | 1.00 | 100.0 |
| | | | 2 | 0.985 | 12.0 | 0.650 | 28.963 | 16.0 | 1.00 | 80.0 |
| | | | 3 | 0.985 | 12.0 | 0.650 | 28.963 | 16.0 | 1.00 | 70.0 |
| | | | 4 | 0.985 | 12.0 | 0.650 | 28.963 | 16.0 | 1.00 | 60.0 |
| | | | 5 | 0.985 | 12.0 | 0.650 | 28.963 | 16.0 | 1.00 | 50.0 |
| | | | 6 | 0.985 | 12.0 | 0.650 | 28.963 | 16.0 | 1.00 | 40.0 |
| | | | 7 | 0.985 | 12.0 | 0.650 | 28.963 | 16.0 | 1.00 | 30.0 |
| | | | 8 | 0.985 | 12.0 | 0.650 | 28.963 | 16.0 | 1.00 | 25.0 |

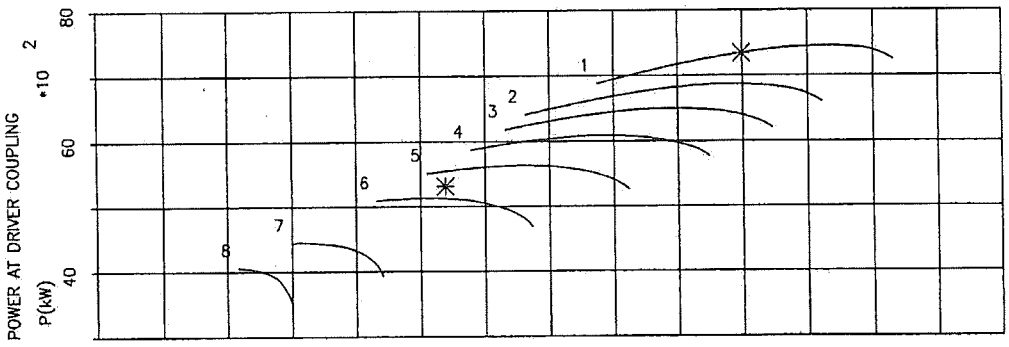


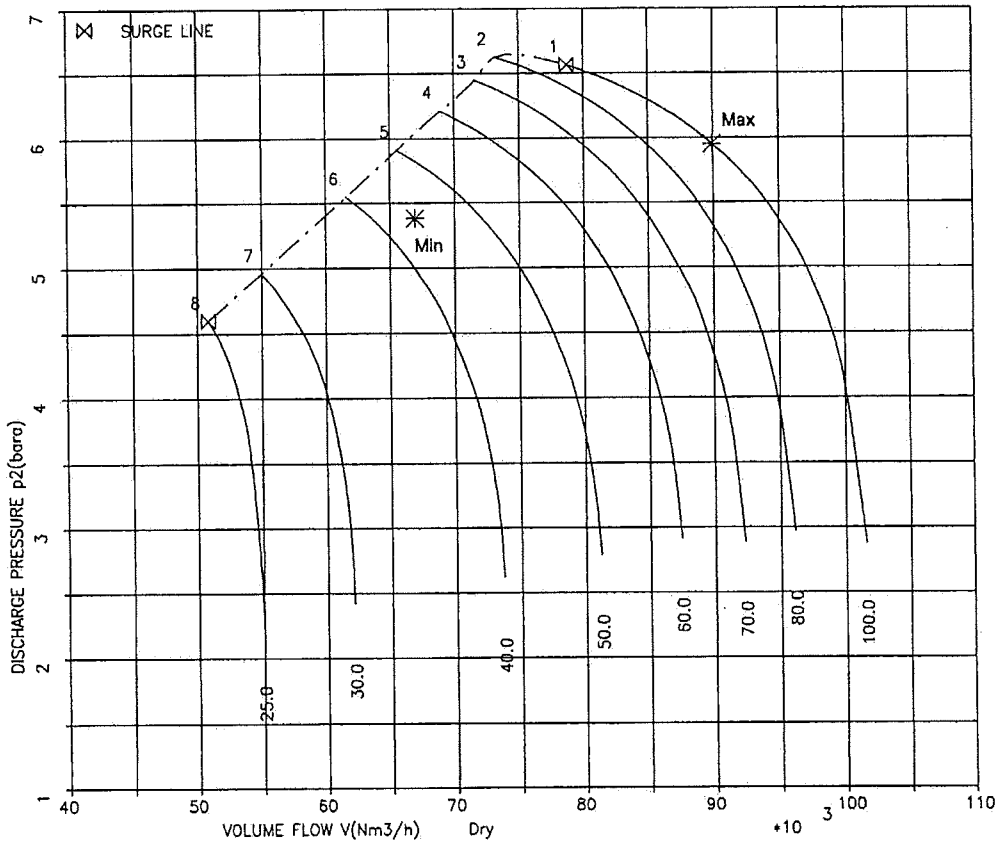



| MAN TURBO | Dept. SC71 | Name B. Frey | Date 09-JUN-04 | Page 1 of 3 |
|---|---|---|---|---|
| Classification<br>☐ MAN only ☒ Project<br>☒ Client ☐ Contract<br>☐ free Distribution | Kosice | | MAN No 7704059 | Client No |
| | Title<br>Performance Curves | | | Document No<br>4-7704059-1 Rev |

# Kosice RIK 80-1+1+1+1 hot

| REFERENCE CURVE No | | 1 | CURVE | p1 (bara) | T1 (°C) | R.H. | MW Dry | TW1 (°C) | N/No | ANGLE (°) |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1/min) | 7297 | 1 | 0.985 | 35.0 | 0.670 | 28.962 | 37.0 | 1.00 | 100.0 |
| | | | 2 | 0.985 | 35.0 | 0.670 | 28.962 | 37.0 | 1.00 | 80.0 |
| | | | 3 | 0.985 | 35.0 | 0.670 | 28.962 | 37.0 | 1.00 | 70.0 |
| | | | 4 | 0.985 | 35.0 | 0.670 | 28.962 | 37.0 | 1.00 | 60.0 |
| | | | 5 | 0.985 | 35.0 | 0.670 | 28.962 | 37.0 | 1.00 | 50.0 |
| | | | 6 | 0.985 | 35.0 | 0.670 | 28.962 | 37.0 | 1.00 | 40.0 |
| | | | 7 | 0.985 | 35.0 | 0.670 | 28.962 | 37.0 | 1.00 | 30.0 |
| | | | 8 | 0.985 | 35.0 | 0.670 | 28.962 | 37.0 | 1.00 | 25.0 |



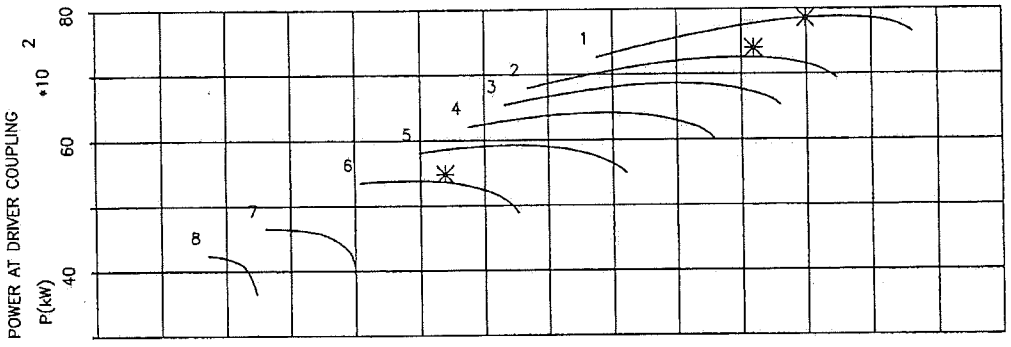



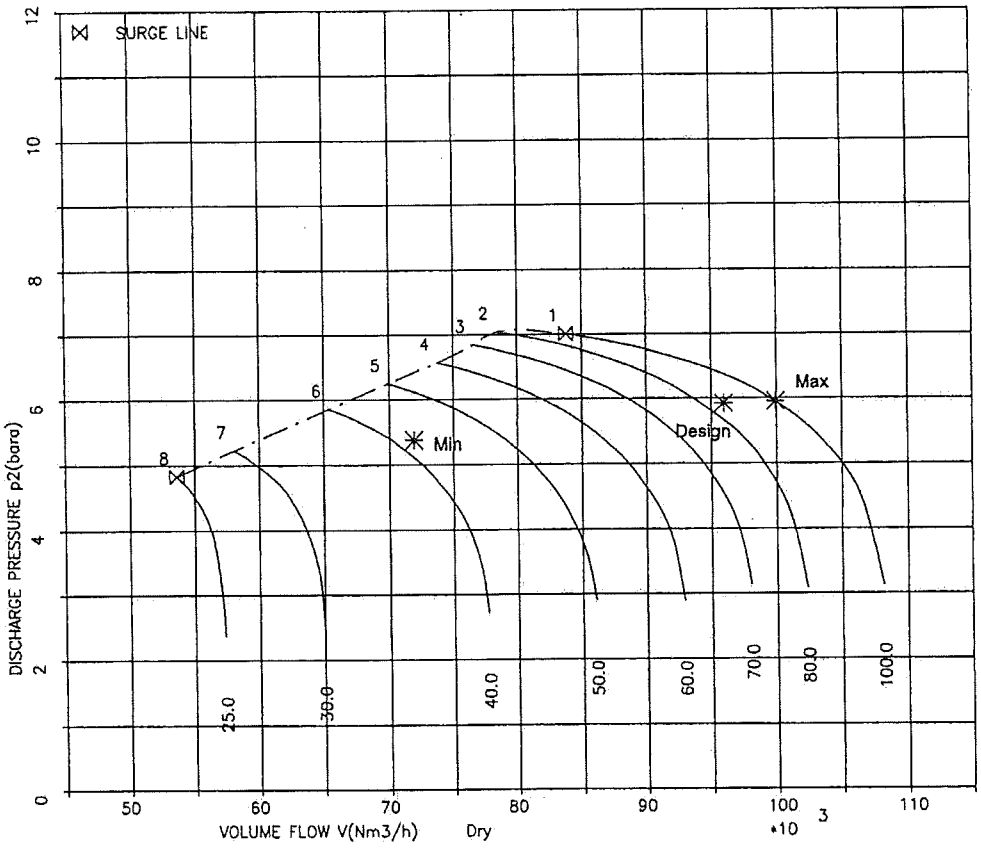



| MAN TURBO | Dept. SC71 | Name B. Frey | Date 09-JUN-04 | Page 3 of 3 |
|---|---|---|---|---|
| Classification<br>☐ MAN only ☒ Project<br>☒ Client ☐ Contract<br>☐ free Distribution | Kosice | | MAN No 7704059 | Client No |
| | Title<br>Performance Curves | | | Document No 4-7704059-1 Rev |

# Kosice RIK 80-1+1+1+1 warm

| REFERENCE CURVE No | (1/min) | CURVE | p1 (bara) | T1 (°C) | R.H. | MW Dry | TW1 (°C) | N/No | ANGLE (°) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 7297 | 1 | 0.985 | 25.0 | 0.650 | 28.963 | 29.0 | 1.00 | 100.0 |
| | | 2 | 0.985 | 25.0 | 0.650 | 28.963 | 29.0 | 1.00 | 80.0 |
| | | 3 | 0.985 | 25.0 | 0.650 | 28.963 | 29.0 | 1.00 | 70.0 |
| | | 4 | 0.985 | 25.0 | 0.650 | 28.963 | 29.0 | 1.00 | 60.0 |
| | | 5 | 0.985 | 25.0 | 0.650 | 28.963 | 29.0 | 1.00 | 50.0 |
| | | 6 | 0.985 | 25.0 | 0.650 | 28.963 | 29.0 | 1.00 | 40.0 |
| | | 7 | 0.985 | 25.0 | 0.650 | 28.963 | 29.0 | 1.00 | 30.0 |
| | | 8 | 0.985 | 25.0 | 0.650 | 28.963 | 29.0 | 1.00 | 25.0 |






| MAN TURBO | Dept. SC71 | Name B. Frey | Date 09-JUN-04 | Page 2 of 3 |
|---|---|---|---|---|
| Classification<br>☐ MAN only ☒ Project<br>☒ Client ☐ Contract<br>☐ free Distribution | Kosice | | MAN No 7704059 | Client No |
| | Title<br>Performance Curves | | | Document No 4-7704059-1 Rev. |

| | | |
|---|---|---|
| MAN | **KENNFELDER**<br>**PERFORMANCE CURVES**<br>**Type RG31-4** | KENNWORT / CODE<br>**KOSBOOST**<br>AUFTRAG-NR / ORDER-NO<br>**312 410**<br>PSP - Element<br>0 |

01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39

AIR LIQUIDE™

| ECHELLE<br>*SCALE* | N° D'AFFAIRE<br>*JOB NUMBER* | FMT<br>*FMT* | GROUPE<br>*GROUP* | N°<br>*NBR* |
|---|---|---|---|---|
| / | **KOSICE**<br>**50-3023-01** | **A4** | **612** | |

| REVISION<br>REVISION | 00 | 01 | 02 | 03 | 04 | 05 | REVIDIERTE ZEILE<br>REVISED LINE |
|---|---|---|---|---|---|---|---|
| DATUM<br>DATE | 04-12-21 | | | | | | |
| NAME<br>NAME | Kretzschmar | | | | | | BLATT<br>SHEET |
| GEPRÜFT<br>CHECKED | Sommer | | | | | | 1 von/of 10 |
| ABTEILUNG<br>DEPARTMENT | TELEFON<br>PHONE NO. | TELEFAX<br>FAX NO. | FORMAT<br>SIZE | DOKUMENTEN-NR. / DOCUMENT NO: | | | REVISION<br>REVISION |
| TC3 | +49-30-4301-2431 | +49-30-4301-2119 | **A4** | **10000219309** | | | **00** |



X:\01_Auftraege\Neubau\Mehrweller\KOSBOOST\Berechnung\0200-Thermodynamik\0210-KENN5\0212-Kunde\Deckblatt.doc

# Centrifugal compressor
# Type RG31-4
# Predicted Performance Curves

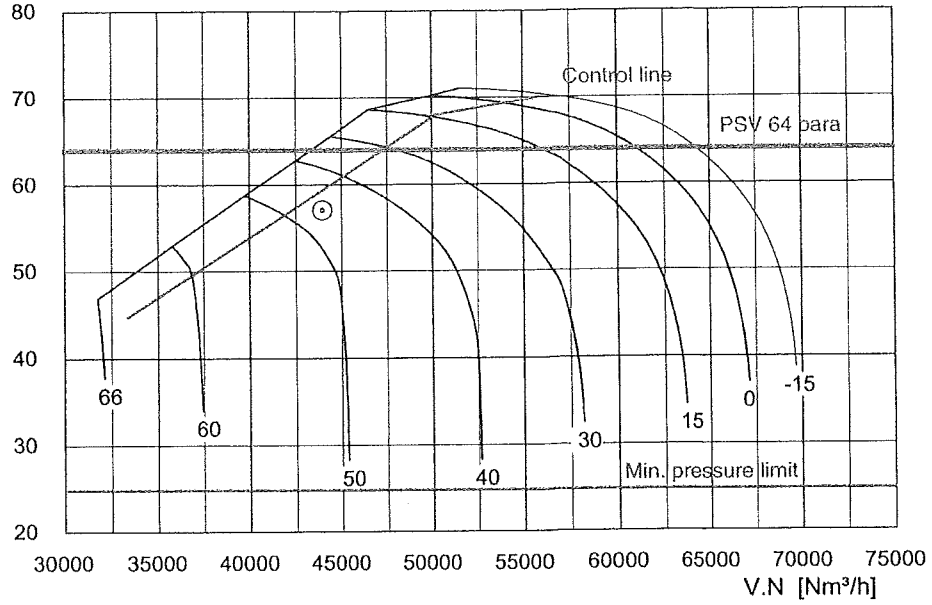
| | |
|---|---|
| Client: | AL AGS GmbH |
| Item: | BAC |
| Job: | KOSBOOST |
| Quote: | 312410 |

Adjustable inlet guide vanes, stage(s) 1, Guide vane angles are for information only!

Case: ⊙ 1

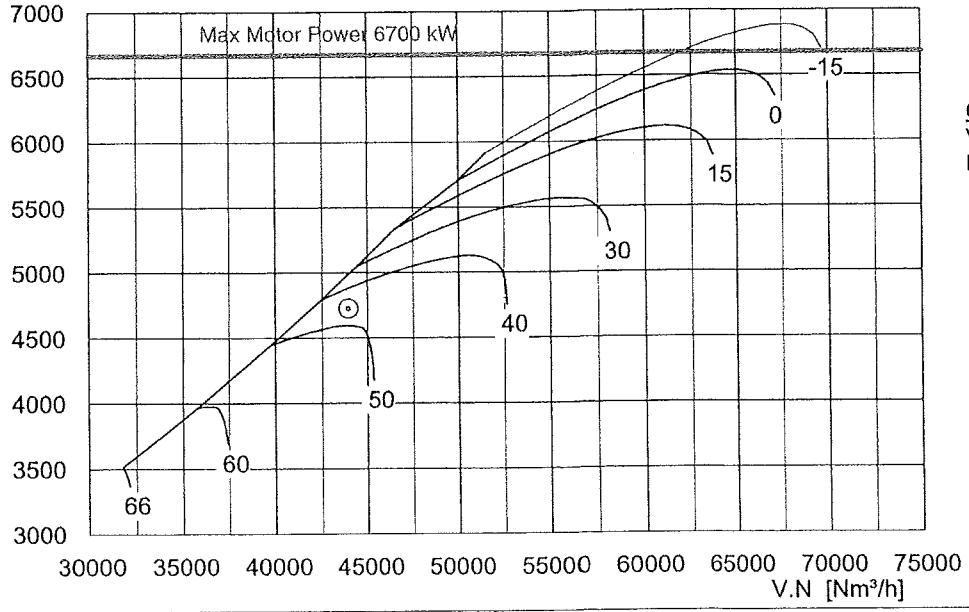
| | | | |
|---|---|---|---|
| Gas | DRY AIR | Suction Pressure [bara] | 5.60 |
| Molar Mass [kg/kmol] | 28.96 | Suction Temp. [°C] | 20 |
| Is. Vol-exponent | 1.4087 | Intercooling Temp. [°C] | 23 |
| Compress. Factor | .99797 | | |

## Discharge Pressure [bara]




Case A1
Vn = 43950
Pd = 57.1

## Power at Coupling [kW]




Case A1
Vn = 43950
Pk = 4726

| Prepared Kretzschmar | Dept.: | Time: | Date: | Remarks: | Page |
|---|---|---|---|---|---|
| Checked: | TC31 | 15:23 | 15.11.04 | A1 | 2 / 10 |

KENN5 - Version 5.4.2.4.6 (#0): x:\01_auftraege\neubau\mehrwelfer\kosboost\berechnung\0200-thermodynamik\0210-kenn5\0213-intern\\casea1_sab.ken

# Centrifugal compressor
# Type RG31-4
# Predicted Performance Curves

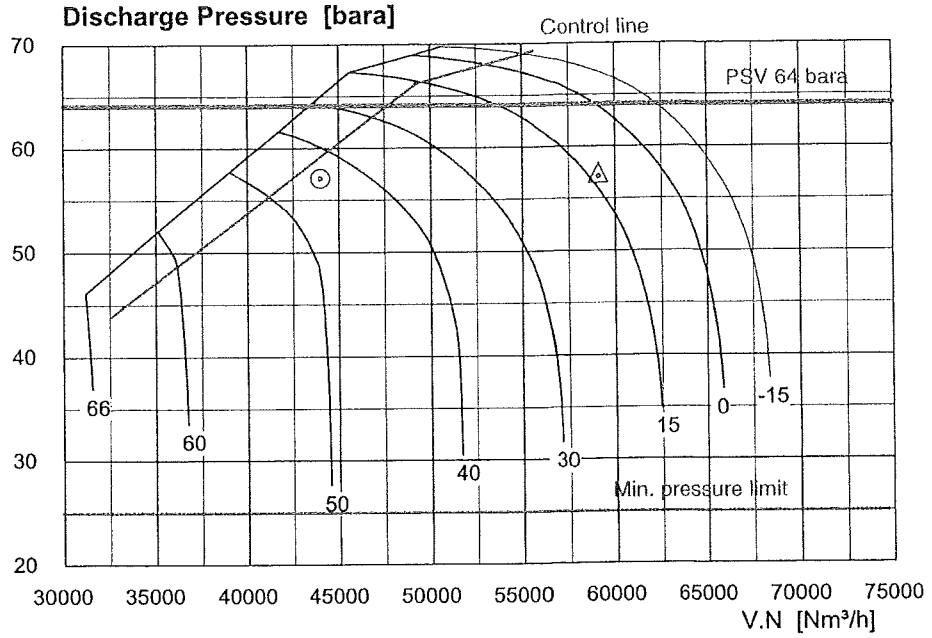
| | |
|---|---|
| Client: | AL AGS GmbH |
| Item: | BAC |
| Job: | KOSBOOST |
| Quote: | 312410 |

Adjustable inlet guide vanes, stage(s) 1, Guide vane angles are for information only!

Case
⊙ 1
△ 2

| | | | |
|---|---|---|---|
| Gas | DRY AIR | Suction Pressure [bara] | 5.50 |
| Molar Mass [kg/kmol] | 28.96 | Suction Temp. [°C] | 20 |
| Is. Vol-exponent | 1.4085 | Intercooling Temp. [°C] | 23 |
| Compress. Factor | .99801 | | |

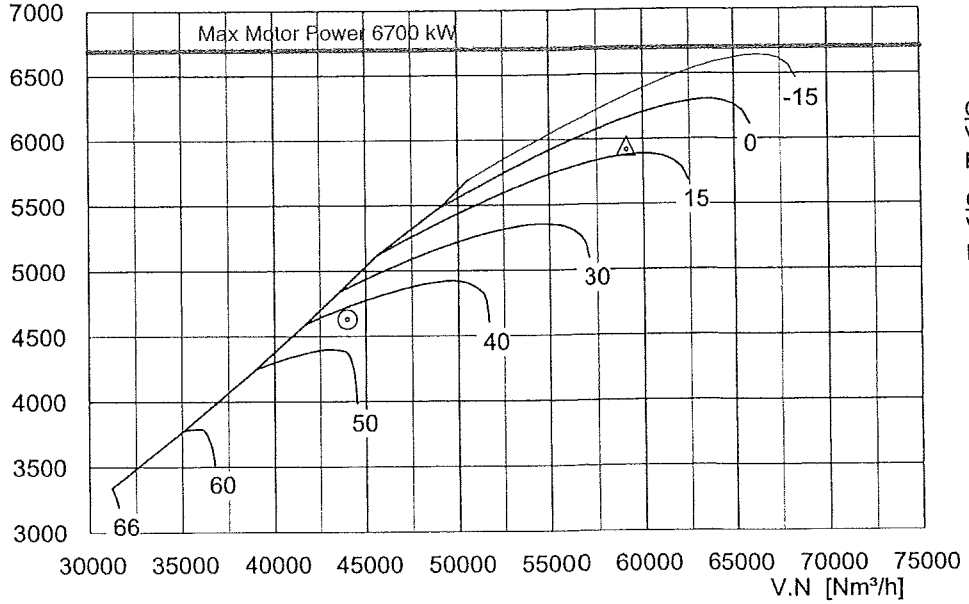
**Discharge Pressure [bara]**




Case A2
Vn = 44000
Pd = 57.1

Case A4
Vn = 59100
Pd = 57.1

**Power at Coupling [kW]**




Case A2
Vn = 44000
Pk = 4648

Case A4
Vn = 59100
Pk = 5928

| Prepared Kretzschmar | Dept.: | Time: | Date: | Remarks: | Page |
|---|---|---|---|---|---|
| Checked: | TC31 | 15:26 | 15.11.04 | A2 / A4 | 3 / 10 |

# Centrifugal compressor
# Type RG31-4
# Predicted Performance Curves

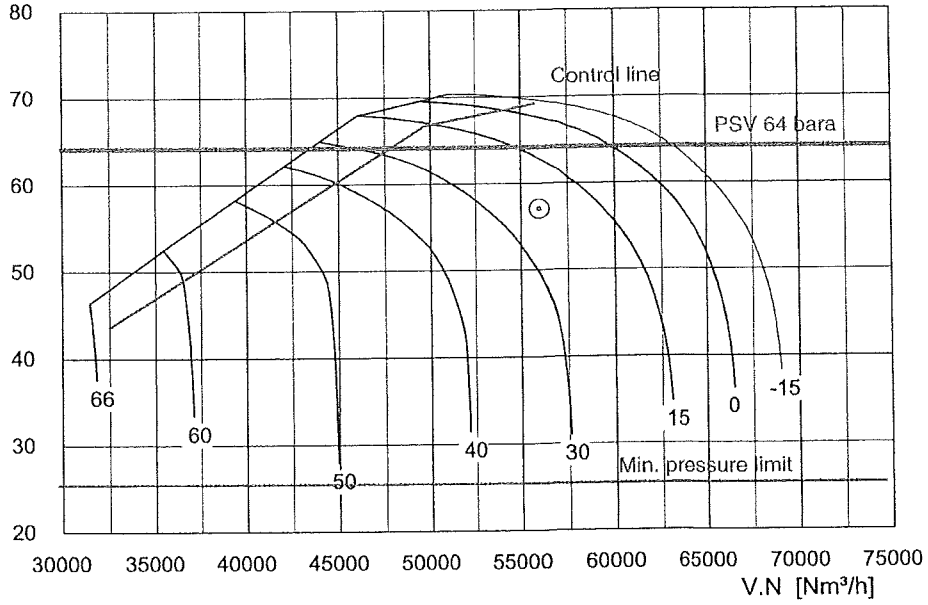
| | |
|---|---|
| Client: | AL AGS GmbH |
| Item: | BAC |
| Job: | KOSBOOST |
| Quote: | 312410 |

Adjustable inlet guide vanes, stage(s) 1, Guide vane angles are for information only!

Case: ⊙ 1

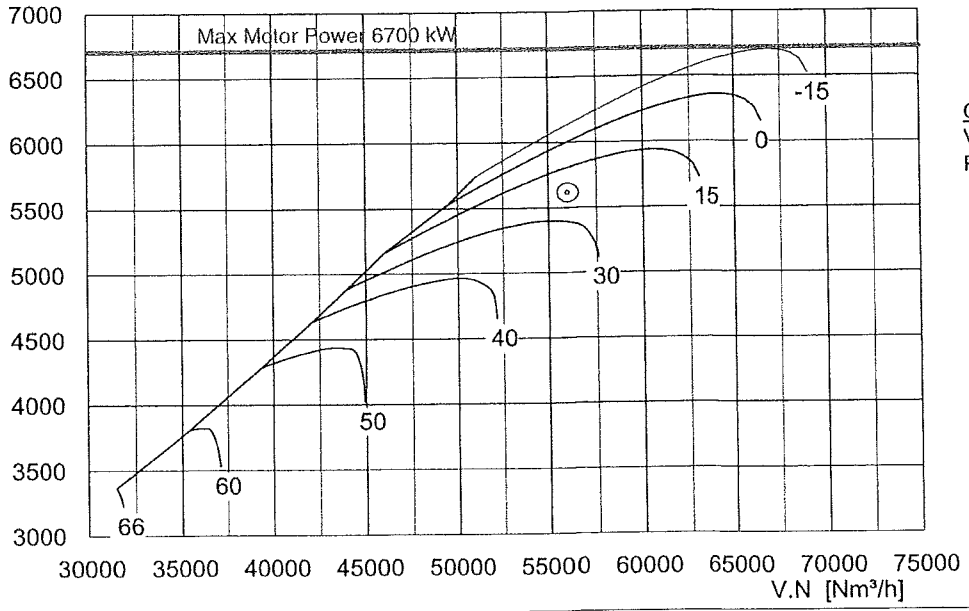
| | | | |
|---|---|---|---|
| Gas | DRY AIR | Suction Pressure [bara] | 5.55 |
| Molar Mass [kg/kmol] | 28.96 | Suction Temp. [°C] | 20 |
| Is. Vol-exponent | 1.4086 | Intercooling Temp. [°C] | 23 |
| Compress. Factor | .99799 | | |

**Discharge Pressure [bara]**




Case A3
Vn = 56000
Pd = 57.1

**Power at Coupling [kW]**




Case A3
Vn = 56000
Pk = 5638

| Prepared Kretzschmar | Dept.: | Time: | Date: | Remarks: | Page |
|---|---|---|---|---|---|
| Checked: | TC31 | 15:28 | 15.11.04 | A3 | 4 / 10 |

KENN5 - Version 5.5.3.6 (#0): x:\01_auftraege\neubau\mehrwelle\kosboost\berechnung\0200-thermodynamik\0210-kenn5\0213-intern\casea3_sab.ken

# Centrifugal compressor
# Type RG31-4
# Predicted Performance Curves

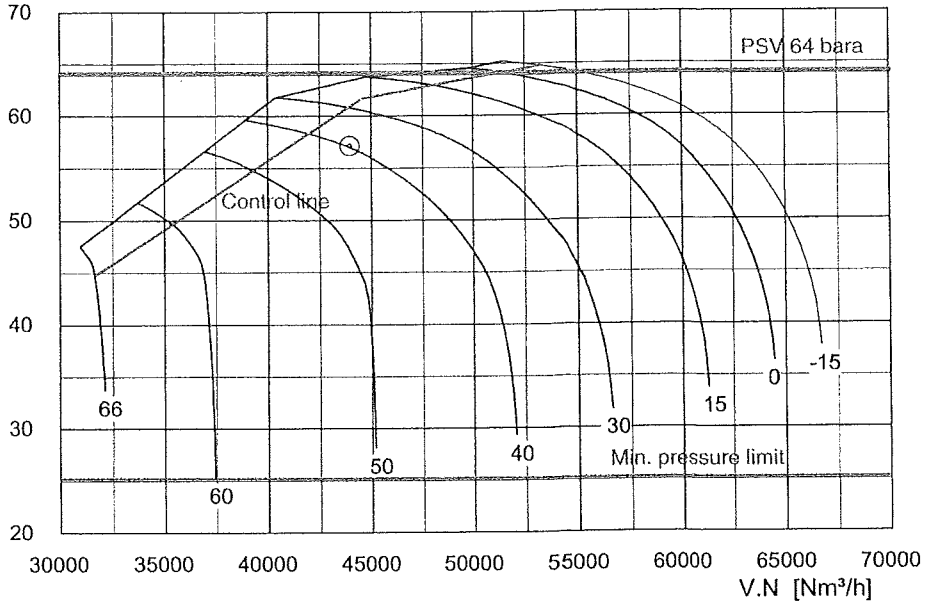
| | |
|---|---|
| Client: | AL AGS GmbH |
| Item: | BAC |
| Job: | KOSBOOST |
| Quote: | 312410 |

Adjustable inlet guide vanes, stage(s) 1, Guide vane angles are for information only!

Case ⊙ 1

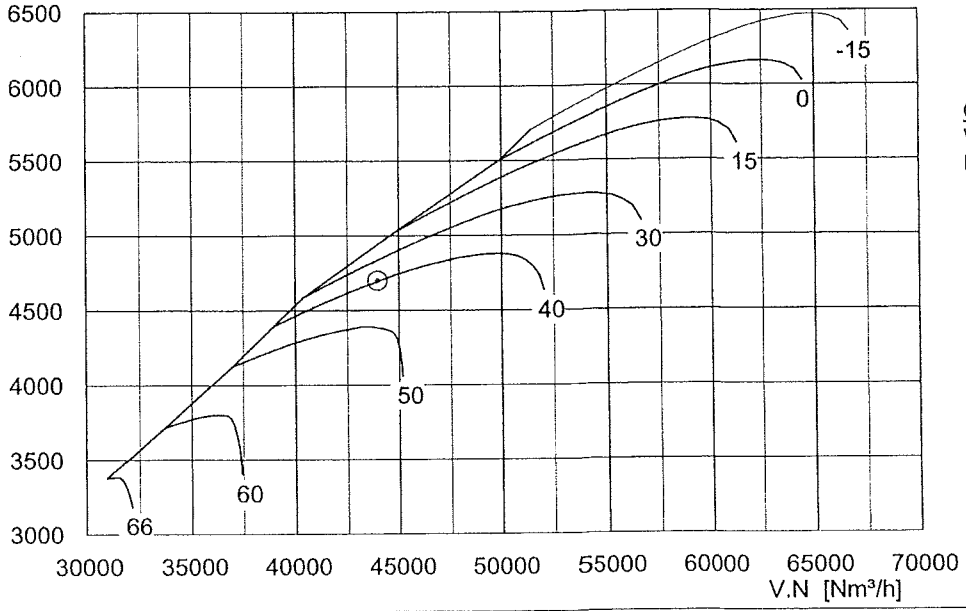
| | | | |
|---|---|---|---|
| Gas | DRY AIR | Suction Pressure [bara] | 5.60 |
| Molar Mass [kg/kmol] | 28.96 | Suction Temp. [°C] | 20 |
| Is. Vol-exponent | 1.4087 | Intercooling Temp. [°C] | 36 |
| Compress. Factor | .99797 | | |

## Discharge Pressure [bara]




Case B1
Vn = 43950
Pd = 57.1

## Power at Coupling [kW]




Case B1
Vn = 43950
Pk = 4718

| Prepared Kretzschmar | Dept.: | Time: | Date: | Remarks: | Page |
|---|---|---|---|---|---|
| Checked: | TC31 | 15:51 | 15.11.04 | B1 | 5 / 10 |

# Centrifugal compressor
# Type RG31-4
# Predicted Performance Curves

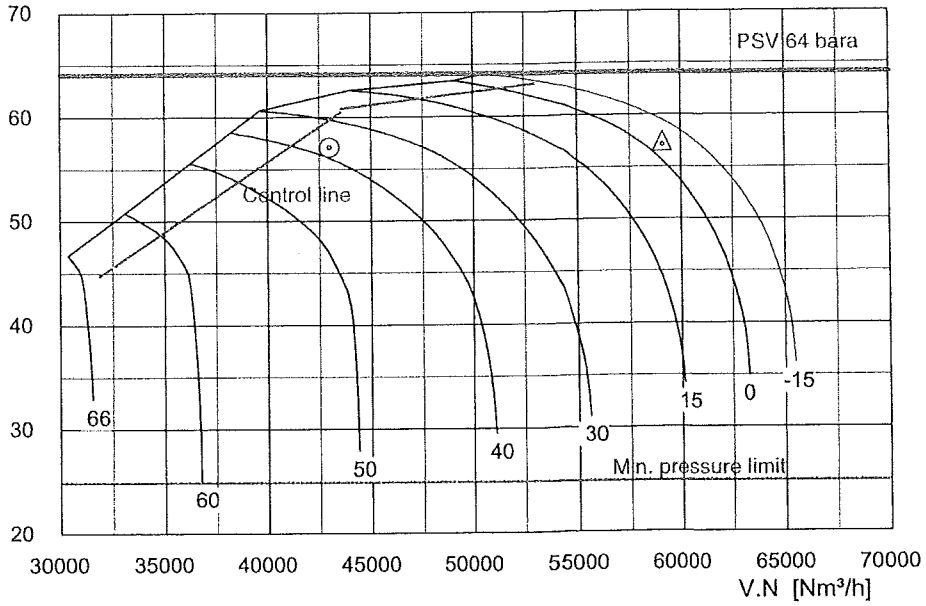
| | |
|---|---|
| Client: | AL AGS GmbH |
| Item: | BAC |
| Job: | KOSBOOST |
| Quote: | 312410 |

Adjustable inlet guide vanes, stage(s) 1, Guide vane angles are for information only!

Case
⊙ 1
△ 2

| | | | | |
|---|---|---|---|---|
| Gas | DRY AIR | Suction Pressure | [bara] | 5.50 |
| Molar Mass [kg/kmol] | 28.96 | Suction Temp. | [°C] | 20 |
| Is. Vol-exponent | 1.4085 | Intercooling Temp. | [°C] | 36 |
| Compress. Factor | .99801 | | | |

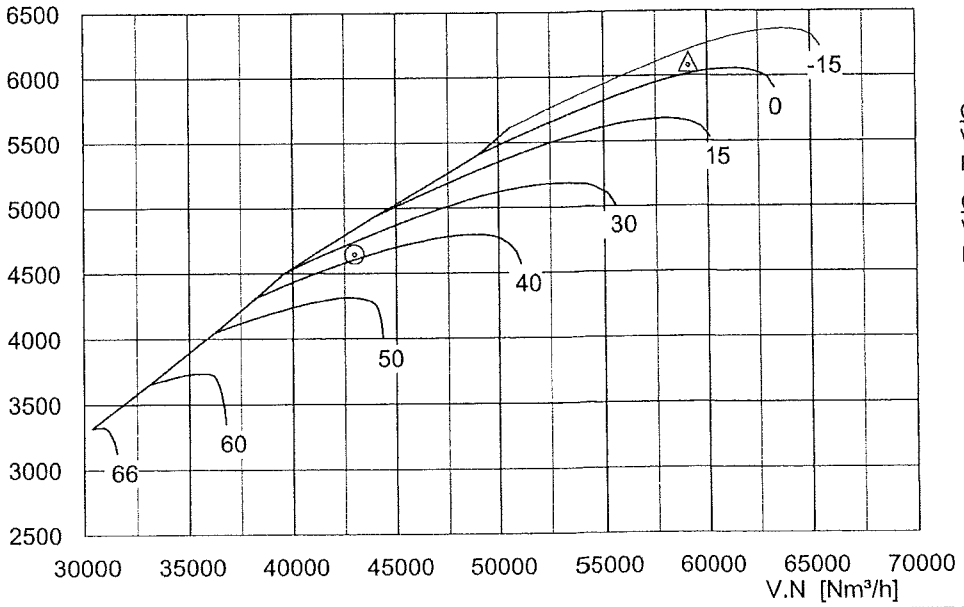
## Discharge Pressure [bara]




Case B2
Vn = 43000
Pd = 57.1

Case B4
Vn = 59100
Pd = 57.1

## Power at Coupling [kW]




Case B2
Vn = 43000
Pk = 4663

Case B4
Vn = 59100
Pk = 6097

| Prepared Kretzschmar | Dept.: | Time: | Date: | Remarks: | Page |
|---|---|---|---|---|---|
| Checked: | TC31 | 15:54 | 15.11.04 | B2 / B4 | 6 / 10 |

# Centrifugal compressor
# Type RG31-4
# Predicted Performance Curves

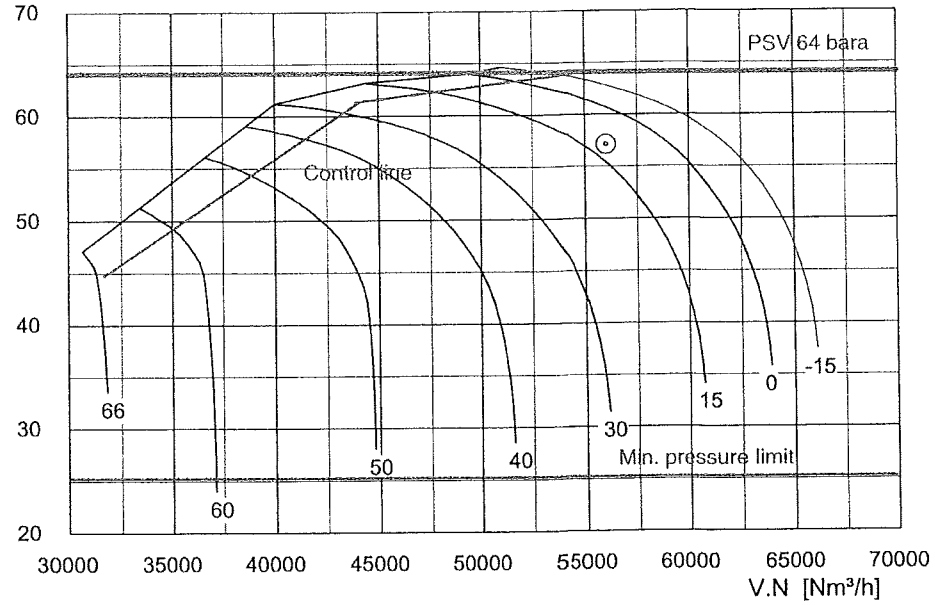
| | |
|---|---|
| Client: | AL AGS GmbH |
| Item: | BAC |
| Job: | KOSBOOST |
| Quote: | 312410 |

Adjustable inlet guide vanes, stage(s) 1, Guide vane angles are for information only!

Case: ⊙ 1

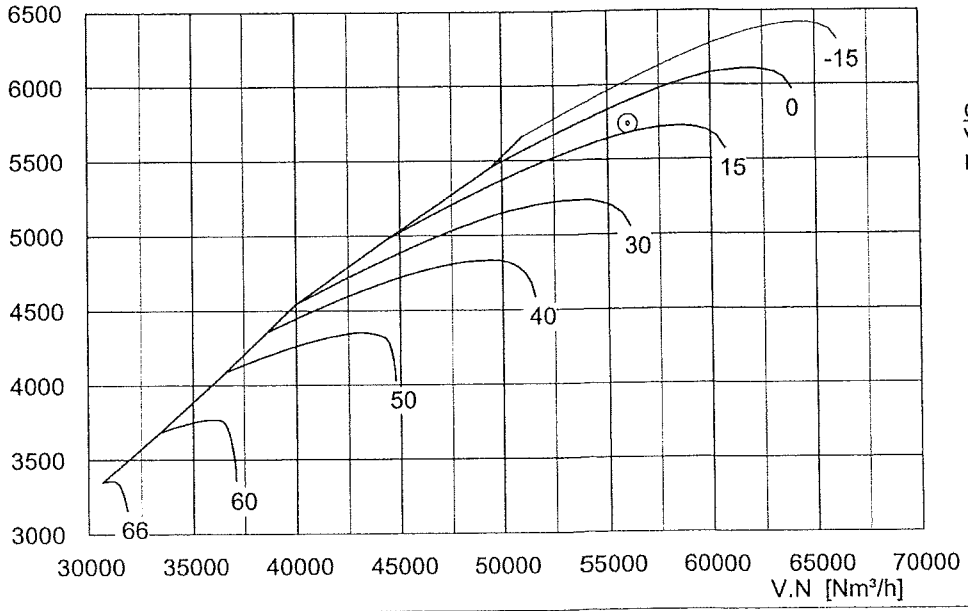
| | | | |
|---|---|---|---|
| Gas | DRY AIR | Suction Pressure [bara] | 5.55 |
| Molar Mass [kg/kmol] | 28.96 | Suction Temp. [°C] | 20 |
| Is. Vol-exponent | 1.4086 | Intercooling Temp. [°C] | 36 |
| Compress. Factor | .99799 | | |

## Discharge Pressure [bara]




Case B3
Vn = 56000
Pd = 57.1

## Power at Coupling [kW]




Case B3
Vn = 56000
Pk = 5753

| Prepared Kretzschmar | Dept.: | Time: | Date: | Remarks: | Page |
|---|---|---|---|---|---|
| Checked: | TC31 | 15:54 | 15.11.04 | B3 | 7 / 10 |

# Centrifugal compressor
# Type RG31-4
# Predicted Performance Curves

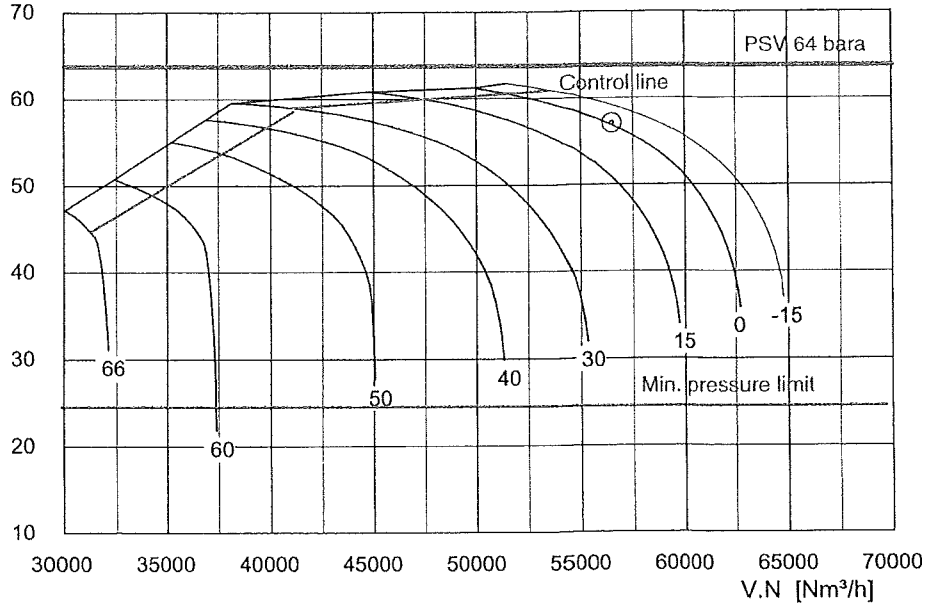
| | |
|---|---|
| Client: | AL AGS GmbH |
| Item: | BAC |
| Job: | KOSBOOST |
| Quote: | 312410 |

Adjustable inlet guide vanes, stage(s) 1, Guide vane angles are for information only!

Case: ⊙ 1

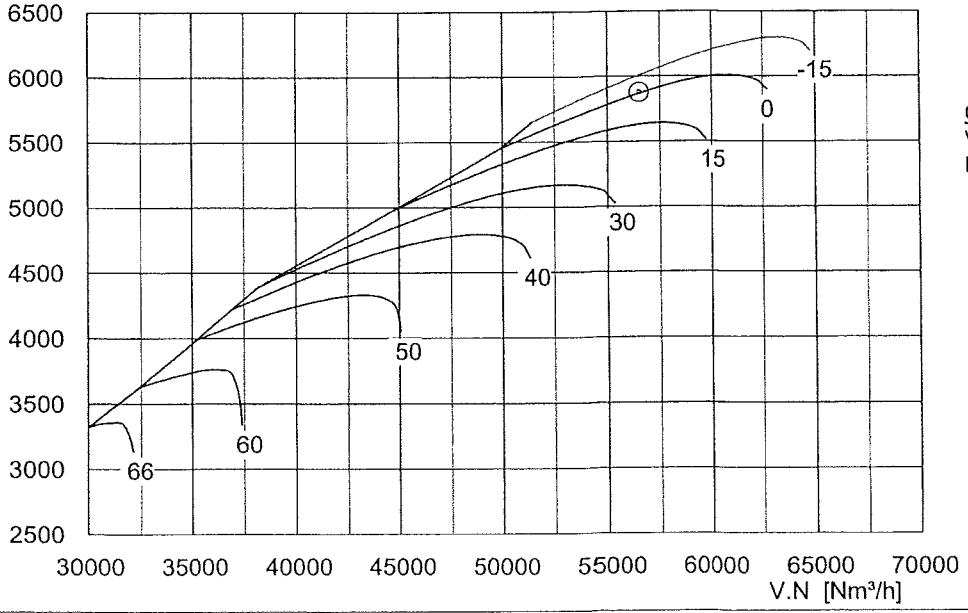
| | | | |
|---|---|---|---|
| Gas | DRY AIR | Suction Pressure [bara] | 5.60 |
| Molar Mass [kg/kmol] | 28.96 | Suction Temp. [°C] | 20 |
| Is. Vol-exponent | 1.4087 | Intercooling Temp. [°C] | 44 |
| Compress. Factor | .99797 | | |

## Discharge Pressure [bara]




Case C1
Vn = 56500
Pd = 57.1

## Power at Coupling [kW]




Case C1
Vn = 56500
Pk = 5898

| Prepared Kretzschmar | Dept.: | Time: | Date: | Remarks: | Page |
|---|---|---|---|---|---|
| Checked: | TC31 | 15:55 | 15.11.04 | C1 | 8 / 10 |

# Centrifugal compressor
# Type RG31-4
# Predicted Performance Curves

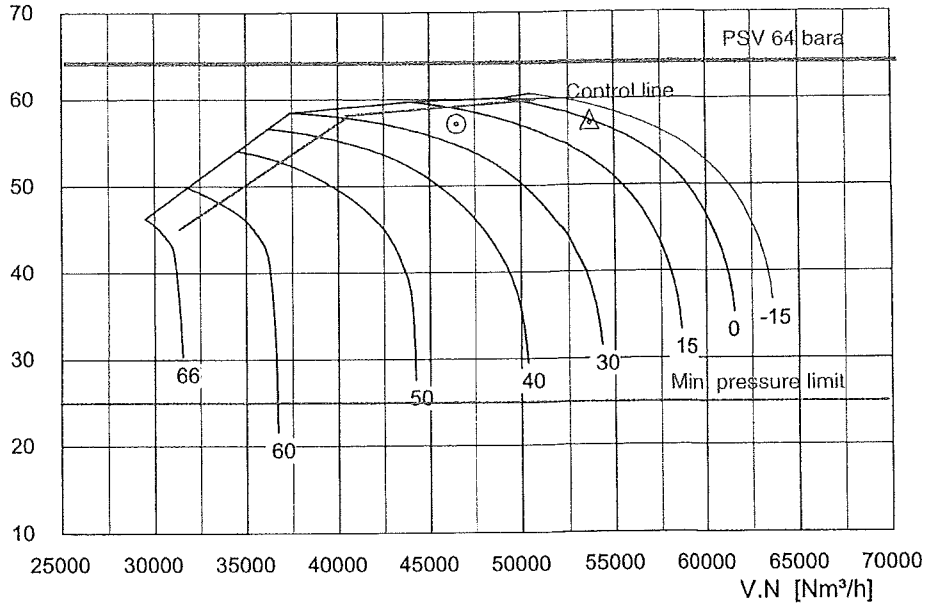
| | |
|---|---|
| Client: | AL AGS GmbH |
| Item: | BAC |
| Job: | KOSBOOST |
| Quote: | 312410 |

Adjustable inlet guide vanes, stage(s) 1, Guide vane angles are for information only!

Case
⊙ 1
△ 2

| | | | |
|---|---|---|---|
| Gas | DRY AIR | Suction Pressure [bara] | 5.50 |
| Molar Mass [kg/kmol] | 28.96 | Suction Temp. [°C] | 20 |
| Is. Vol-exponent | 1.4085 | Intercooling Temp. [°C] | 44 |
| Compress. Factor | .99801 | | |

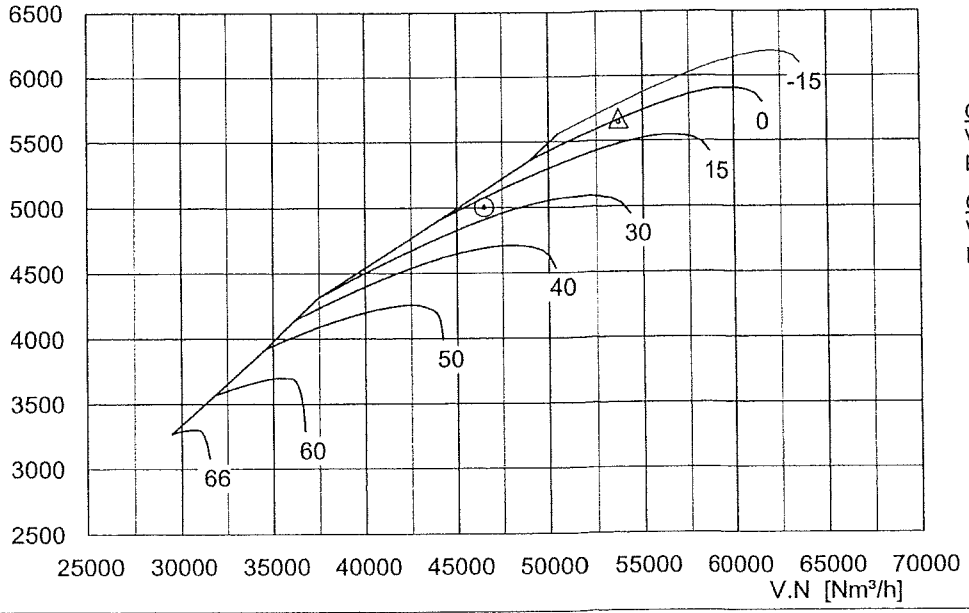
## Discharge Pressure [bara]




Case C2
Vn = 46500
Pd = 57.1

Case C4
Vn = 53700
Pd = 57.1

## Power at Coupling [kW]




Case C2
Vn = 46500
Pk = 5021

Case C4
Vn = 53700
Pk = 5669

| Prepared Kretzschmar | Dept.: | Time: | Date: | Remarks: | Page |
|---|---|---|---|---|---|
| Checked: | TC31 | 15:56 | 15.11.04 | C2 / C4 | 9 / 10 |

# Centrifugal compressor
# Type RG31-4
# Predicted Performance Curves

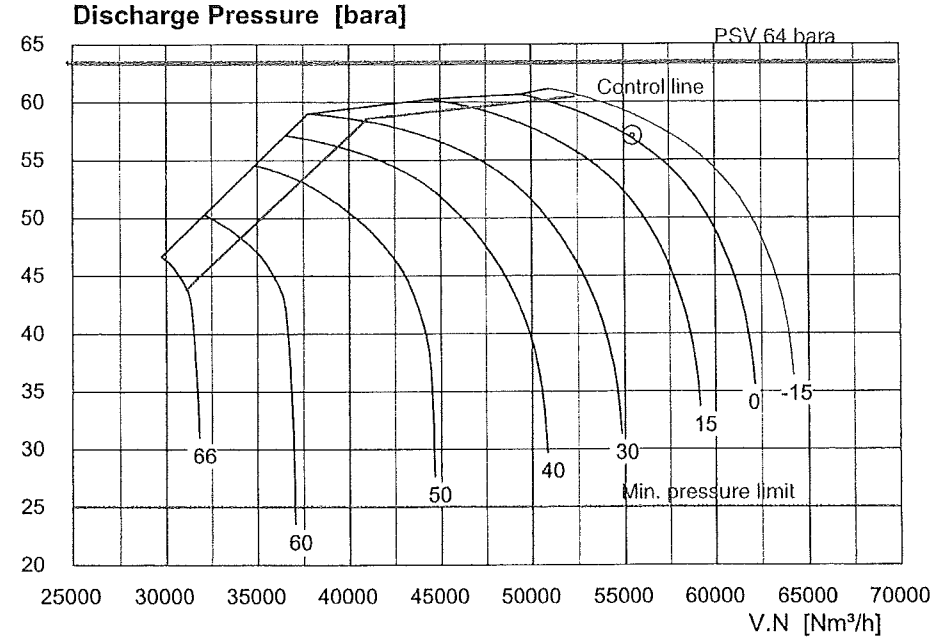
| | |
|---|---|
| Client: | AL AGS GmbH |
| Item: | BAC |
| Job: | KOSBOOST |
| Quote: | 312410 |

Adjustable inlet guide vanes, stage(s) 1, Guide vane angles are for information only!

Case ⊙ 1

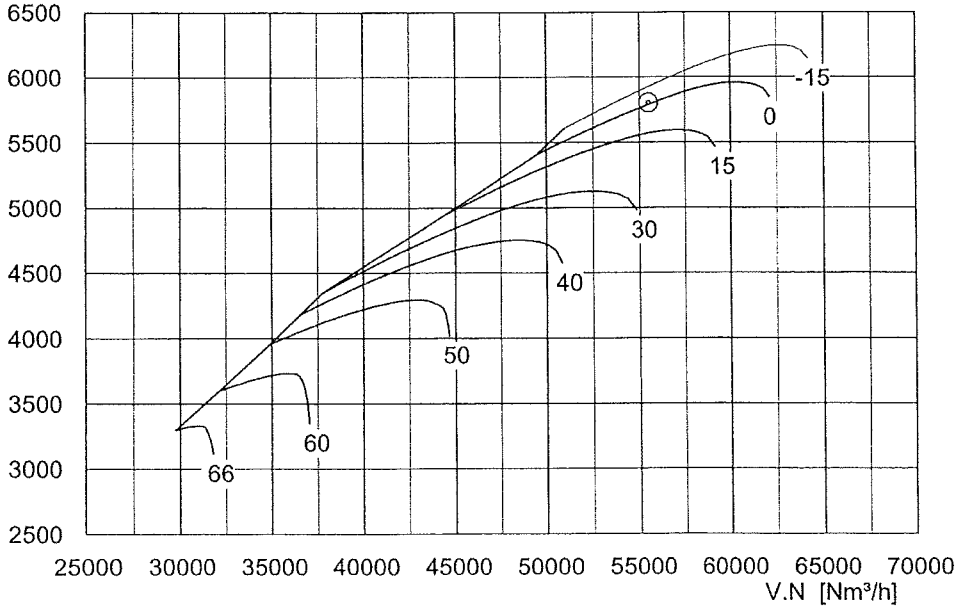
| | | | |
|---|---|---|---|
| Gas | DRY AIR | Suction Pressure [bara] | 5.55 |
| Molar Mass [kg/kmol] | 28.96 | Suction Temp. [°C] | 20 |
| Is. Vol-exponent | 1.4086 | Intercooling Temp. [°C] | 44 |
| Compress. Factor | .99799 | | |

## Discharge Pressure [bara]




Case C3
Vn = 55500
Pd = 57.1

## Power at Coupling [kW]



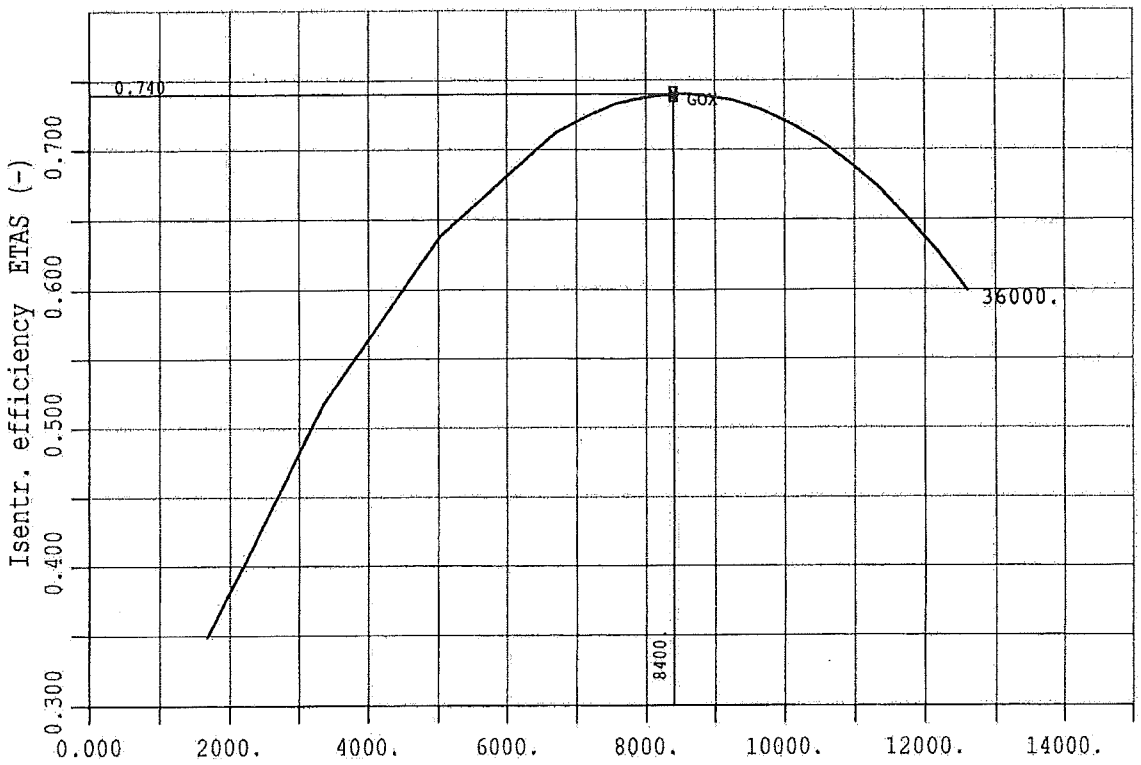

Case C3
Vn = 55500
Pk = 5826

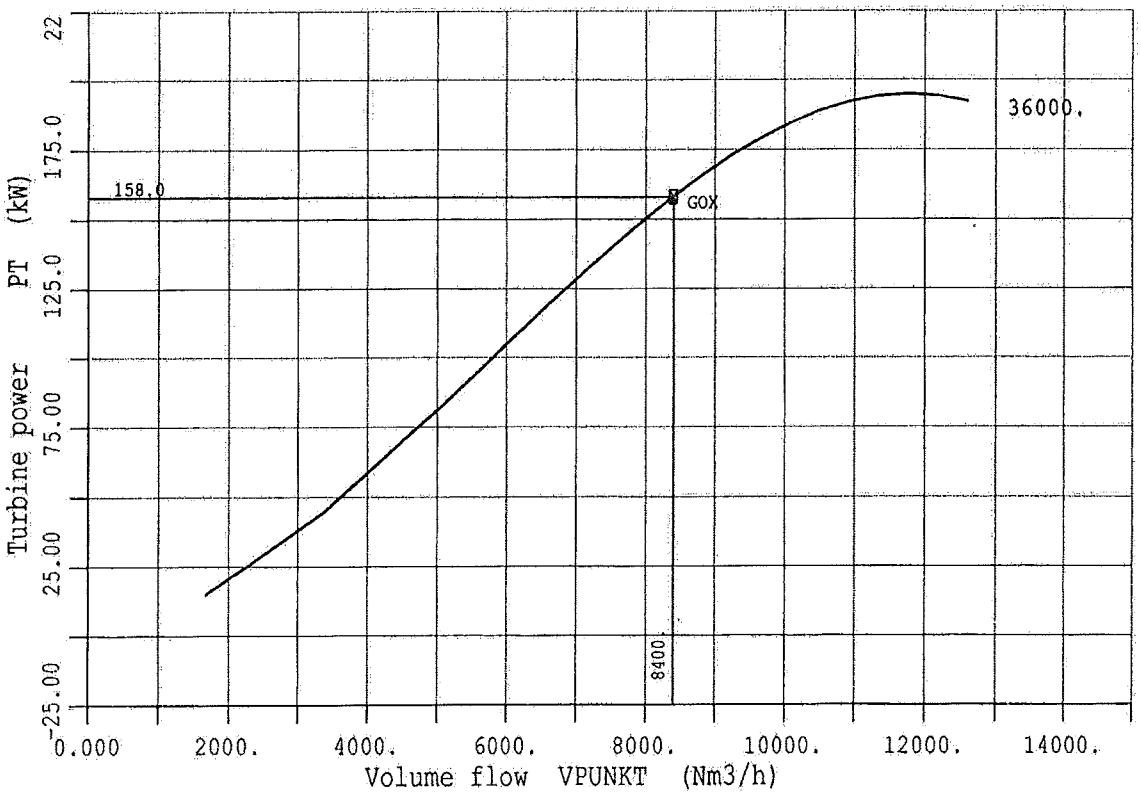
| Prepared Kretzschmar | Dept.: | Time: | Date: | Remarks: | Page |
|---|---|---|---|---|---|
| Checked: | TC31 | 16:14 | 15.11.04 | C3 | 10 / 10 |

KENN5 - Version 5.5.3.6 (#0): x:\01_auftraege\neubau\mehrwelle\kosboost\berechnung\0200-thermodynamik\0210-kenn5\0213-intern\case3_sab.ken

Atlas Copco Energas

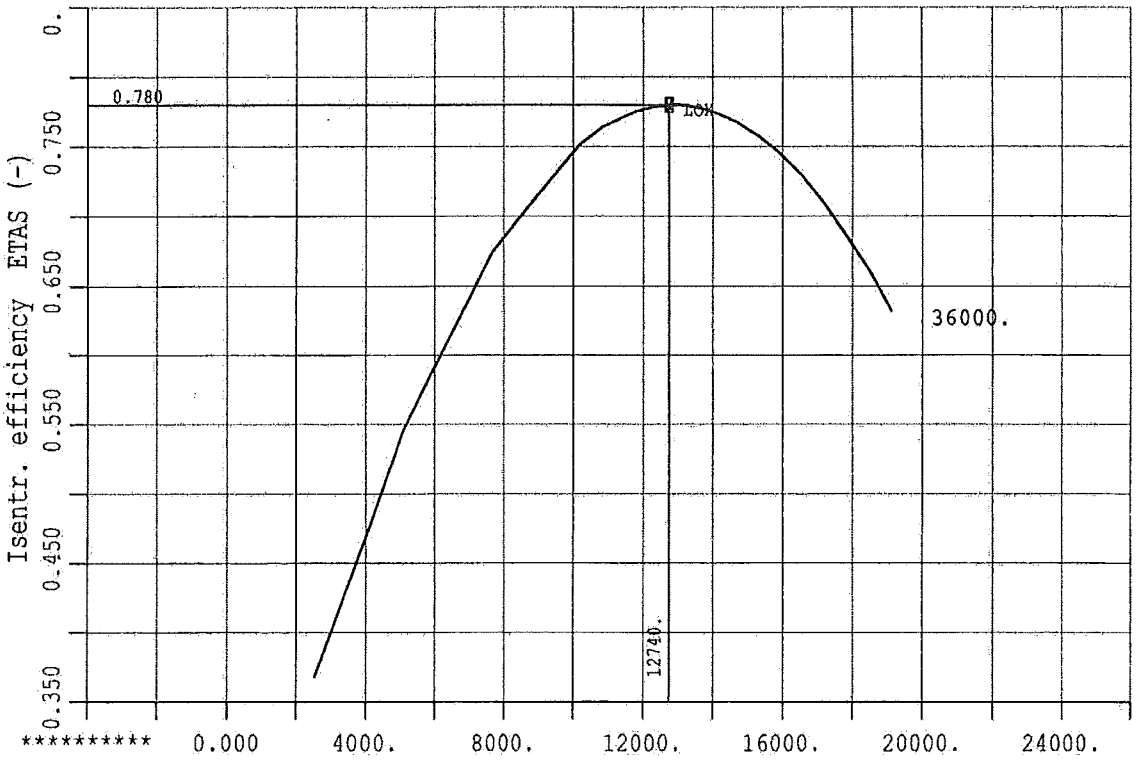
Molweight M = 28.960 kg/kmol
Inlet pressure PIN = 56.850 bar a
Inlet temperature TIN = 182.000 deg K
Outlet pressure POUT = 5.500 bar a
Messer Griesheim / ETG 125 MS / GOX

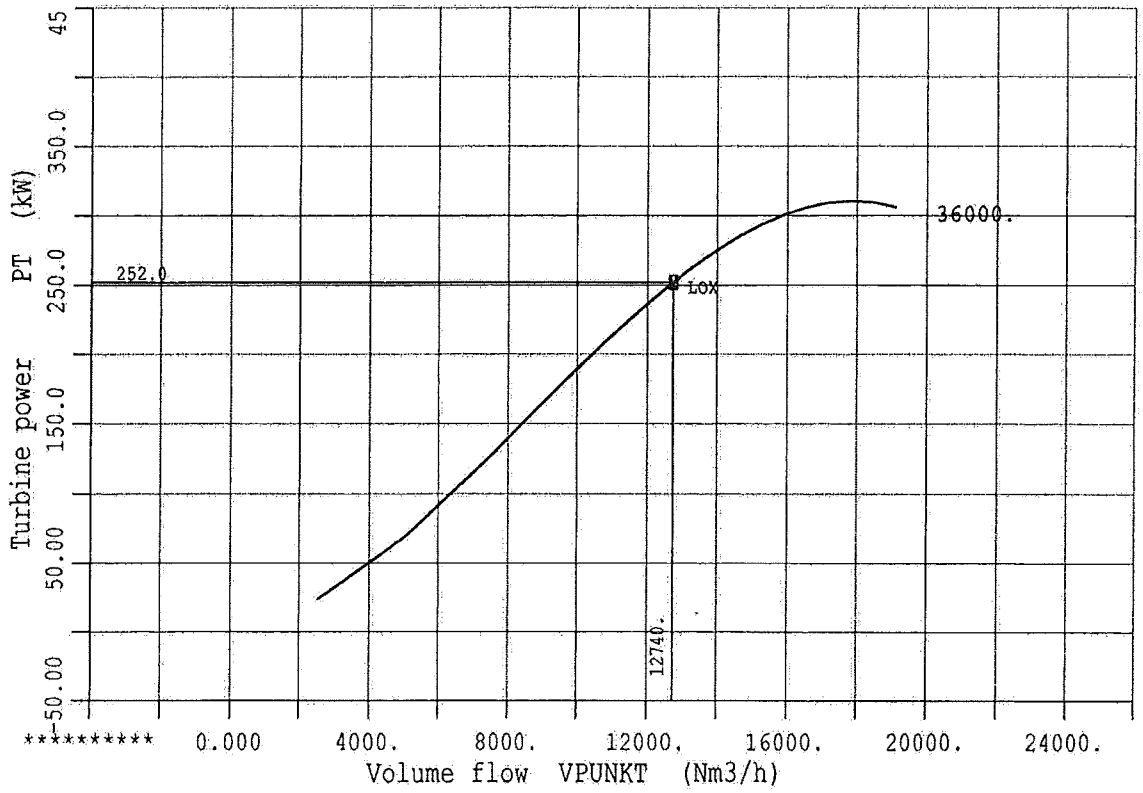


Atlas Copco Energas

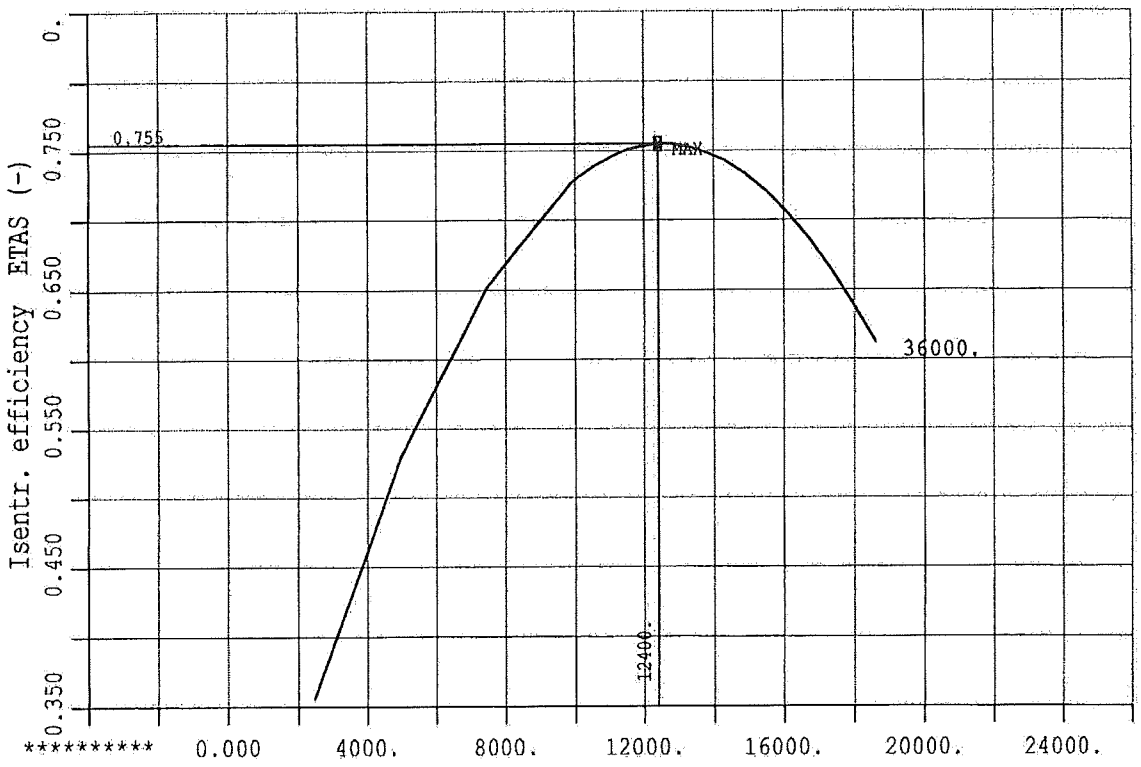
Molweight M = 28.960 kg/kmol
Inlet pressure PIN = 56.650 bar a
Inlet temperature TIN = 182.000 deg K
Outlet pressure POUT = 5.560 bar a
Messer Griesheim / ETG 125 MS / LOX

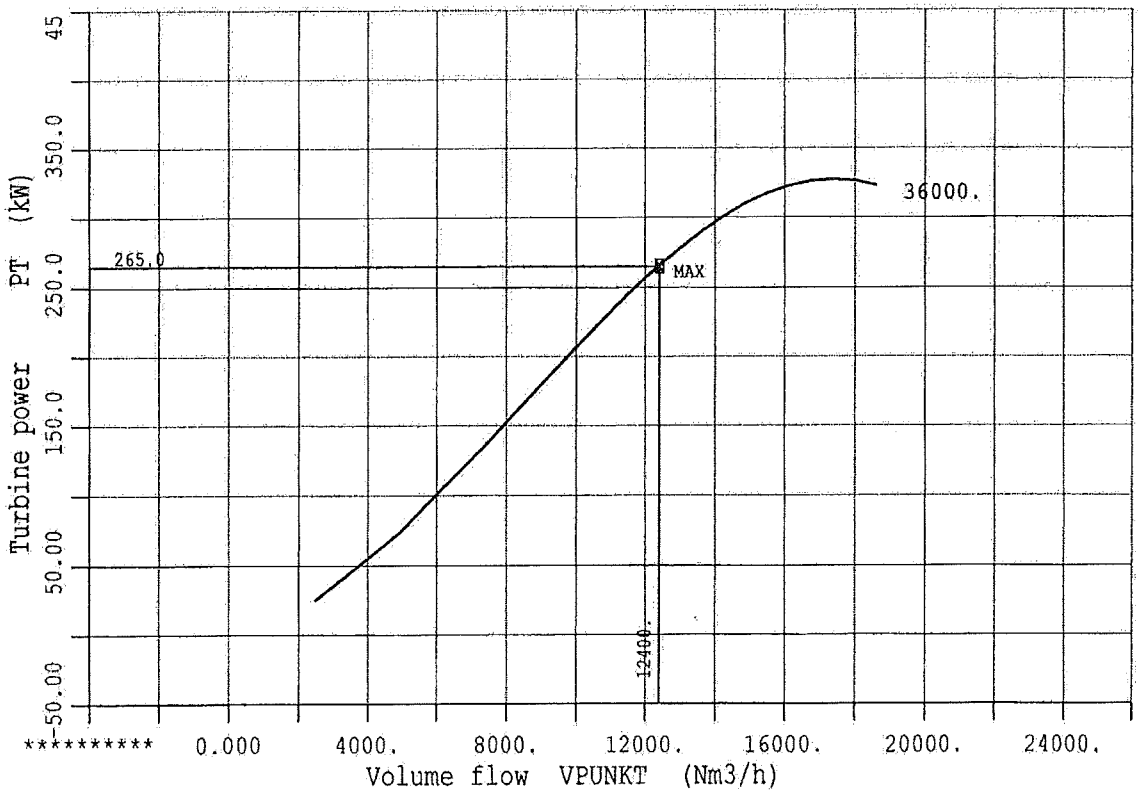


Atlas Copco Energas

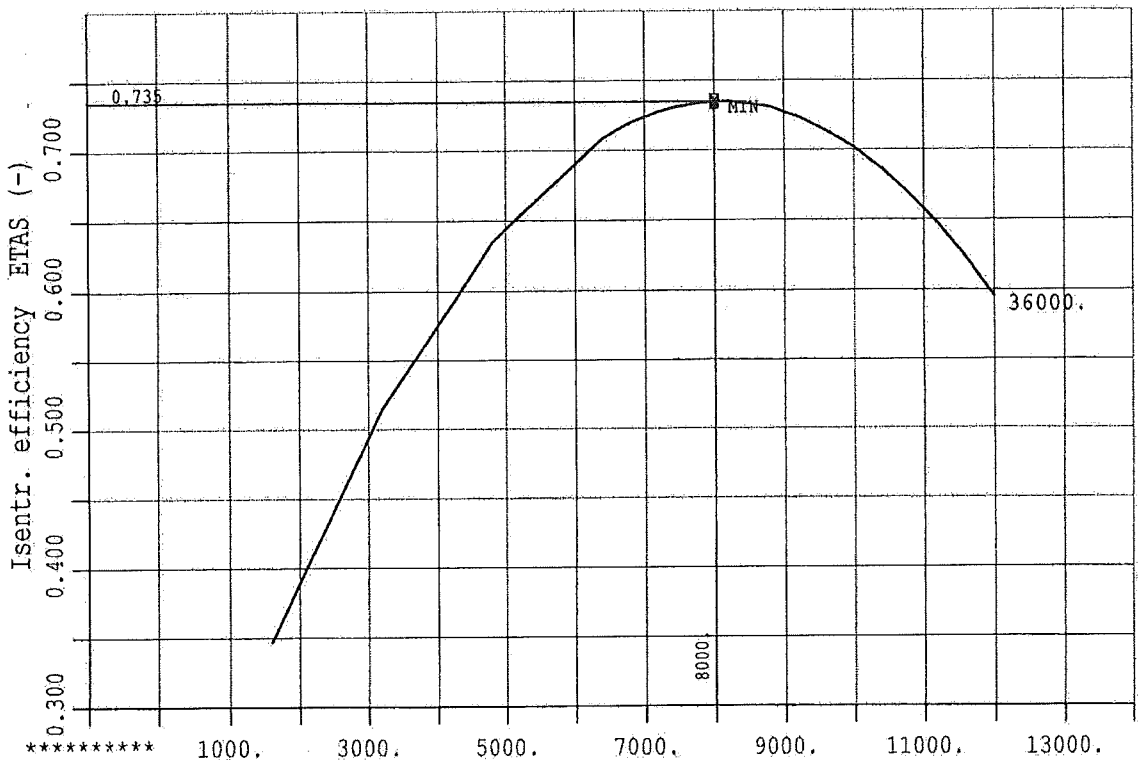
Molweight M = 28.960 kg/kmol
Inlet pressure PIN = 54.710 bar a
Inlet temperature TIN = 192.000 deg K
Outlet pressure POUT = 5.160 bar a
Messer Griesheim / ETG 125 MS / MAX

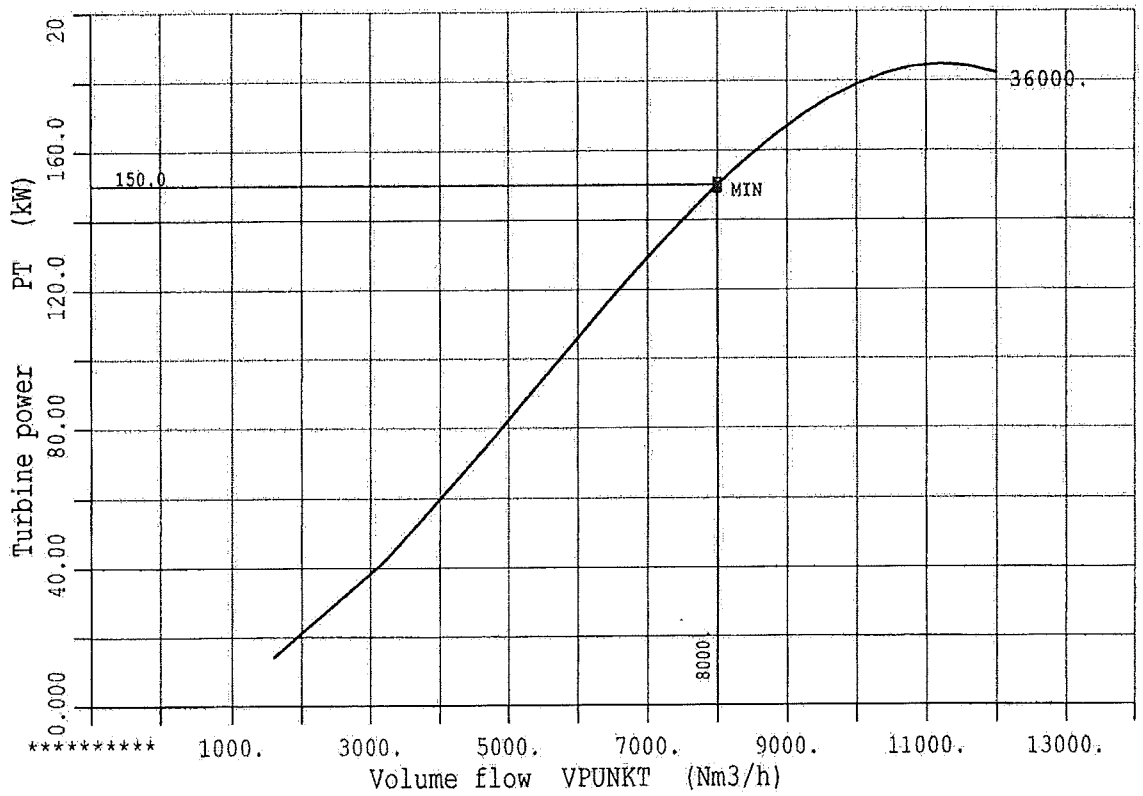


Atlas Copco Energas

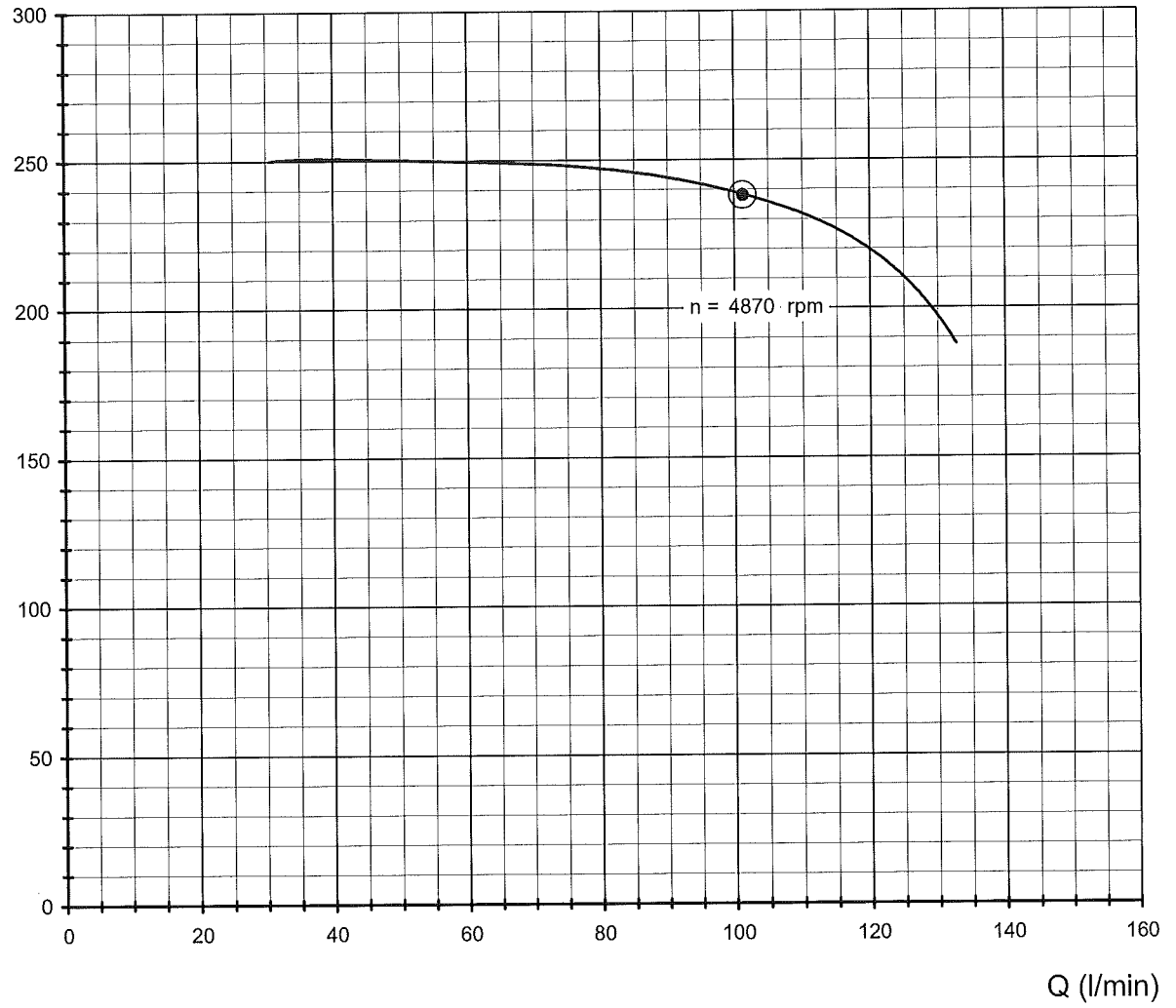
Molweight M = 28.960 kg/kmol
Inlet pressure PIN = 54.900 bar a
Inlet temperature TIN = 180.000 deg K
Outlet pressure POUT = 5.100 bar a
Messer Griesheim / ETG 125 MS / MIN

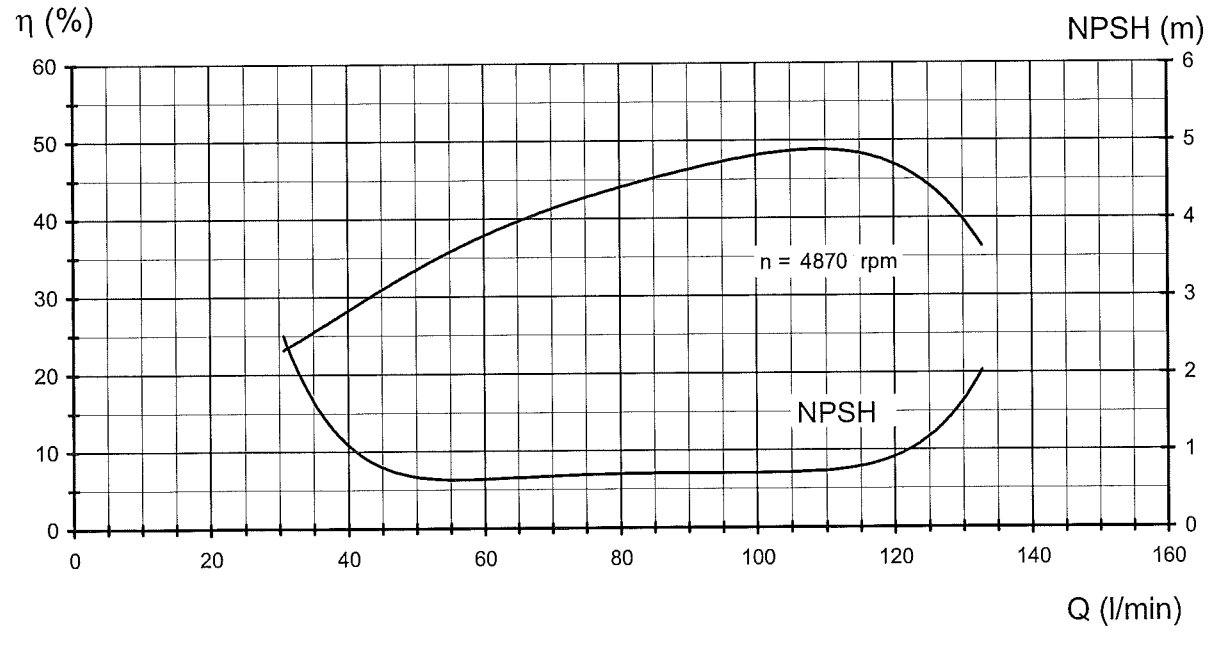


| sefco | CL4 - 13 | 229-04/5 |
|---|---|---|

Impeller ∅ 130 / 3.8 mm with Inducer, Blade-ring
Diffuser 90

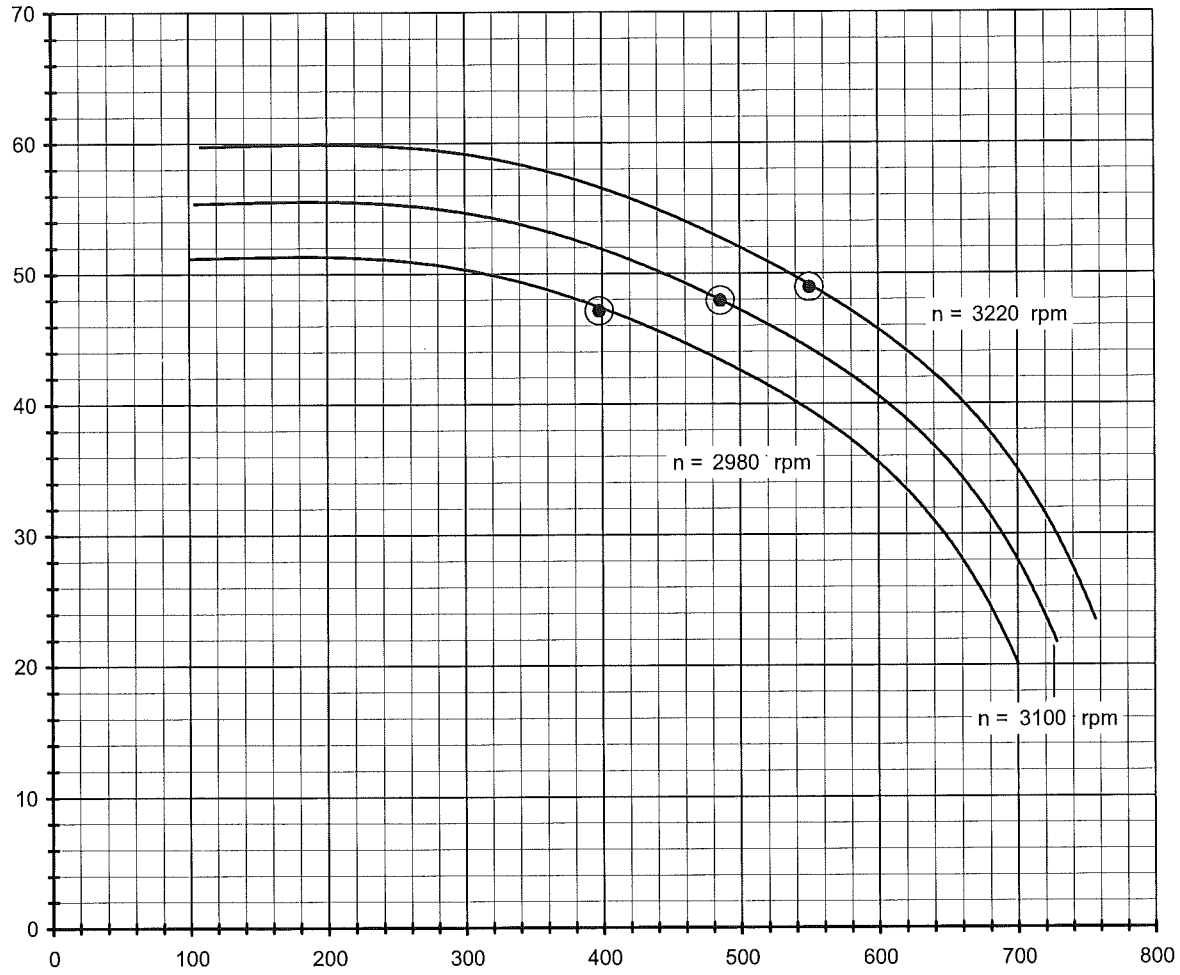


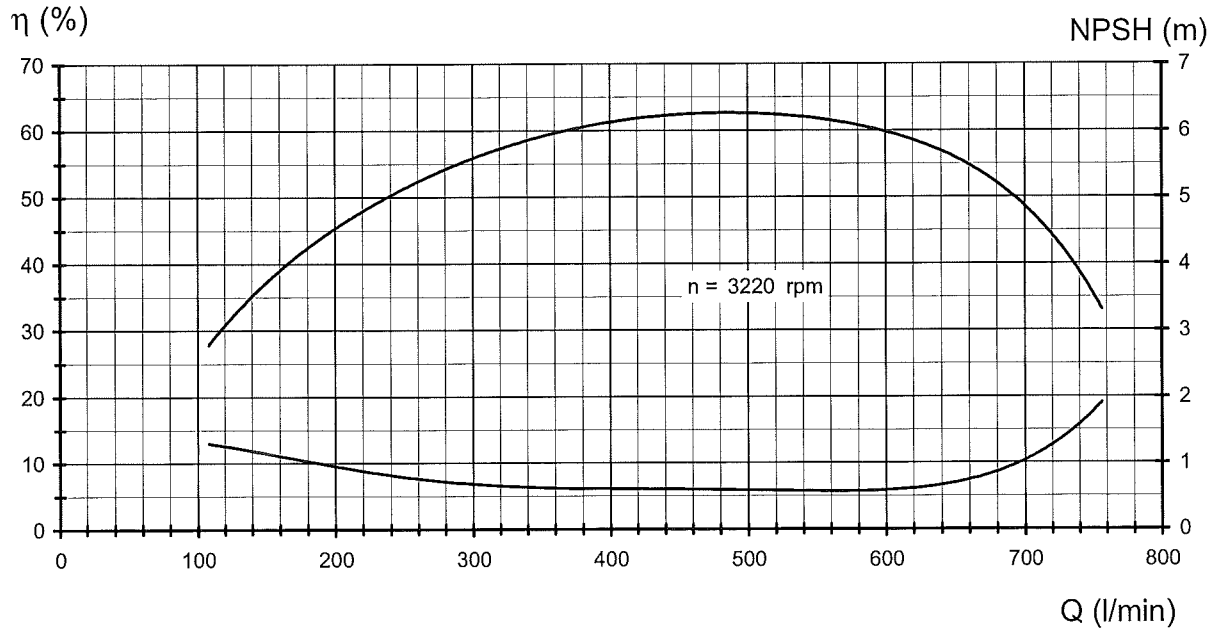




Gezeichnet Dessiné C.M. 20.08.2004
Geprüft Controllé

| sefco | CL - 19 | 229-04/1 |
|---|---|---|

Impeller ∅ 190 / 6.5 mm with Inducer, Blade-ring
Diffuser 600

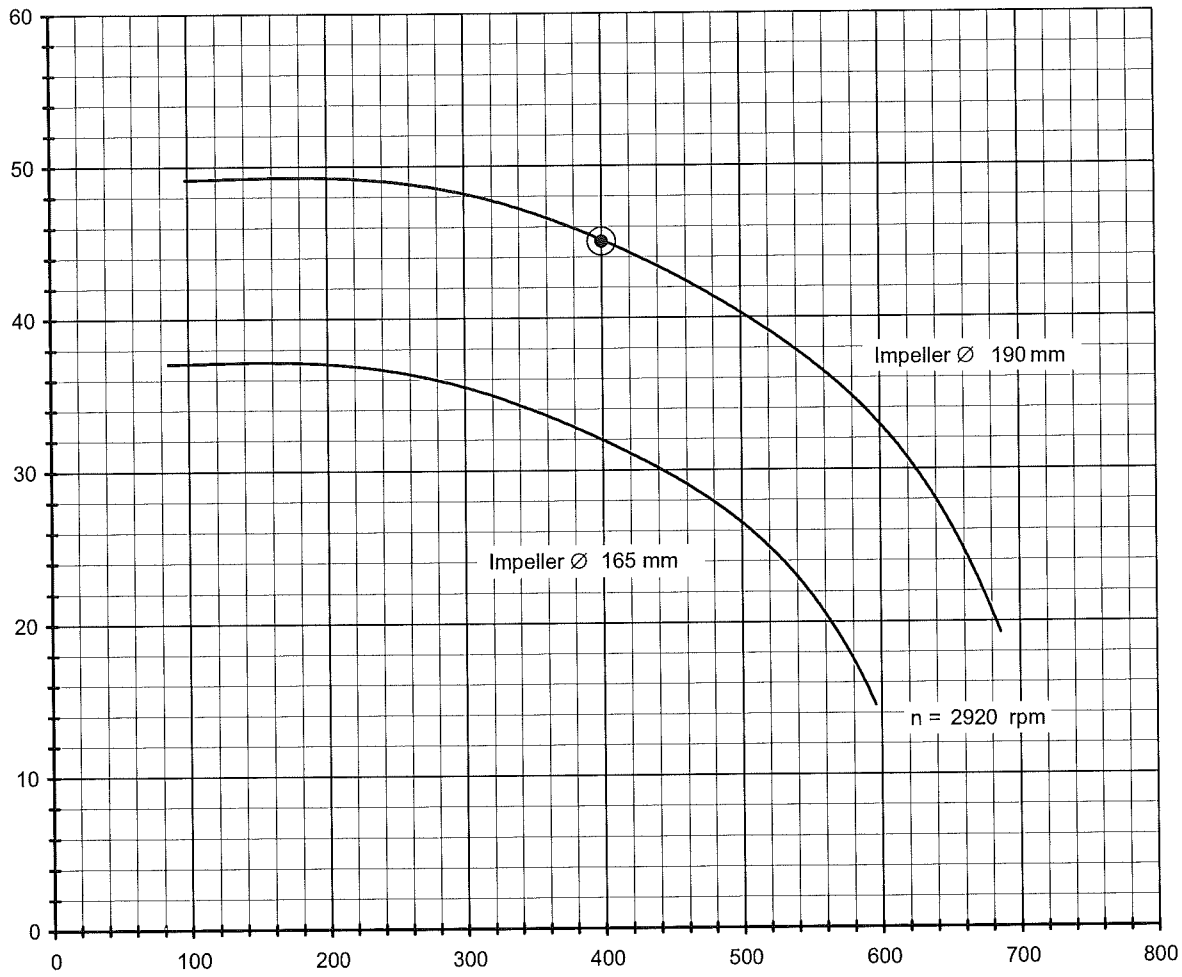


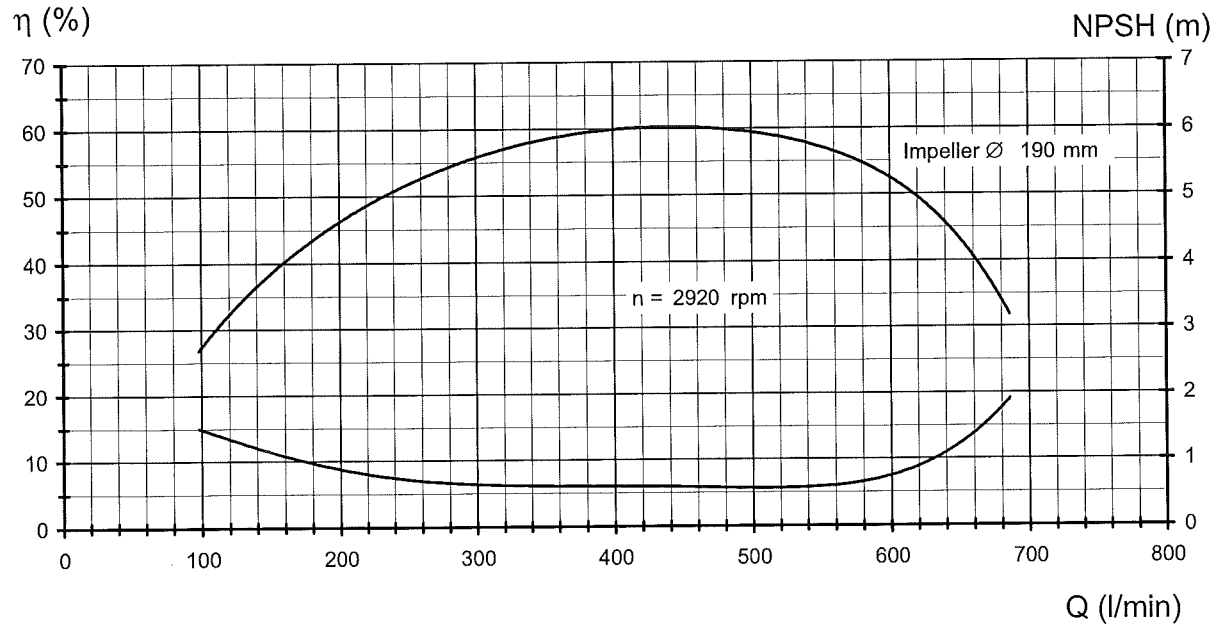




Gezeichnet Dessiné
Geprüft Contrôlé
CM
20.08.2004

| sefco | C - 19 | 229-04/3 |
|---|---|---|

Impeller ∅ 190 and 165 / 6.5 mm with Inducer, Blade-ring
Diffuser 600



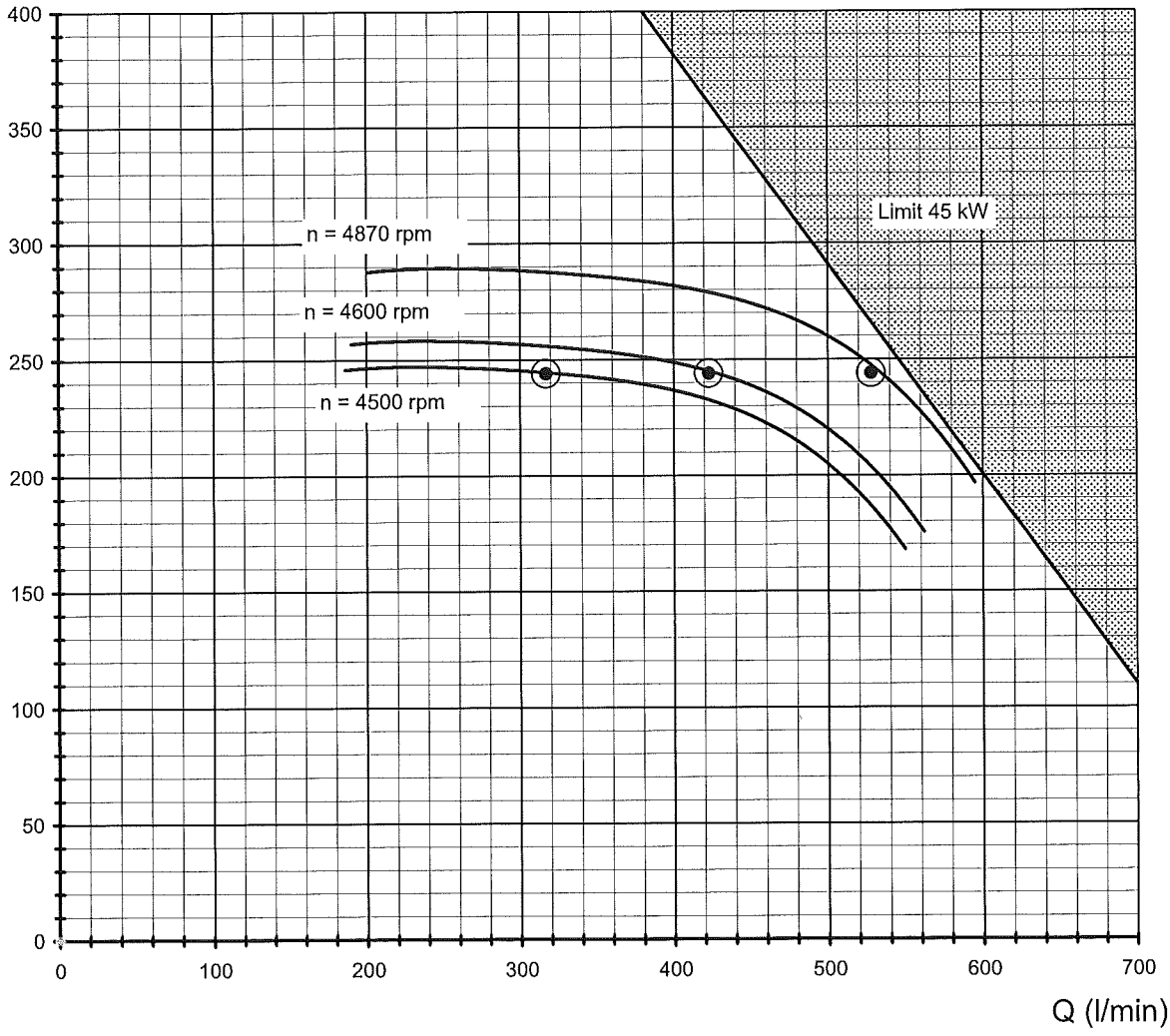



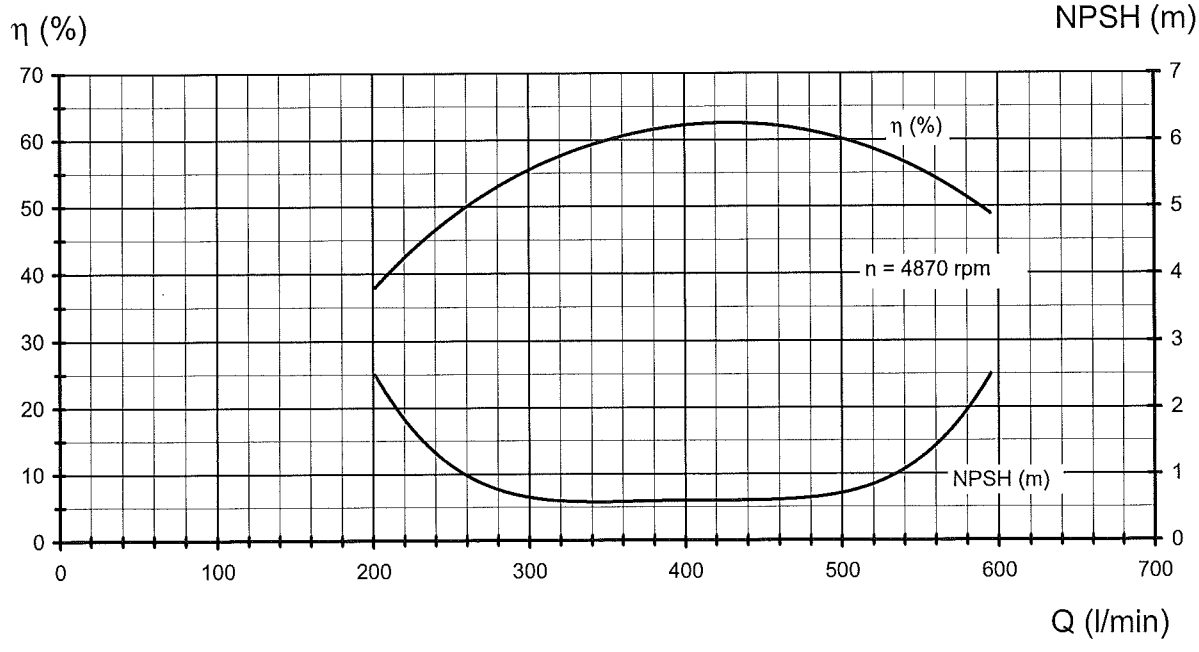

| Gezeichnet Dessiné | Geprüft Controllé |
|---|---|
| | |
| | |

| Gezeichnet Dessiné | Geprüft Controllé |
|---|---|
| CM | |
| 20.08.2004 | |

| sefco | CL2 - 19 | 229-04/4A |
|---|---|---|

Impeller ∅ 190 / 4.5 mm, with Inducer, Blade-ring
Diffusor 300+

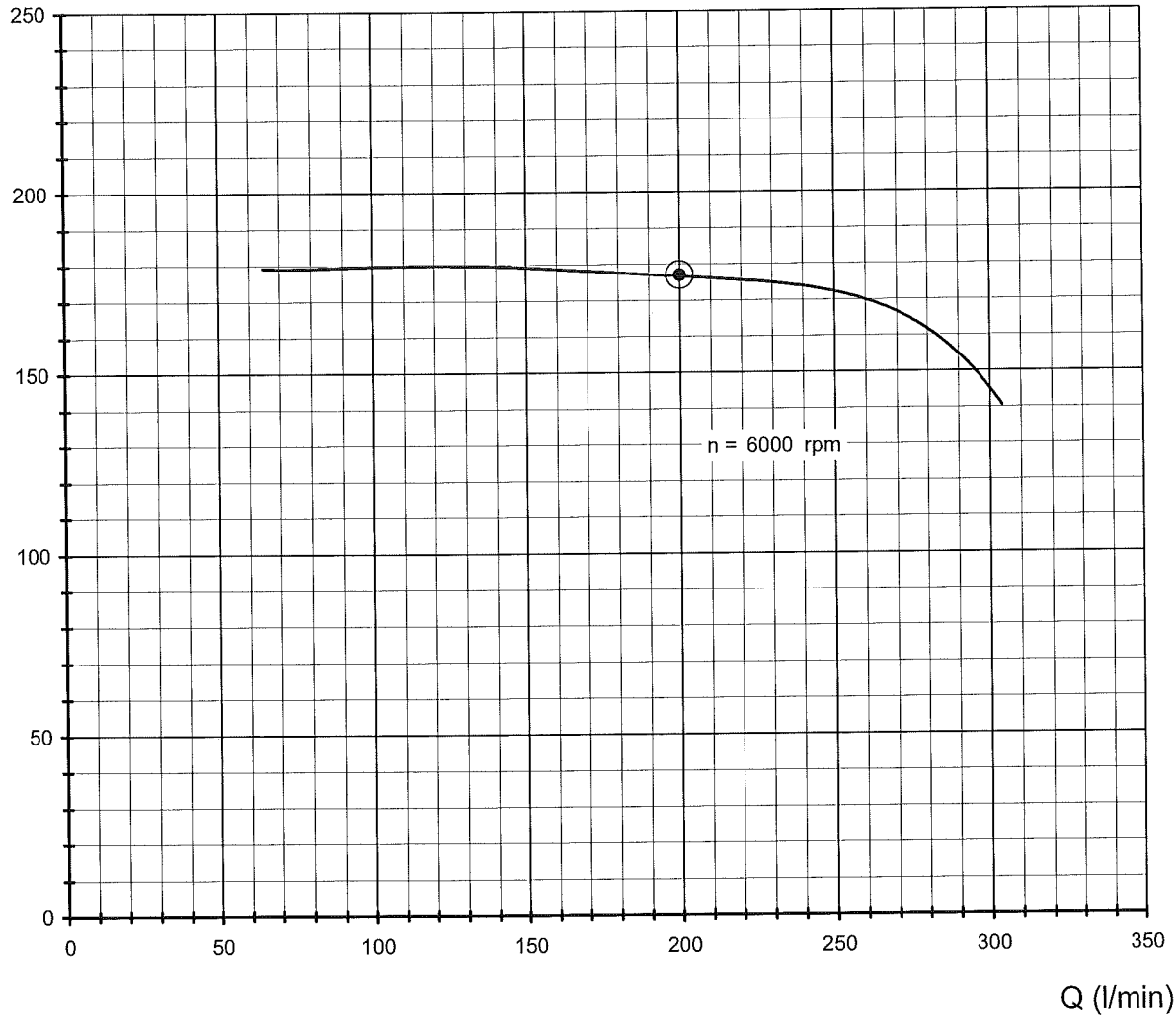


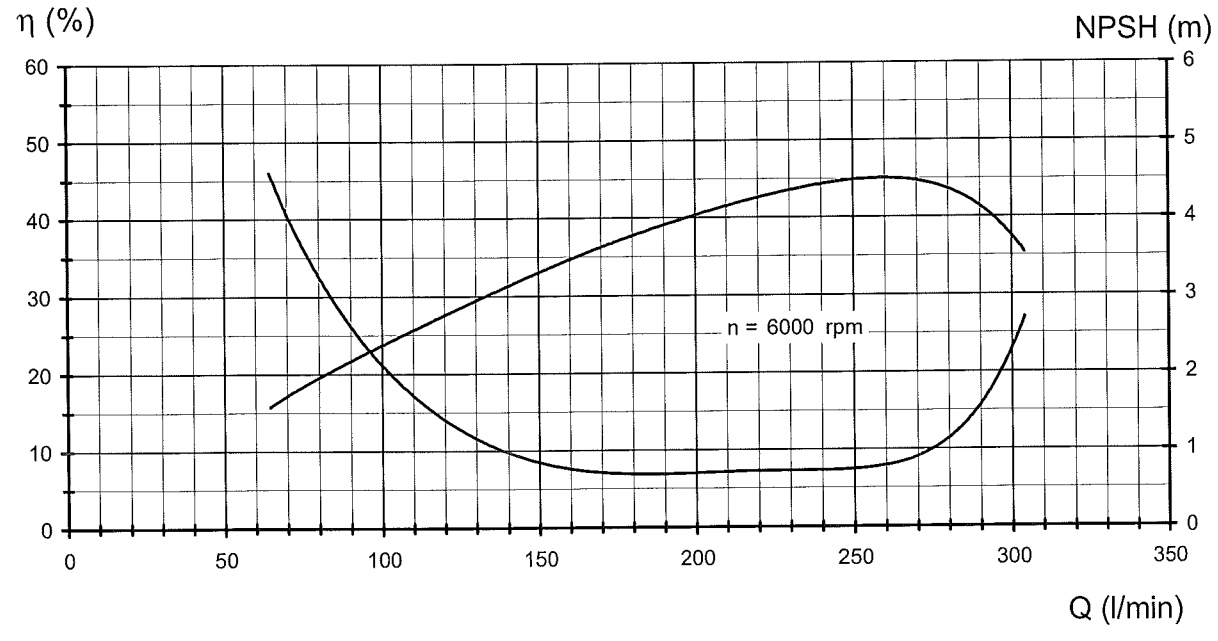




Gezeichnet Dessiné NS 29.09.2004
Geprüft Contrôlé

| sefco | C - 19 | 229-04/2 |
|---|---|---|

Impeller ∅ 176 / 4.5 mm with Inducer, Blade-ring
Diffuser 150



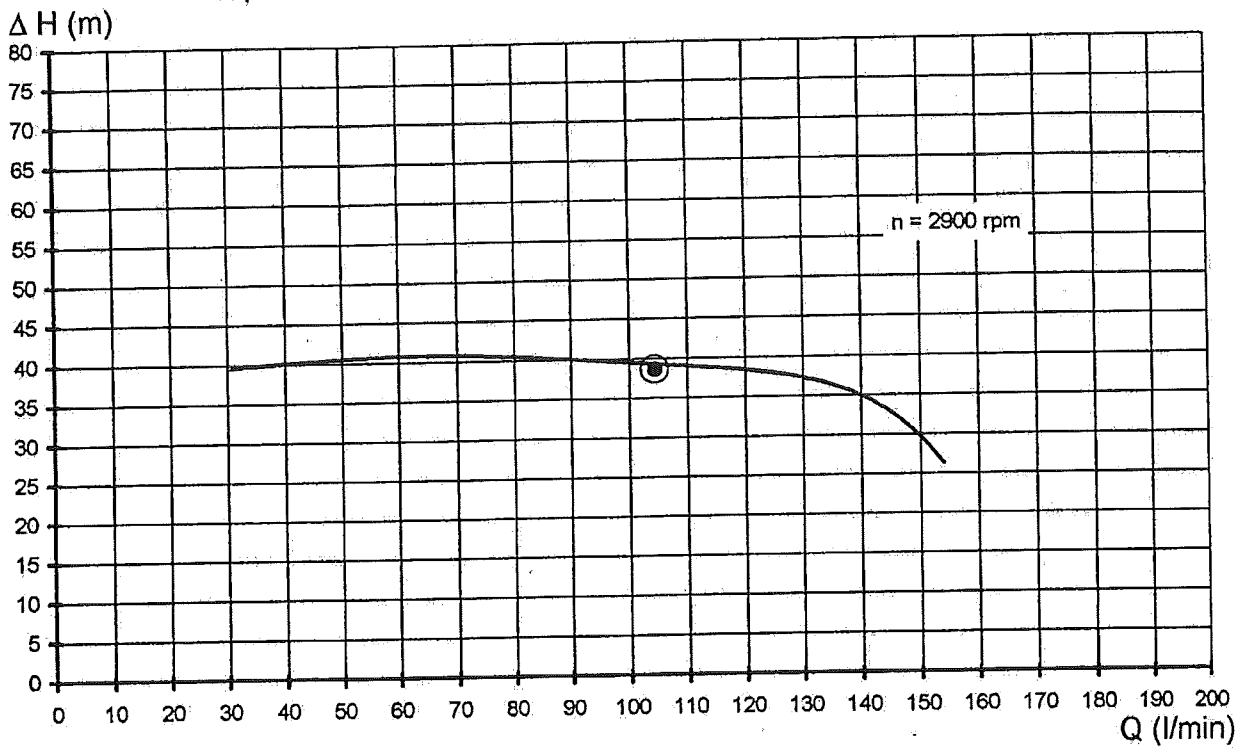



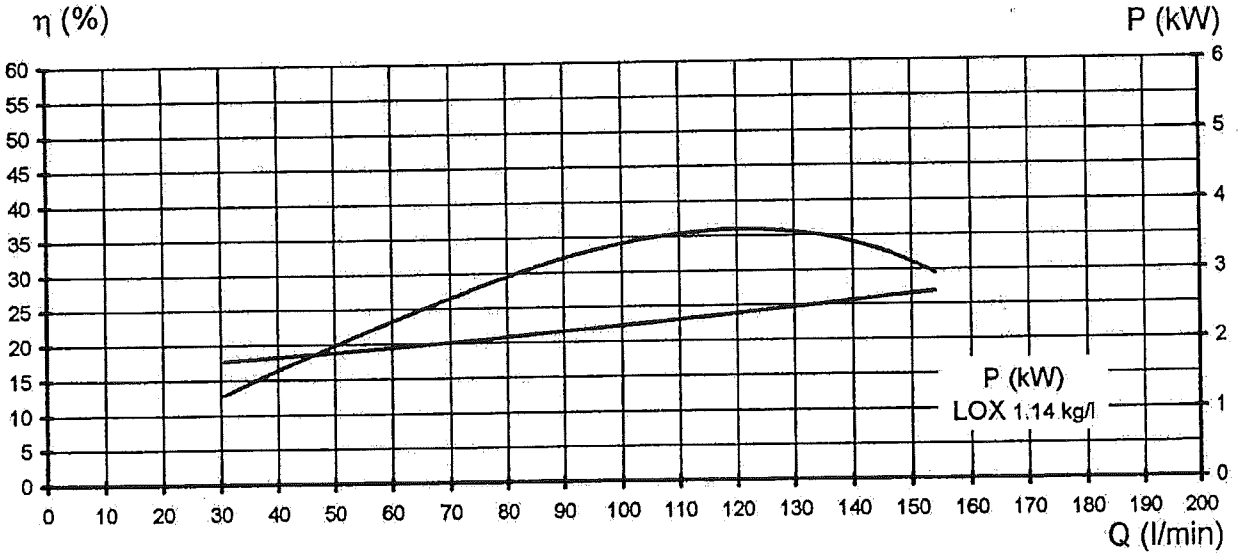

Gezeichnet Dessiné
Geprüft Controllé

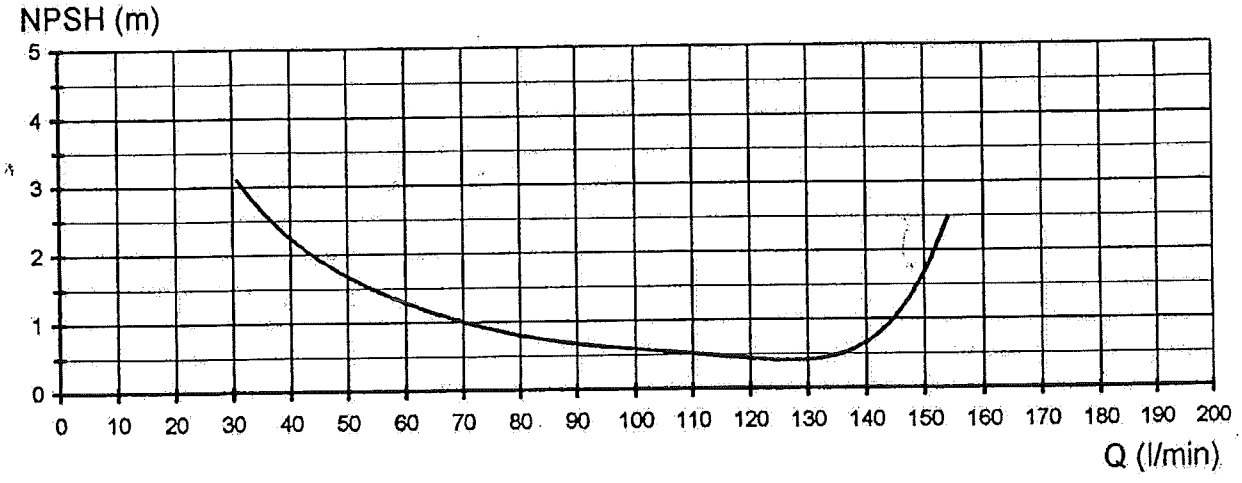
Gezeichnet Dessiné CM
Geprüft Controllé
20.08.2004

| sefco | CL - 19 | P63001 | 180-04/2 |
|---|---|---|---|

Impeller ∅ 173 / 4.5 mm with Inducer , Blade-ring , Diffuser 150




| Gezeichnet Dessiné | Geprüft Controlé |
|---|---|
| NS | |
| 25.06.2004 | 29.06.2004 |
| 1 | |