

**909132**  
**923152 Tomal AB**  
**909132 407386 / IN7269:**



30-11-2018

**Vores kontakt** : heo  
**Kundenavn** : 923152 Tomal AB  
**Kontaktperson** : Andreas Nelje  
**Kunderef.** : 909132 407386 / IN7269:  
**Bemærkning** :

| Pos.   | Varenummer                           | Anlæg / ordre | Side |
|--|--------------------------------------|---------------|------|
| 909132-1                                       | <b>DST56-400-55/D-RD0</b>            |               |      |
|  | <i>Tekniske Data - Kunde enheder</i> |               | 3    |
|  | <i>Kurveblad - Kunde enheder</i>     |               | 5    |
|  | <i>Lyddata</i>                       |               | 6    |
|  | <i>EU Overensstemmelseserklæring</i> |               | 7    |
| 909132-2                                       | <b>DST40-250-37/D</b>                |               |      |
|  | <i>Tekniske Data - Kunde enheder</i> |               | 8    |
|  | <i>Kurveblad - Kunde enheder</i>     |               | 9    |
|  | <i>Lyddata</i>                       |               | 10   |
|  | <i>EU Overensstemmelseserklæring</i> |               | 11   |
| <b>Øvrige dokumenter</b>                       |                                      |               | 12   |
| Doc-04-01-SV Instruction manual (Swedish)      |                                      |               |      |
| Doc-04-02-SV ATEX Instruction manual (Swedish) |                                      |               |      |
| Doc-10-11-EN Motors ABB ATEX                   |                                      |               |      |
| Doc-14-01-EN Flexible connections              |                                      |               |      |
| Doc-16-01-EN Vibration Dampers                 |                                      |               |      |
| Doc-17-03-EN Shaft Seal Standard Double Lip    |                                      |               |      |

Anlæg / ordre:

30-11-2018/heo

Betegnelse:

909132-1

**Indtastede Data**

|                       |         |         |
|-----------------------|---------|---------|
| Luftmængde            | [m³/h]  | 10000   |
| Statisk tryk          | [Pa]    | 5750    |
| Sugeside tryk         | [Pa]    | -5500   |
| Densitet (omgivelser) | [kg/m³] | 1,225   |
| Temperatur            | [°C]    | 15      |
| Tryk (omgivelser)     | [kPa]   | 101,325 |
| Opstillingshøjde      | [m]     | 0       |

**Driftspunkt 1****Lufttekniske Data**

|                          | Drift   | Opstart               |
|--------------------------|---------|-----------------------|
| Temperatur               | [°C]    | 15                    |
| Luftmængde (Aktuel)      | [m³/h]  | 10000                 |
| Luftmængde (Normal)      | [Nm³/h] | 8965                  |
| Luftmængde               | [m³/h]  | 10000                 |
| Luftmængde               | [kg/h]  | 11587                 |
| Total tryk               | [Pa]    | 5750                  |
| Statisk tryk             | [Pa]    | 5750                  |
| Total tryk               | [Pa]    | 5750                  |
| Statisk tryk             | [Pa]    | 5750                  |
| Densitet (ved indløb)    | [kg/m³] | 1,159                 |
| Effektforbrug (løbehjul) | [kW]    | 19,71                 |
| Omdrejningstal           | [1/min] | 2697                  |
| Frekvens                 | [Hz]    | 45,6                  |
| Lydtryksniveau           | [dB(A)] | 79,6* (1m) 79,6* (1m) |

|                         |         |       |       |
|-------------------------|---------|-------|-------|
| Lydeffektniveau         | [dB(A)] | 95,2* | 95,2* |
| Effektforbrug (aksel)   | [kW]    | 19,71 | 19,71 |
| Virkningsgrad, løbehjul | [%]     | 79,4  | 79,4  |
| Periferihastighed       | [m/s]   | 100,2 | 100,2 |
| Indløbshastighed        | [m/s]   | 22,1  | 22,1  |
| Udløbshastighed         | [m/s]   | 21,2  | 21,2  |
| Opstartstid ca.         | [s]     | 9     | 9     |
| Temperaturstigning      | [°C]    | 6,1   | 6,1   |
| Max. tilladt temperatur | [°C]    | 15    | 15    |

\*Værdi inkl. motor ved nom. RPM + øvrige kilder (± 5dB)

**Motor Data**

|                           |                                |                       |
|---------------------------|--------------------------------|-----------------------|
| Fabrikat                  | ABB Process Performance Motors |                       |
| Type                      | Aluminum                       |                       |
| Byggestørrelse            | M3AA 200 MLA 2                 |                       |
| Ydelse                    | [-]                            | 200 MLA 2             |
| Omdrejningstal            | [1/min]                        | 2958                  |
| Spænding                  | [V]                            | 3x400                 |
| Frekvens                  | [Hz]                           | 50(45,6)              |
| Byggeform                 | [-]                            | B3                    |
| Klemkasse                 | [-]                            | For oven              |
| Effektivitetsklasse       | [-]                            | IE3                   |
| Ex beskyttelse            | [-]                            | -                     |
| Isolationskl./beskyttelse | [-]                            | F/IP55                |
| Opstart                   | [-]                            | -                     |
| Motorværn                 | [-]                            | Termistor 1x3 - 150°C |
| Isoleret leje ND-side     | [-]                            | -                     |
| Rulleleje i D-side        | [-]                            | -                     |
| Aksel diameter            | [mm]                           | 0                     |
| Vægt, Motor               | [Kg]                           | 225                   |

**Ventilator Data**

|                      |                               |         |
|----------------------|-------------------------------|---------|
| Ventilator type      | DST56-400-55/D-RD0            |         |
| Varenummer           | 90408-0008                    |         |
| Position af hus      | RD 0                          |         |
| Løbehjul diameter    | [mm]                          | 710     |
| Løbehjul bredde      | [%]                           | 70      |
| Tilslutning sugeside | [mm]                          | ø400    |
| Tilslutning trykside | [mm]                          | 450x280 |
| Vægt excl. motor     | [Kg]                          | 400     |
| Tilslutning          | Rørforbindelse på begge sider |         |
| Medium               | Luft                          |         |

**Materiale og overflade**

|                 |                   |                           |
|-----------------|-------------------|---------------------------|
| Løbehjul        | 1.8963 - Corten B | Ingen maling              |
| Hus (indvendig) | 1.0038 - S235 JR  | Grundning                 |
| Hus (udvendig)  |                   | C3M RAL 9007 GråAluminium |
| Konsol          | 1.0038 - S235 JR  | C3M RAL 9007 GråAluminium |

**ATEX**

- Udførelse indvendig zone 22
- Eksplosionsgruppe (sub-group) III B
- Temperaturklasse T125°C
- Udførelse udvendig keine Zone
- Eksplosionsgruppe (sub-group) -
- Temperaturklasse -
- ATEX mærkning
- II 3/- D Ex h IIIB 125°C Dc/-

**Ventilator Tilbehør**

- Jordingskabler

**Fastmonteret Tilbehør**

- Svejseflange 450x280-30x8 - smal - 1.0038
- Dræn Standard type 1" - 1.0038
- Inspektionslem Standard type 150 - 1.0038
- Akseltætning - Standard dobbelt læbe
- ATEX tillæg Zone 22

**Løsdele Tilbehør**

- Flex med spændebånd L70.5.1-I ø408-150mm
- Flex for flangesamling L70.5.1-II 450x280-140/120-30mm - smal
- Kanalflange 450x280-30x5 - smal - 1.0038
- 2 x Modflange for flex 450x280-30x5 - smal - 1.0038
- Slidskørt 450x280 - smal - 1.0038
- Vibrationsdæmpere 4 x C 7536 - S60

Anlæg / ordre:

Betegnelse:

30-11-2018/heo

909132-1

## Øvrig Tilbehør

- Instruktionsvejledning DA (Danish)
- Håndteringsvejledning EN DA DE SV FR IT ES (1A)
- Overgang 450x280 mm til ø630 mm- 1.0038 - 1,25mm
- Jethætte ø630mm - 1.0038
- Overgang fra cyklon til 500x500mm - 1.0038 galv. plade
- Overgang fra 500x500mm til ø500mm spio-nippel- 1.0038 galv.
- ø500mm spio-rør, l=6.000mm - 1.0038 galv. plade
- ø500mm 90° spio-bøjning 1.0038 galv.plade
- ø500mm spio-nippel 1.0038 galv. plade
- Reduktion ø500mm spio-nippel til ø400mm indstik - 1.0038 galv. plade
- Div. bolte & Skruer for montage
- Rund lyddæmper med kerne SLGPU 100mm - 630x1200
- Nipple NPU630
- Muffe MF630
- Emballage 1650x1650x1450 Emballage, plastovertrukket træ tremmekasse (ISPM 15)

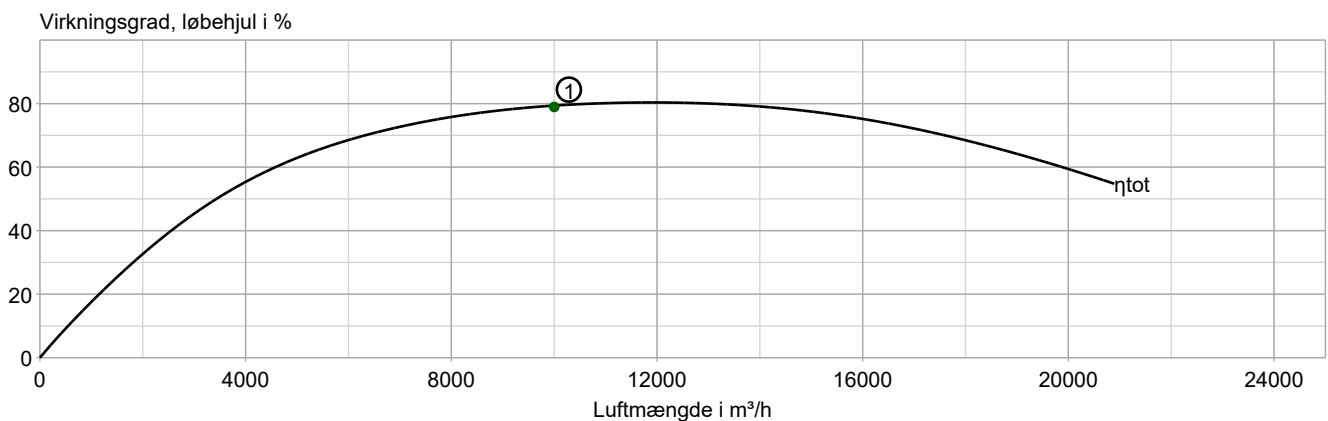
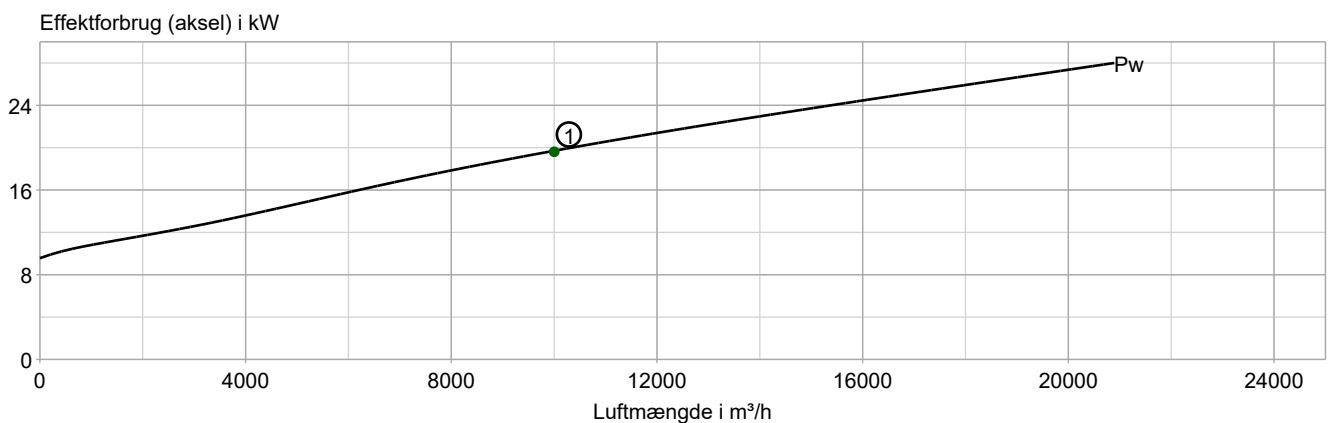
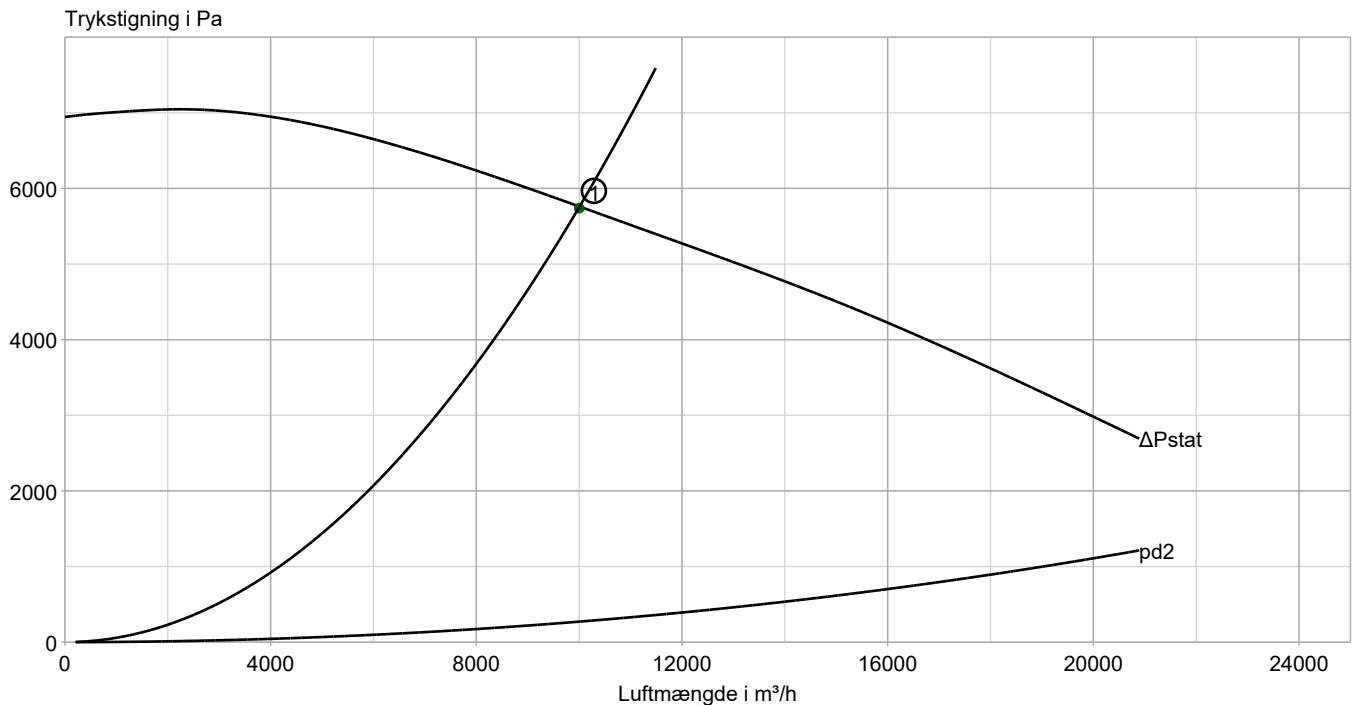


Anlæg / ordre:

Betegnelse:

30-11-2018/heo

909132-1



|                       |         |       |
|-----------------------|---------|-------|
| Driftspunkt           |         | 1     |
| Luftmængde            | [m³/h]  | 10000 |
| Total tryk            | [Pa]    | 5750  |
| Statisk tryk          | [Pa]    | 5750  |
| Effektforbrug (aksel) | [kW]    | 19,71 |
| Densitet (ved indløb) | [kg/m³] | 1,159 |
| Omdrejningstal        | [1/min] | 2697  |

# DST56-400-55/D-RD0

Lyddata

Anlæg / ordre:

30-11-2018/heo

Betegnelse:

909132-1

|                     |         |       |                    |       |       |
|---------------------|---------|-------|--------------------|-------|-------|
| Driftspunkt         | 1       |       |                    |       |       |
| Hus                 | 1.0038  | 5 mm  | Luftmængde         | 10000 | m³/h  |
| Indløbsdiameter     | 400     | mm    | Total tryk         | 5750  | Pa    |
| Afgang              | 450x280 | mm    | Medietemperatur    | 15    | °C    |
| Driftsomsdrejninger | 2697    | 1/min | Mediedensitet      | 1,159 | kg/m³ |
| Skovlantal          | 8       |       | Driftspunkt V/Vopt | 0,83  |       |
| Skovlfrekvens       | 360     | Hz    | Måleflade index    | 15,6  | dB    |

|                                    |                 |              |           |            |            |            |             |             |             |             |
|------------------------------------|-----------------|--------------|-----------|------------|------------|------------|-------------|-------------|-------------|-------------|
| Basisydelse (VDI 3731)             | dB              | 113,4        |           |            |            |            |             |             |             |             |
| Lydkorrektion (driftspunkt V/Vopt) | dB              | 0,1          |           |            |            |            |             |             |             |             |
| <b>Oktavbånd</b>                   | <b>Hz</b>       | <b>Total</b> | <b>63</b> | <b>125</b> | <b>250</b> | <b>500</b> | <b>1000</b> | <b>2000</b> | <b>4000</b> | <b>8000</b> |
| Rotationsstøj                      | dB              |              | 0         | 0          | 0          | 5          | 0           | 0           | 0           | 0           |
| Strouhal tal                       | dB              |              | 0,4       | 0,9        | 1,8        | 3,5        | 7,1         | 14,2        | 28,3        | 56,7        |
| Relativt spektrum                  | dB              |              | -5,9      | -6,5       | -8         | -10,3      | -13,6       | -17,8       | -22,9       | -28,9       |
| Total lineær lydniveau             | dB              | 113,5        | 107,6     | 107        | 105,5      | 108,2      | 99,9        | 95,7        | 90,6        | 84,6        |
| A-Vægtet                           | dB              |              | -26,2     | -16,1      | -8,6       | -3,2       | 0           | 1,2         | 1           | -1,1        |
| Dæmpning pladetykkelse hus         | dB              |              | -4,5      | -6,5       | -8,5       | -13,5      | -13,5       | -13,5       | -13,5       | -13,5       |
| Total lydniveau                    | LwA 1 dB(A)     | 107,3        | 81,4      | 90,9       | 96,9       | 105        | 99,9        | 96,9        | 91,6        | 83,5        |
| Lydniveau hus                      | LwA 2 dB(A)     | 95/95,2*     | 76,9      | 84,4       | 88,4       | 91,5       | 86,4        | 83,4        | 78,1        | 70          |
|                                    | LpA 2(1m) dB(A) | 79,4/79,6*   | 61,3      | 68,9       | 72,9       | 75,9       | 70,8        | 67,8        | 62,6        | 54,5        |
| Lydniveau kanalsugeside            | LwA 3 dB(A)     | 107,1        | 80,4      | 89,9       | 94,9       | 105        | 99,9        | 96,9        | 91,6        | 83,5        |
|                                    | LpA 3(1m) dB(A) | 97,1**       | 61,2      | 75,5       | 83,6       | 94,9       | 90,2        | 87,3        | 82          | 73,9        |
| Lydniveau kanaltrykside            | LwA 4 dB(A)     | 109,4        | 81,4      | 91,9       | 98,9       | 108        | 99,9        | 95,9        | 90,6        | 83,5        |
|                                    | LpA 4(1m) dB(A) | 99,2**       | 62,2      | 77,5       | 87,6       | 97,9       | 90,2        | 86,3        | 81          | 73,9        |

## Lyddæmpning

|                         |                 |              |           |            |            |            |             |             |             |             |
|-------------------------|-----------------|--------------|-----------|------------|------------|------------|-------------|-------------|-------------|-------------|
| <b>Oktavbånd</b>        | <b>Hz</b>       | <b>Total</b> | <b>63</b> | <b>125</b> | <b>250</b> | <b>500</b> | <b>1000</b> | <b>2000</b> | <b>4000</b> | <b>8000</b> |
| Lyddæmper Trykside      | dB              |              | -2        | -5         | -14        | -23        | -37         | -30         | -21         | -12         |
| Lydniveau kanaltrykside | LwA 4 dB(A)     | 90,9         | 79,4      | 86,9       | 84,9       | 85         | 62,9        | 65,9        | 69,6        | 71,5        |
| Lydniveau kanaltrykside | LpA 4(1m) dB(A) | 78,8**       | 60,2      | 72,5       | 73,6       | 74,9       | 53,2        | 56,3        | 60          | 61,9        |
| Lydniveau hus           | LwA 2 dB(A)     | 95/95,2*     | 76,9      | 84,4       | 88,4       | 91,5       | 86,4        | 83,4        | 78,1        | 70          |
| Lydniveau hus           | LpA 2(1m) dB(A) | 79,4/79,6*   | 61,3      | 68,9       | 72,9       | 75,9       | 70,8        | 67,8        | 62,6        | 54,5        |
| Lydniveau motor         | LwA dB(A)       | 82           |           |            |            |            |             |             |             |             |
| Lyddæmpning motor       | Lw dB           | 0            |           |            |            |            |             |             |             |             |
| Øvrige lydkilder        | LwA dB(A)       | 0            |           |            |            |            |             |             |             |             |

\* Værdi inkl. motor ved nom. RPM + øvrige kilder (± 5dB)

\*\*Teoretiske lydværdier til vurdering af lydtryksniveau ved systemgrænse (± 5dB)

## EC declaration of conformity

**Manufacturer**

and authorized to  
compile the technical file:

**BarkerBille A/S**

Tempovej 23  
2750 Ballerup  
Denmark  
+45 44974192

**Machinery:**

Fan

**Type:**

DST56-400-55/D-RD0

**Production No.:**

909132-1

**Declares that the machinery fulfils all relevant provisions of:**

- DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on machinery
- DIRECTIVE 2014/35/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits
- DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility
- DIRECTIVE 2014/34/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres

**The machinery is designed according to requirement in Group II, and is marked**

II 3/- D Ex h IIIB 125°C Dc/-

**Deposit of technical documentation to notified body XXXX.****Following harmonized standards have been used:**

- EN ISO 12100:2011 Safety of machinery - General principles for design - Risk assessment and risk reduction
- EN 1127-1:2011 Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology
- EN ISO 80079-36:2016 Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres - Basic method and requirements
- EN ISO 80079-37:2016 Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres - Non-electrical type of protection constructional safety "c", control of ignition sources "b", liquid immersion "k"
- EN 14986:2017 Design of fans working in potentially explosive atmospheres

**Place and Date:**

Ballerup.

30-11-2018

**Signature:**

Flemming Bille, General Manager

Anlæg / ordre:  
Betegnelse:

30-11-2018/heo  
909132-2

## Indtastede Data

|                       |         |         |
|-----------------------|---------|---------|
| Luftmængde            | [m³/h]  | 8000    |
| Statisk tryk          | [Pa]    | 6000    |
| Sugeside tryk         | [Pa]    | -5900   |
| Densitet (omgivelser) | [kg/m³] | 1,225   |
| Temperatur            | [°C]    | 15      |
| Tryk (omgivelser)     | [kPa]   | 101,325 |
| Opstillingshøjde      | [m]     | 0       |

## Driftspunkt 1

### Lufttekniske Data

|                          | Drift   | Opstart               |
|--------------------------|---------|-----------------------|
| Temperatur               | [°C]    | 15                    |
| Luftmængde (Aktuel)      | [m³/h]  | 8000                  |
| Luftmængde (Normal)      | [Nm³/h] | 7142                  |
| Luftmængde               | [m³/h]  | 8000                  |
| Luftmængde               | [kg/h]  | 9231                  |
| Total tryk               | [Pa]    | 5366                  |
| Statisk tryk             | [Pa]    | 6000                  |
| Total tryk               | [Pa]    | 5366                  |
| Statisk tryk             | [Pa]    | 6000                  |
| Densitet (ved indløb)    | [kg/m³] | 1,154                 |
| Effektforbrug (løbehjul) | [kW]    | 15,7                  |
| Omdrejningstal           | [1/min] | 2864                  |
| Frekvens                 | [Hz]    | 48,8                  |
| Lydtryksniveau           | [dB(A)] | 78,7* (1m) 78,7* (1m) |

|                         |         |       |       |
|-------------------------|---------|-------|-------|
| Lydeffektniveau         | [dB(A)] | 93,5* | 93,5* |
| Effektforbrug (aksel)   | [kW]    | 15,7  | 15,7  |
| Virkningsgrad, løbehjul | [%]     | 74,5  | 74,5  |
| Periferihastighed       | [m/s]   | 94,5  | 94,5  |
| Indløbshastighed        | [m/s]   | 45,3  | 45,3  |
| Udløbshastighed         | [m/s]   | 30,3  | 30,3  |
| Opstartstid ca.         | [s]     | 14    | 14    |
| Temperaturstigning      | [°C]    | 6,1   | 6,1   |
| Max. tilladt temperatur | [°C]    | 15    | 15    |

\*Værdi inkl. motor ved nom. RPM + øvrige kilder (± 5dB)

## Motor Data

|                           |                             |
|---------------------------|-----------------------------|
| Fabrikat                  | ABB Process Performance Alu |
| Type                      | ABB M3AA 160MLD 2 (G)       |
| Byggestørrelse            | [-] 160MLD 2                |
| Ydelse                    | [kW] 22                     |
| Omdrejningstal            | [1/min] 2933                |
| Spænding                  | [V] 3x400                   |
| Frekvens                  | [Hz] 50(48,8)               |
| Byggeform                 | [-] B3                      |
| Klemkasse                 | [-] For oven                |
| Effektivitetsklasse       | [-] IE2                     |
| Ex beskyttelse            | [-] -                       |
| Isolationskl./beskyttelse | [-] F/IP55                  |
| Opstart                   | [-] Frekvensomformer        |
| Motorværn                 | [-] Termistor 1x3 - 150°C   |
| Isoleret leje ND-side     | [-] -                       |
| Rulleleje i D-side        | [-] -                       |
| Aksel diameter            | [mm] 42                     |
| Vægt, Motor               | [Kg] 123                    |

## Ventilator Data

|                      |                               |
|----------------------|-------------------------------|
| Ventilator type      | DST40-250-37/D                |
| Varenummer           | 90407-0007                    |
| Position af hus      | RD 0                          |
| Løbehjul diameter    | [mm] 630                      |
| Løbehjul bredde      | [%] 100                       |
| Tilslutning sugeside | [mm] ø250                     |
| Tilslutning trykside | [mm] 315x225                  |
| Vægt excl. motor     | [Kg] 240                      |
| Tilslutning          | Rørforbindelse på begge sider |
| Medium               | Ren luft efter cyklon         |

## Materiale og overflade

|                 |                   |                           |
|-----------------|-------------------|---------------------------|
| Løbehjul        | 1.8963 - Corten B | Ingen maling              |
| Hus (indvendig) | 1.0038 - S235 JR  | Grunding                  |
| Hus (udvendig)  |                   | C3M RAL 9007 GråAluminium |
| Konsol          | 1.0038 - S235 JR  | C3M RAL 9007 GråAluminium |

## ATEX

- Udførelse indvendig zone 22
- Eksplosionsgruppe (sub-group) III B
- Temperaturklasse T125°C
- Udførelse udvendig non zone
- Eksplosionsgruppe (sub-group) -
- Temperaturklasse -
- ATEX mærkning
- II 3/- D Ex h IIIB 125°C Dc/-

## Ventilator Tilbehør

- Løbehjul med krympering

## Fastmonteret Tilbehør

- Svejseflange 315x225-30x8 - smal - 1.0038
- Dræn Standard type 1" - 1.0038
- Inspektionslem Standard type 120 - 1.0038
- Akseltætning - Dobbelt PTFE Plade ø50
- Gnistfri indløb ø250
- ATEX tillæg Zone 22

## Løsdele Tilbehør

- Flex med spændebånd L70.5.1-I ø258-150mm
- Flex for flangesamling L70.5.1-II 315x225-140/120-30mm - smal
- Kanalflange 315x225-30x5 - smal - 1.0038
- 2 x Modflange for flex 315x225-30x5 - smal - 1.0038
- Slidskørt 315x225 - smal - 1.0038
- Vibrationsdæmpere 4 x C 7536 - S60
- Overgang 315x225 - 1.0038 - 0,9mm D1=ø250 type=Spio-nipple

## Øvrig Tilbehør

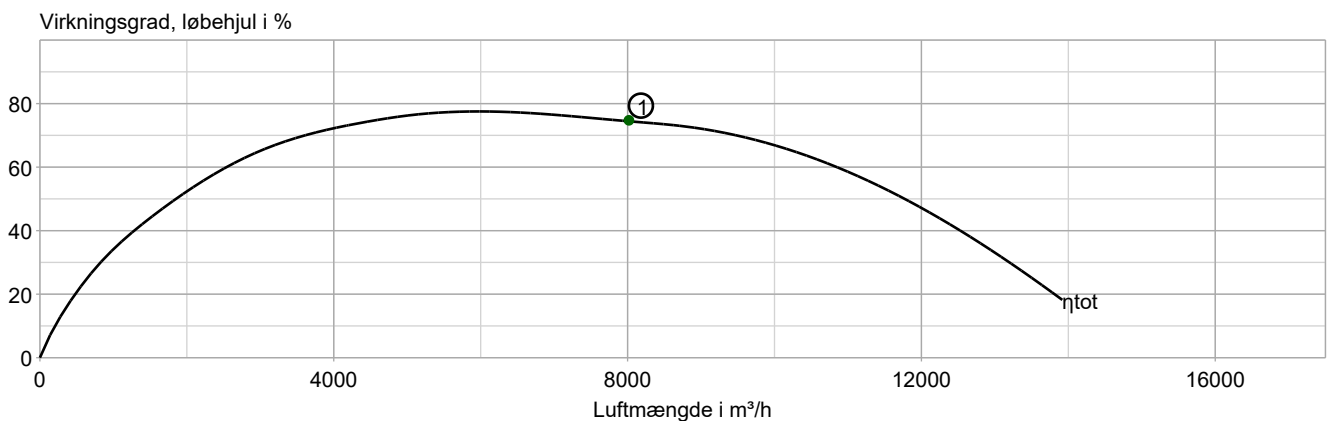
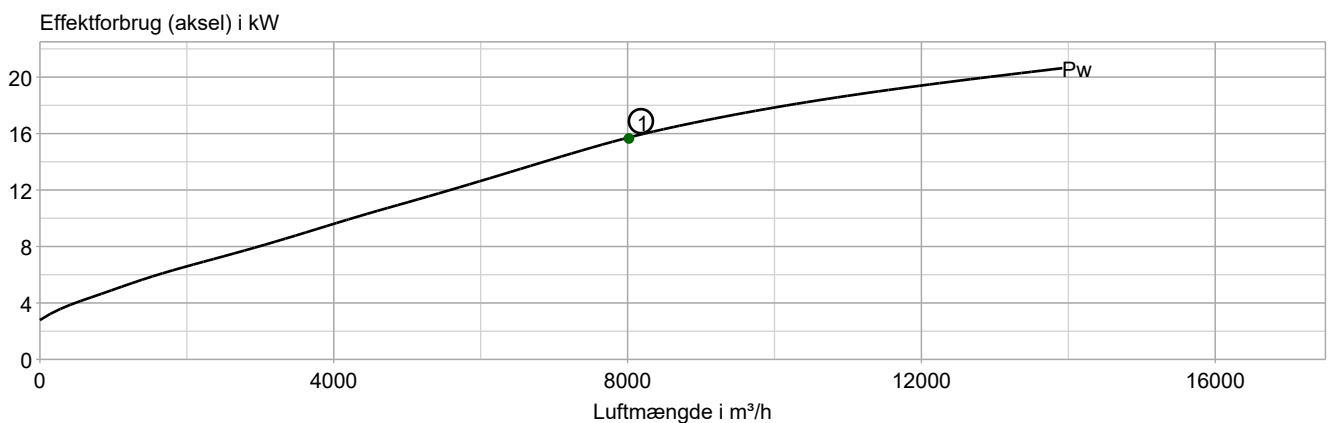
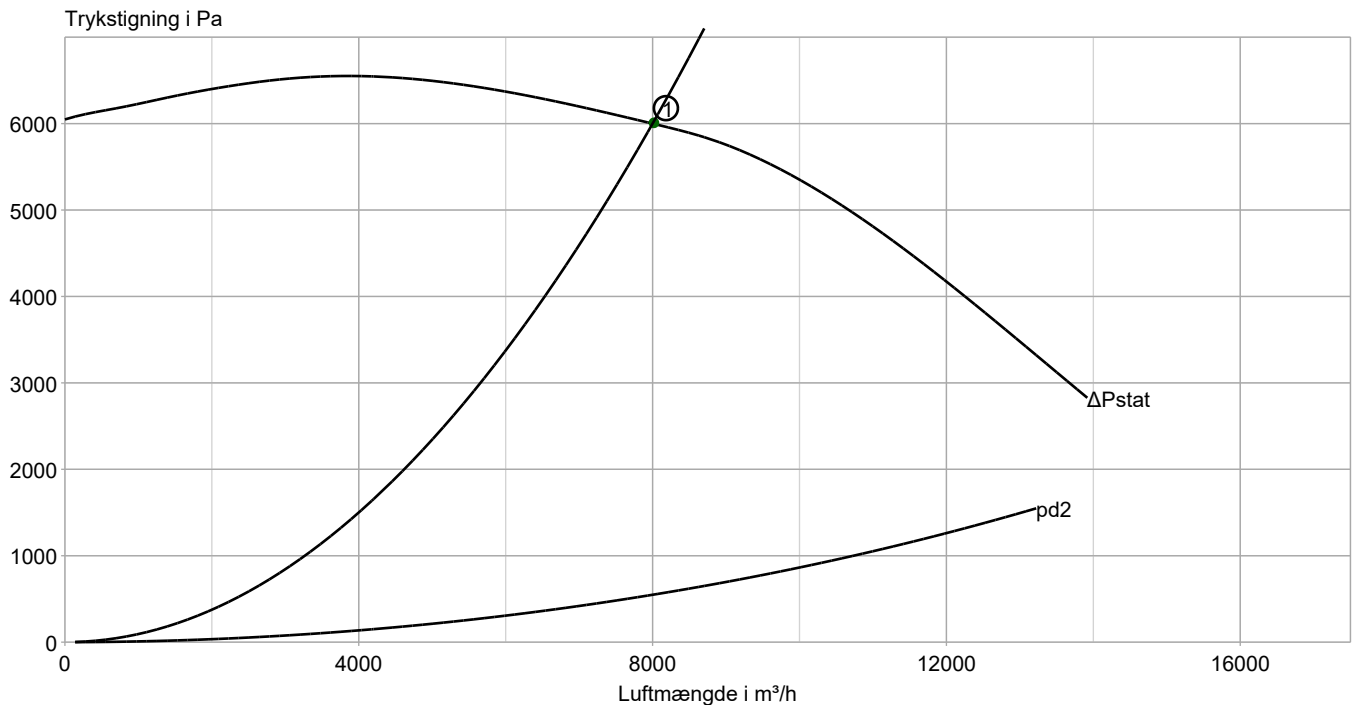
- Instruktionsvejledning DA (Danish)
- Håndteringsvejledning EN DA DE SV FR IT ES (1A)
- Packing in wooden crate (ISPM 15) wrapped in plastic

Anlæg / ordre:

Betegnelse:

30-11-2018/heo

909132-2



|                       |         |       |
|-----------------------|---------|-------|
| Driftspunkt           |         | 1     |
| Luftmængde            | [m³/h]  | 8000  |
| Total tryk            | [Pa]    | 5366  |
| Statisk tryk          | [Pa]    | 6000  |
| Effektforbrug (aksel) | [kW]    | 15,7  |
| Densitet (ved indløb) | [kg/m³] | 1,154 |
| Omdrejningstal        | [1/min] | 2864  |

Anlæg / ordre:

30-11-2018/heo

Betegnelse:

909132-2

|                     |         |       |                    |       |       |
|---------------------|---------|-------|--------------------|-------|-------|
| Driftspunkt         | 1       |       |                    |       |       |
| Hus                 | 1.0038  | 4 mm  | Luftmængde         | 8000  | m³/h  |
| Indløbsdiameter     | 250     | mm    | Total tryk         | 5366  | Pa    |
| Afgang              | 315x225 | mm    | Medietemperatur    | 15    | °C    |
| Driftsomsdrejninger | 2864    | 1/min | Mediedensitet      | 1,154 | kg/m³ |
| Skovlantal          | 8       |       | Driftspunkt V/Vopt | 1,37  |       |
| Skovlfrekvens       | 382     | Hz    | Måleflade index    | 14,8  | dB    |

Basisydelse (VDI 3731) dB 111,2

Lydkorrektion (driftspunkt V/Vopt) dB 0

| Oktavbånd                  | Hz              | Total      | 63    | 125   | 250   | 500   | 1000  | 2000  | 4000  | 8000  |
|----------------------------|-----------------|------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Rotationsstøj              | dB              |            | 0     | 0     | 0     | 5     | 0     | 0     | 0     | 0     |
| Strouhal tal               | dB              |            | 0,4   | 0,8   | 1,7   | 3,3   | 6,7   | 13,3  | 26,7  | 53,3  |
| Relativt spektrum          | dB              |            | -6,1  | -6,5  | -7,9  | -10,2 | -13,4 | -17,5 | -22,6 | -28,5 |
| Total lineær lydniveau     | dB              | 111,2      | 105,2 | 104,7 | 103,3 | 106   | 97,8  | 93,7  | 88,7  | 82,8  |
| A-Vægtet                   | dB              |            | -26,2 | -16,1 | -8,6  | -3,2  | 0     | 1,2   | 1     | -1,1  |
| Dæmpning pladetykkelse hus | dB              |            | -4    | -6    | -8    | -13   | -13   | -13   | -13   | -13   |
| Total lydniveau            | LwA 1 dB(A)     | 105,2      | 79    | 88,6  | 94,7  | 102,8 | 97,8  | 94,9  | 89,7  | 81,7  |
| Lydniveau hus              | LwA 2 dB(A)     | 93,3/93,5* | 75    | 82,6  | 86,7  | 89,8  | 84,8  | 81,9  | 76,7  | 68,7  |
|                            | LpA 2(1m) dB(A) | 78,6/78,7* | 60,2  | 67,8  | 71,9  | 75    | 70    | 67,1  | 61,9  | 53,9  |
| Lydniveau kanalsugeside    | LwA 3 dB(A)     | 105        | 78    | 87,6  | 92,7  | 102,8 | 97,8  | 94,9  | 89,7  | 81,7  |
|                            | LpA 3(1m) dB(A) | 95**       | 55,6  | 70,7  | 80,1  | 92,6  | 88,5  | 85,8  | 80,7  | 72,7  |
| Lydniveau kanaltrykside    | LwA 4 dB(A)     | 107,3      | 79    | 89,6  | 96,7  | 105,8 | 97,8  | 93,9  | 88,7  | 81,7  |
|                            | LpA 4(1m) dB(A) | 97**       | 56,6  | 72,7  | 84,1  | 95,6  | 88,5  | 84,8  | 79,7  | 72,7  |

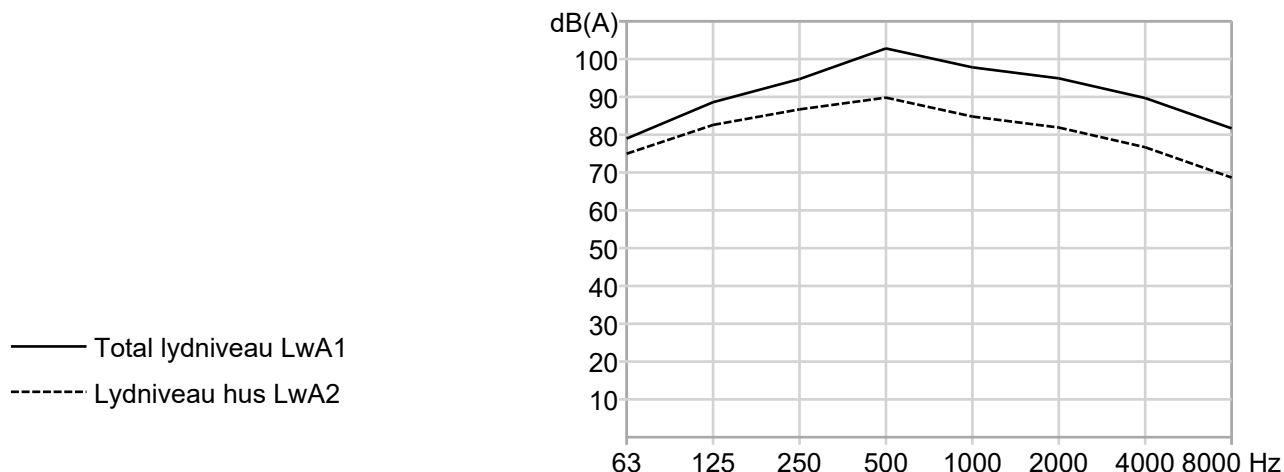
Lydniveau motor LwA dB(A) 79

Lyddæmpning motor Lw dB 0

Øvrige lydkilder LwA dB(A) 0

\* Værdi inkl. motor ved nom. RPM + øvrige kilder (± 5dB)

\*\*Teoretiske lydværdier til vurdering af lydtryksniveau ved systemgrænse (± 5dB)



## EC declaration of conformity

**Manufacturer**

and authorized to  
compile the technical file:

**BarkerBille A/S**

Tempovej 23  
2750 Ballerup  
Denmark  
+45 44974192

**Machinery:**

Fan

**Type:**

DST40-250-37/D

**Production No.:**

909132-2

**Declares that the machinery fulfils all relevant provisions of:**

- DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on machinery
- DIRECTIVE 2014/35/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits
- DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility
- DIRECTIVE 2014/34/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres

**The machinery is designed according to requirement in Group II, and is marked**

II 3/- D Ex h IIIB 125°C Dc/-

**Deposit of technical documentation to notified body XXXX.****Following harmonized standards have been used:**

- EN ISO 12100:2011 Safety of machinery - General principles for design - Risk assessment and risk reduction
- EN 1127-1:2011 Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology
- EN ISO 80079-36:2016 Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres - Basic method and requirements
- EN ISO 80079-37:2016 Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres - Non-electrical type of protection constructional safety "c", control of ignition sources "b", liquid immersion "k"
- EN 14986:2017 Design of fans working in potentially explosive atmospheres

**Place and Date:**

Ballerup.

30-11-2018

**Signature:**

Flemming Bille, General Manager



**SV**

# Handbok

## BarkerBille-fläktar



**Revision: 2018-09-25**

**Doc-04-01-SV Instruction manual BarkerBille fans.docx**



# Innehåll

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|   |           |
|---|-----------|
| <b>Innehåll .....</b>   | <b>2</b>  |
| <b>1. Förord .....</b>  | <b>4</b>  |
| 1.1 Avgränsning.....  | 4         |
| 1.2 Dokumentation.....  | 5         |
| <b>2. Leverans och transport .....</b>                              | <b>6</b>  |
| 2.1 Förpackning .....   | 6         |
| 2.2 Transportkonsoler .....   | 6         |
| 2.3 Stöttning av axel/lagerenhet .....                              | 6         |
| 2.4 Konservering av lager.....                                      | 6         |
| <b>3. Avlastning och lyftning .....</b>                             | <b>7</b>  |
| <b>4. Förvaring före montering och uppstart .....</b>               | <b>7</b>  |
| 4.1. Rotation av fläkthjul .....                                    | 7         |
| 4.2 Konservering av lager.....                                      | 7         |
| 4.3 Stöttning av axel/lagerenhet .....                              | 7         |
| 4.4 Direktdrivna fläktar med fläkthjul monterat på motoraxeln ..... | 8         |
| <b>5. Försäkran om överensstämmelse och typskylt .....</b>          | <b>8</b>  |
| 5.1 Typskylt.....   | 8         |
| 5.2 Försäkran om överensstämmelse (innehåll) .....                  | 9         |
| <b>6. Användningsvillkor.....</b>                                   | <b>10</b> |
| 6.1 Standardfläktar .....   | 10        |
| 6.2 ATEX-fläktar .....  | 10        |
| <b>7. Användning .....</b>  | <b>10</b> |
| <b>8. Förberedelser .....</b>                                       | <b>11</b> |
| <b>9. Montering .....</b>   | <b>11</b> |
| 9.1 Flexibel montering .....  | 11        |
| 9.2 Monteringstolerans .....  | 11        |
| 9.3 Vibrationsdämpare (tillval) .....                               | 12        |
| 9.4 Flexibla anslutningar (tillval) .....                           | 12        |
| 9.5 Kanalanslutning .....   | 12        |
| 9.6 Avstängningsspjäll (tillval) .....                              | 12        |
| <b>10. Elanslutning .....</b>                                       | <b>13</b> |
| <b>11. Uppstart och drift.....</b>                                  | <b>13</b> |
| 11.1 Drift med frekvensomvandlare.....                              | 13        |
| 11.2 Vibrationer .....  | 13        |
| 11.3 Vibrationskontroll och egenfrekvens.....                       | 14        |
| 11.4 Ändring av varvtal .....                                       | 14        |
| <b>12. Underhåll och reparationer .....</b>                         | <b>15</b> |

|  |           |
|--|-----------|
| 12.1 Checklista för underhåll .....                        | 16        |
| 12.2 Felsökning .....                                      | 17        |
| 12.3 Motor.....  | 19        |
| 12.4 Fläkthjul .....                                       | 19        |
| 12.5 Övrig utrustning .....                                | 19        |
| 12.6 Övergripande rengöring.....                           | 19        |
| <b>13. Bullerförhållanden .....</b>                        | <b>20</b> |
| <b>14 Bortskaffande.....</b>                               | <b>20</b> |
| <b>15 Reservdelar (generellt) .....</b>                    | <b>21</b> |
| 15.1 Direkt driven (exempel) .....                         | 21        |
| 15.2 Remdriven (exempel) .....                             | 22        |
| 15.3 Direkt driven genom koppling och axel (exempel) ..... | 23        |

# 1. Förord

Vi är glada att du har valt en fläkt från BarkerBille.

Alla fläktar från BarkerBille är specialtillverkade efter användarens specifikationer och försedda med ett unikt produktionsnummer. Varje fläkt har genomgått en riskbedömning i enlighet med tillämplig lagstiftning och handboken innehåller viktig information och krav för användarna. Dessa måste följas för att fläkten ska vara säker och fungera korrekt under hela dess livslängd.

Användaren måste läsa handboken noggrant för att använda fläkten på ett optimalt sätt. Var särskilt uppmärksam på underhållsavsnittet, eftersom korrekt underhåll är en viktig förutsättning för problemfri drift. Det är dessutom viktigt att följa anvisningarna noggrant för att fläktens garanti ska fortsätta gälla. Observera att montering, drift och underhåll endast får utföras av utbildad personal.

Observera att ytterligare information och striktare krav gäller för ATEX-fläktar. För ATEX-fläktar gäller både handboken samt den kompletterande informationen i ATEX-handboken.



Se ATEX-handbok

Vid icke godkända modifieringar av produkten kommer BarkerBilles produktgarantier och ansvar att upphöra att gälla.

Handboken måste sparas under hela fläktens livslängd.

Kontakta BarkerBille om du har ytterligare frågor eller kommentarer.

## 1.1 Avgränsning

Handboken gäller för följande BarkerBille-fläktar:

| Fläkttyp | Fläktbeteckning        | Transmission | Fläkthjulsstorlek | Motorstorlek  |
|----------|------------------------|--------------|-------------------|---------------|
| ATS      | ATS140 → ATS180        | D            | Ø 250–315         | 0,75–3 kW     |
| AT       | AT315 → AT800          | D, R         | Ø 400–900         | 0,75–15 kW    |
| CAT      | CAT450 → CAT900        | D, K, R      | Ø 500–1 000       | 4–160 kW      |
| HT       | HT0010 → HT1250        | D, K, R      | Ø 260–1 250       | 0,55–110 kW   |
| MAT      | MAT200 → MAT2000       | D, K, R      | Ø 250–2 500       | 0,75–800 kW   |
| HAT56    | HAT56-160 → HAT56-1400 | D, K, R      | Ø 250–2 500       | 0,75–1 000 kW |
| DHAT     | DHAT-160 → DHAT-1400   | D, K, R      | Ø 250–2 500       | 0,75–1 000 kW |
| DST20    | DST20-125 → DST20-250  | D, K, R      | Ø 560–1 120       | 4–160 kW      |
| MT       | MT0260 → MT1250        | D, K, R      | Ø 260–1 250       | 0,55–160 kW   |
| HN       | HN0400 → HN2250        | D, K, R      | Ø 400–2 250       | 4–710 kW      |
| DAT      | DAT200 → DAT2000       | D, K, R      | Ø 250–2 500       | 0,75–1 000 kW |
| DST40    | DST40-160 → DST40-1000 | D, K, R      | Ø 315–2 500       | 0,75–800 kW   |
| DST56    | DST56-220 → DST56-1400 | D, K, R      | Ø 400–2 500       | 4–800 kW      |
| STS      | STS140 → STS1120       | D, K, R      | Ø 250–2 000       | 0,75–450 kW   |

|     |                 |         |             |            |
|-----|-----------------|---------|-------------|------------|
| HST | HST220 → HST450 | D, K, R | Ø 400–800   | 4–250 kW   |
| VB  | VB0010 → VB1250 | D, K, R | Ø 260–1 250 | 2,2–110 kW |

## 1.2 Dokumentation

Nedan följer en beskrivning av dokumenten som kan ingå i leveransen av en BarkerBille-fläkt.

| Dokument                           | Beskrivning  | Medföljer leverans | Slutdok. | Slutdok. ATEX |
|------------------------------------|--|--------------------|----------|---------------|
| Hanteringsanvisningar              | Dokument som innehåller information om och krav för korrekt och säker hantering av fläkten. Innehåller avsnitt 1–4 i handboken.                      | x                  |          |               |
| Handbok                            | Dokument som innehåller information om och krav för korrekt och säker hantering, uppstart, montering, drift, underhåll och bortskaffande av fläkten. |                    | x        | x             |
| ATEX-handbok                       | Dokument som kompletterar handboken och gäller för alla ATEX-fläktar.  |                    |          | x             |
| Dokumentation från underleverantör | Dokument från underleverantörer som kompletterar handboken.  |                    | x        | x             |
| Teknisk specifikation              | Dokument som bland annat specificerar lufttekniska data, grafer, ljud- och motordata samt övriga komponenter för varje enskild fläkt.                |                    | x        | x             |
| Försäkran om överensstämmelse      | Dokument som anger fläkttyp, serienummer, datum, eventuell ATEX-märkning och relevanta direktiv och standarder för fläkten.                          |                    | x        | x             |
| Kompletterande anvisningar         | Dokument som innehåller praktisk och kompletterande information om fläktar.  |                    | x*)      | x*)           |
| Följesedel                         | Dokument som anger leveransomfånget, inklusive tillbehör.  | x                  |          |               |

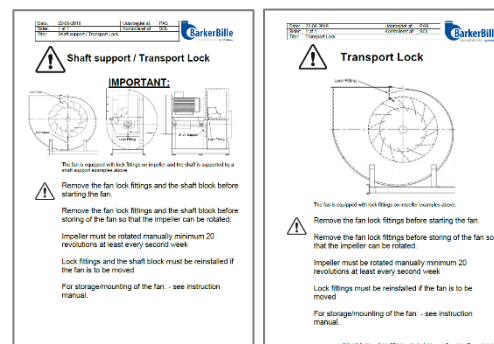
\*) Dokumentet kan erhållas från BarkerBille på begäran.

## 2. Leverans och transport

Transporten avtalas på förhand och specificeras i orderbekräftelsen. Vid val av transport ska följande behov beaktas: användning, storlek, egenskaper, temperaturförhållanden, transporttid och transportsätt (fartyg, flygplan, tåg eller lastbil). Förpackning och försiktighetsåtgärder under transport avtalas på förhand med BarkerBille.

### 2.1 Förpackning

Fläkten levereras på en lastpall, på transportfötter eller direkt på en underram. Som standard levereras fläkten utan förpackning, men det är möjligt att välja till olika förpackningsalternativ.



### 2.2 Transportkonsoler

För att förhindra att lagren på större fläktar tar skada kan fläkten utrustas med låsbeslag på fläkthjulet och axelstöd.

Om detta är fallet kommer fläkten att vara försedd med en informationsskylt.

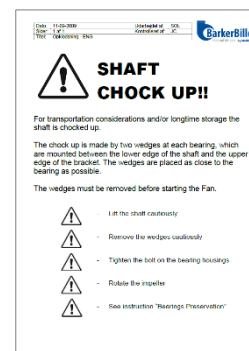
Efter transporten ska låsbeslagen och axelstödet demonteras och fläkten ska roteras. Montera tillbaka låsbeslagen och axelstödet om fläkten ska flyttas.

### 2.3 Stöttning av axel/lagerenhet

Axeln kan stöttas för att förhindra skador på lagren på större fläktar. Detta sker oftast i samband med sjötransport, järnvägstransport, transport i svår terräng eller vid extra lång transporttid och/eller förvaringstid.

Om detta är fallet kommer fläkten att vara försedd med en informationsskylt.

Före uppstarten måste stöttningen tas bort. Detta görs genom att försiktigt lyfta axeln och sedan ta bort stöttningen. Fläkten måste därefter roteras.



### 2.4 Konservering av lager

För att minimera risken för kondens i lagren under en extra lång transporttid och/eller förvaringstid kan lagren konserveras.

Om detta är fallet kommer fläkten att vara försedd med en informationsskylt.

Före uppstarten måste konserveringen avlägsnas och nytt fett/ny olja måste fyllas på i lagren.



För mer information om lager, se Teknisk specifikation och Dokumentation från underleverantör

### 3. Avlastning och lyftning

---

Om lyftning krävs ska endast godkänd lyftutrustning användas.

Mindre fläktar är försedda med två lyftöglor, medan större fläktar har fyra lyftöglor.

Om det finns fler än fyra lyftöglor kommer piktogram att ange vilka fyra öglor som är avsedda för att lyfta fläkten.

Vikten anges på fläktens typskylt som en totalvikt eller som vikten utan motorn.

Motorvikten anges på motorns typskylt.

Vid lyft med gaffeltruck måste gaffeln placeras under konsolen eller underramen (eventuellt på lastpallen). Se till att lyfta och sänka så långsamt som möjligt. Stötar, vibrationer och fall kan orsaka obalans och skador på bland annat lagren.



### 4. Förvaring före montering och uppstart

---

Fläktarna bör helst förvaras inomhus i tempererade rum före montering och uppstart. Luftfuktighet, temperatursvängningar, vibrationer från omgivningarna och fläktens storlek ska dock alltid beaktas.

#### 4.1. Rotation av fläkthjul

Vid förvaring – eller om fläkten är ur drift under mer än två veckor – måste axeln och lagren roteras för hand, såvida axeln inte är stöttad och lagren är frigjorda – se avsnitt 2.3.

Detta gäller även för fläktar med konserverade lager.

Rotation kan ske vid uppstart eller genom att manuellt rotera fläkthjulet minst 20 varv varannan vecka.

#### 4.2 Konservering av lager

När fläktar förvaras på en plats med hög luftfuktighet eller kraftiga temperatursvängningar rekommenderas det att lagren konserveras.

När fläktar förvaras eller transporteras mer än två månader för uppstarten rekommenderas det att lagren konserveras.

#### 4.3 Stöttning av axel/lagerenhet

Om det inte är möjligt eller önskvärt att rotera fläkten rekommenderas det att stötta axeln så att lagren inte belastas. Stöttningen skyddar lagren mot tryckmärken.

Stöttningen kan utföras med två kilar vid vardera lager eller motsvarande stöttningsaxel. Kilarna ska placeras så nära lagerhusen som möjligt.

Före uppstarten måste alla stöttningsaxlar tas bort. Detta görs genom att försiktigt lyfta axeln och sedan ta bort stöttningsaxlarna. Fläkten måste därefter roteras.

För remdrivna fläktar måste remdrivningen tas bort innan stöttningen utförs. När remmarna har avlägsnats måste de förvaras enligt dokumentationen från underleverantören. Remskivan måste

behandlas med rostskyddsmedel. Före uppstarten måste remskivorna rengöras och remmarna monteras tillbaka och spännas med rätt remspänning.



För mer information om remmar, se Dokumentation från underleverantör

#### 4.4 Direktdrivna fläktar med fläkthjul monterat på motoraxeln

Direktdrivna fläktar kan vara försedda med låsbeslag på fläkthjulet och axeln kan vara stöttad – se avsnitt 2.2.



För mer information om motorer, se Dokumentation från underleverantör

## 5. Försäkran om överensstämmelse och typskylt

Alla fläktar levereras med CE-märkning, vilket anges i försäkran om överensstämmelse och på typskylten. Originalversionen av försäkran om överensstämmelse medföljer slutdokumentationen, medan den väderbeständiga typskylten är fäst på flätkonsolen.





Se Försäkran om överensstämmelse

### 5.1 Typskylt

Typskylten anger fläktens tekniska detaljer, typ, position, tillverkningsår, kundreferens, produktionsnummer, totaltryck, temperatur, luftvolym, vikt, nominell hastighet, högsta hastighet (högsta tillåtna hastighet för fläkthjul), fläktens effektförbrukning, motorns effektförbrukning och CE-märkning.

När du kontaktar BarkerBille ska du alltid uppge produktionsnumret som anges på typskylten.

|   |                                    |                          |  |  |  |
|---|------------------------------------|--------------------------|--|--|--|
|  |                                    |                          | <b>BarkerBille A/S</b><br>Tempovej 23 · DK-2750 Ballerup<br>Tel. +45 44 97 41 92 · Fax +45 44 97 41 93<br>info@barkerbille.com · www.barkerbille.com |  |  |
| Type:   | Pos.                               | Year                     |  |  |  |
| Ref:  | Production no:                     |                          |  |  |  |
| Total pressure [Pa] / temp [°C]:  | Air volume [m³/h]:                 | Weight excl. motor [kg]: |  |  |  |
| Fan speed [rpm] / speed max [rpm]:  | Fan power [kW] / motor power [kW]: |                          |  |  |  |
|  |                                    |                          |  |  |  |

## 5.2 Försäkran om överensstämmelse (innehåll)

Försäkran om överensstämmelse innehåller fläkttypen, produktionsnumret och produktionsdatumet för den specifika fläkten samt en underskrift.



### EG-försäkran om överensstämmelse

**Tillverkare**

och behörig att  
sammanställa den tekniska  
dokumentationen:

**BarkerBille A/S**

Tempovej 23  
2750 Ballerup  
Danmark  
+45 44974192

**Maskin:**

Fläkt

**Typ:****Produktionsnr:**

försäkrar härmed att maskinen uppfyller alla relevanta bestämmelser i:

- EUROPAPARLAMENTETS OCH RÅDETS DIREKTIV 2006/42/EG av den 17 maj 2006 om maskiner
- EUROPAPARLAMENTETS OCH RÅDETS DIREKTIV 2014/35/EU av den 26 februari 2014 om harmoniseringen av medlemsländernas lagar som rör tillhandahållandet på marknaden av elektrisk utrustning som utformats för användning inom vissa spänningsgränser
- EUROPAPARLAMENTETS OCH RÅDETS DIREKTIV 2014/30/EU av den 26 februari 2014 om harmoniseringen av medlemsländernas lagar som rör elektromagnetisk kompatibilitet

**Följande harmoniserade standarder har använts:**

- SS-EN ISO 12100:2011 Maskinsäkerhet - Allmänna konstruktionsprinciper - Riskbedömning och riskreducering

**Ort och datum:****Underskrift:**

BarkerBille A/S • Tempovej 23 DK-2750 Ballerup | Jørgen Hansens Vej 1 DK-6670 Holsted • mail@barkerbille.com • www.barkerbille.com • +45 44 97 41 92



## 6. Användningsvillkor

### 6.1 Standardfläktar

Standardfläktar får inte placeras i en potentiellt explosiv atmosfär och är inte konstruerade för att invändigt hantera en explosiv atmosfär.

### 6.2 ATEX-fläktar

ATEX-fläktar är konstruerade för att placeras i en potentiellt explosiv atmosfär och/eller för att invändigt hantera en explosiva atmosfärer. För ATEX-fläktar gäller denna handbok samt den kompletterande informationen i ATEX-handboken.



Se ATEX-handbok

## 7. Användning

Fläkten är konstruerad för att integreras i centralstyrda processsystem.

Fläkten används till processluft för många olika ändamål och kan användas för att transportera följande medier:

| Typ   | Medium                       |                 |          |                |        |                 |                 |
|-------|------------------------------|-----------------|----------|----------------|--------|-----------------|-----------------|
|       | Statiskt tryck vid 15 °C, Pa | Luftvolym, m³/h | Ren luft | Gashaltig luft | Rökgas | Dammfylld luft  | Material        |
| ATS   | < 1 700                      | < 25 000        | x        |                |        |                 |                 |
| AT    | < 2 000                      | < 35 000        | x        | x              |        |                 |                 |
| CAT   | < 1 700                      | < 65 000        | x        | x              | x      |                 |                 |
| HT    | < 24 000                     | < 4 000         | x        | x              | x      |                 |                 |
| MAT   | < 3 500                      | < 250 000       | x        | x              | x      | x <sup>1)</sup> |                 |
| HAT56 | < 12 500                     | < 180 000       | x        | x              | x      | x <sup>1)</sup> |                 |
| DHAT  | < 12 500                     | < 180 000       | x        | x              | x      | x <sup>1)</sup> |                 |
| DST20 | < 16 000                     | < 20 000        | x        | x              | x      | x <sup>1)</sup> |                 |
| MT    | < 14 000                     | < 25 000        | x        | x              | x      | x               |                 |
| HN    | < 24 000                     | < 220 000       | x        | x              | x      | x               |                 |
| DAT   | < 8 500                      | < 300 000       | x        | x              | x      | x               |                 |
| DST40 | < 16 000                     | < 70 000        | x        | x              | x      | x               | x               |
| DST56 | < 12 000                     | < 140 000       | x        | x              | x      | x               | x               |
| STS   | < 5 000                      | < 60 000        | x        | x              | x      | x               | x <sup>2)</sup> |

|     |         |          |   |   |   |   |                 |
|-----|---------|----------|---|---|---|---|-----------------|
| HST | < 7 000 | < 30 000 | x | x | x | x | x <sup>2)</sup> |
| VB  | < 8 000 | < 25 000 | x | x | x | x | x <sup>2)</sup> |

<sup>1)</sup> Endast kortvarigt dammfyllt luft

<sup>2)</sup> Kan även levereras med klippfunktion (papper, papp och liknande)

Om den exakta medietypen har uppgetts av kunden kommer den att anges i den tekniska specifikationen.



Se Teknisk specifikation

## 8. Förberedelser

Kontrollera de levererade delarna och komponenterna beträffande transportskador innan monteringen inleds.

Kontrollera att alla delar och komponenter har levererats så att monteringen kan slutföras.

Leveransomfånget anges i följesedeln som medföljer fläkten.



Se Följesedel

## 9. Montering



**VIKTIGT:**

**Tillämpliga nationella säkerhetsföreskrifter måste iakttas**

Bär alltid erforderlig säkerhetsutrustning.

Monteringen får endast utföras av utbildad personal och enligt handboken.



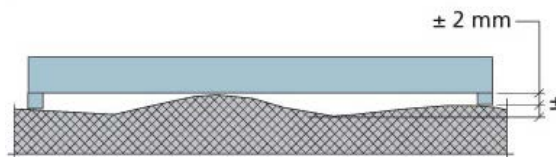
### 9.1 Flexibel montering

Fläkten är utformad för flexibel montering. Detta innebär att fläkten måste monteras på vibrationsdämpare och med flexibla anslutningar.

### 9.2 Monteringstolerans

Före monteringen måste du säkerställa att fundamentet kan bära upp fläktens totalvikt och dynamiska belastning. Fläktens och motorns vikt anges på typskyltarna och den dynamiska belastningen kan erhållas om denna är relevant.

Det måste säkerställas att fundamentet är plant längs hela fläktramens längd och bredd i enlighet med ritningen.



### 9.3 Vibrationsdämpare (tillval)

Fläkten ska monteras på vibrationsdämpare som ska monteras antingen direkt på ett fundament eller på en underram.



För mer information om vibrationsdämpare, se Dokumentation från underleverantör

### 9.4 Flexibla anslutningar (tillval)

De flexibla anslutningarna måste monteras löst utsträckta och vara centrerade i förhållande till fläkten och kanalanslutningen.



För mer information om flexibla anslutningar, se Dokumentation från underleverantör

### 9.5 Kanalanslutning

Innan kanalanslutningar monteras ska du säkerställa att

- fläkten och kanalerna är rengjorda och fria från främmande material.
- det inte förekommer onormal friktion eller mekaniska missljud när fläkthjulet roteras för hand.

Montera kanalanslutningarna så att de är centrerade i förhållande till fläktens inlopp och utlopp och stötta dem så att de är självbärande.

Om inget annat anges har fläktens prestanda dimensionerats utan att ta hänsyn till kanalanslutningens utformning.

En olämplig kanalutformning före och efter fläkten kommer att minska fläktens prestanda.

Om fläkten monteras fritt sugande ska en sugtratt med skyddsnät monteras på inloppet. Maskstorleken beror på avståndet från skyddsnätet till farliga rörliga delar.

Se standarden SS-EN ISO 13857 om skyddsnätet inte ingår i leveransen.



Se Kompletterande anvisningar

### 9.6 Avstängningsspjäll (tillval)

Det kan vara fördelaktigt att montera ett avstängningsspjäll på utloppet som kan stängas i samband med underhåll – se avsnitt 12 Underhåll. När fläkten är avstängd kommer ett stängt spjäll att förhindra drag genom fläkten och därmed även fläkthjulets rotation.

## 10. Elanslutning

Fläkten är konstruerad för att integreras i centralstyrda processsystem.

Elanslutningar måste alltid utföras enligt alla tillämpliga nationella regler. Det rekommenderas att alltid installera en spärrbar underhållsbrytare framför fläkten.

## 11. Uppstart och drift



### VIKTIGT:

**Uppstarten får endast utföras av utbildad personal.**

Före uppstarten ska du kontrollera att

- fläkten är rätt monterad.
- eventuella låsbeslag och axelstöd har tagits bort.
- eventuella stöttningar har tagits bort.
- eventuell konservering har avlägsnats.
- eventuella främmande material i fläkthuset och fläkthjulet har tagits bort.
- eventuella demonterade remmar har monterats tillbaka korrekt.

Rotera fläkthjulet för hand och kontrollera om det förekommer onormalt motstånd eller missljud.

### 11.1 Drift med frekvensomvandlare

Vid uppstart av en fläkt med drivsystem med variabel frekvens (VFD) måste fläkten varvas upp till nominellt varvtal (r/min) och eventuella varvtalsområden med kritiska egenfrekvenser ska "uteslutas". Detta måste utföras på frekvensomvandlaren så att drift i dessa områden undviks – se avsnitt 11.3.

Frekvensomvandlarens ramptider ska ställas in så att onödigt höga belastningar på grund av snabba accelerationer och retardationer undviks.

### 11.2 Vibrationer

Före leveransen har fläkthjulet balanserats till minst G2,5 och fläkten har testats i fabriken med en vibrationsnivå på högst 3,5 mm/sek.

Uppmätt vibrationsnivå under drift (på platsen):

| Vibrationsnivå  | Åtgärd  |
|-----------------|---|
| 0–4,5 mm/sek    | Vibrationsnivån är acceptabel för en ny installation  |
| 0–6,3 mm/sek    | Vibrationsnivån är acceptabel under drift   |
| 6,3–11,2 mm/sek | Vibrationsnivån är inte acceptabel under längre driftperioder. Åtgärd måste vidtas så snart som möjligt för att minska vibrationsnivån. |
| > 11,2 mm/sek   | Vibrationsnivån är så hög att fläkten tar skada. Fläkten ska omedelbart stoppas och vibrationsnivån måste minskas.                      |

Nivån ska mätas mitt i lagerhusets axel eller i motorn.

**VIKTIGT:**

Vid högre vibrationsnivåer än 11,2 mm/sek måste fläkten stoppas OMEDELBART.



Se Kompletterande anvisningar

### 11.3 Vibrationskontroll och egenfrekvens

Naturliga vibrationer uppstår när en tillförd kraft eller frekvens är identisk med ett systems egenfrekvens. När detta inträffar kommer systemets svängningsamplitud att öka och i vissa fall kommer vibrationsnivån att överstiga den högsta tillåtna nivån.

Fläktens kritiska egenfrekvens är generellt sett betydligt högre än den tillförda frekvensen på grund av dess solida konstruktion och är vanligtvis högre än ( $< 4\,000\text{ r/min}/67\text{ Hz}$ ).

I vissa fall kan en kritisk egenfrekvens uppstå på ett lägre varvtal ( $< 4\,000\text{ r/min}$ ). I detta fall rekommenderar vi att driften i detta område  $\pm 2\text{ Hz}$  undviks via frekvensomvandlaren (utesluts).

För att fastställa det kritiska varvtalet rekommenderas det att köra ett "Run Up Coast Down"-test vid uppstarten. För ATEX-fläktar är det ett obligatoriskt krav att fastställa det kritiska varvtalet.



Se ATEX-handbok

Om fläkten inte har en frekvensomvandlare och har monterats med remdrivning är det möjligt att ändra utväxlingen för att undvika drift på den kritiska varvtalsnivån.

OBS: När fläkten har monterats kan andra frekvenser uppmätas/förekomma, till exempel på grund av luftturbulens från inlopp och utlopp, rördragning, fundament osv. Vid luftturbulens bör rördragningen kontrolleras. Om fläkten monteras på en stålkonstruktion kan konstruktionens egenfrekvens påverkas av fläktens varvtal. En lösning på detta problem kan vara att förstärka stålkonstruktionen eller att använda ett mer flexibelt fläktmontage.

### 11.4 Ändring av varvtal

Generellt sett ska fläkten endast köras med det nominella varvtalet som anges i den tekniska specifikationen och på typskylten.



Se Teknisk specifikation

Vid ändring av fläktens varvtal finns det risk för att nå fläktens egenfrekvens. Kontinuerlig drift får aldrig ske i dessa frekvensområden – se avsnitt 11.3.

En ändring av varvtalet påverkar även lagrens smörjintervall och valet av smörjfett. Det nominella varvtalet anges på typskylten, medan smörjintervallet och typen av smörjfett för det nominella varvtalet anges på smörjskylten.

Kontakta BarkerBille i samband med en eventuell ändring av fläktens nominella varvtal.

## 12. Underhåll och reparationer



### VIKTIGT:

**Tillämpliga nationella säkerhetsföreskrifter måste iakttas**

Använd alltid erforderlig säkerhetsutrustning.

Underhåll får endast utföras av utbildad personal och enligt handboken.



Innan underhållsarbete eller reparationer utförs **MÅSTE** du säkerställa följande:

- 1. Kontrollera att fläkten är bortkopplad från alla strömkällor på ett säkert sätt och säkrad mot återanslutning.**

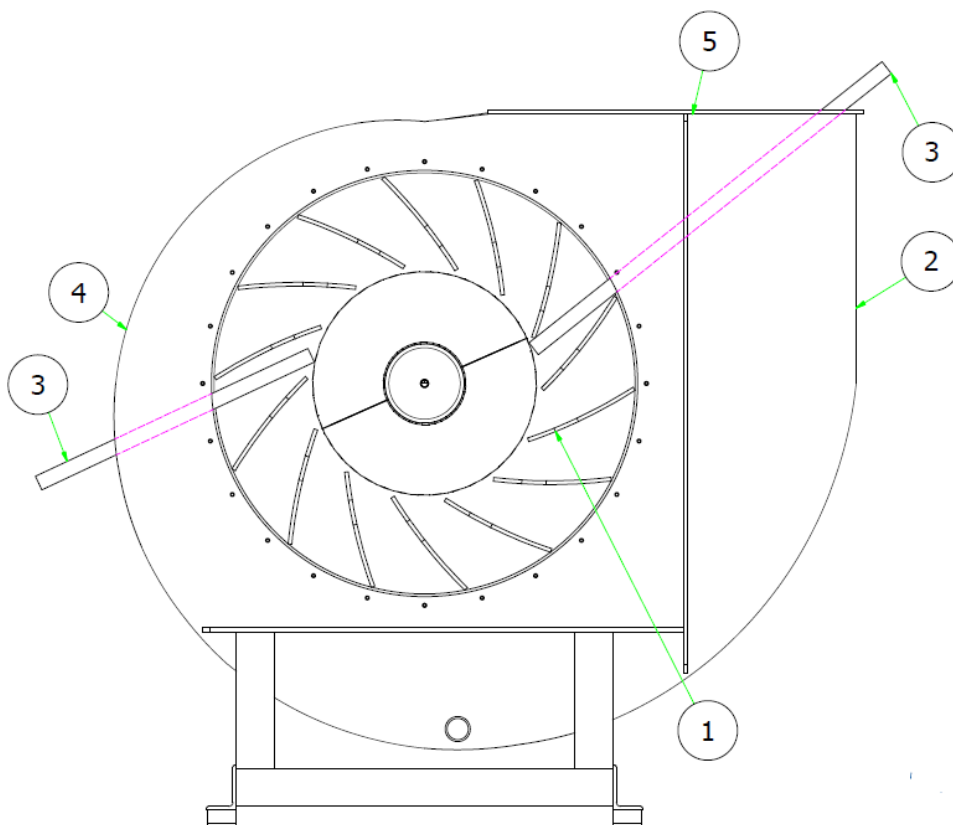


- 2. Kontrollera att fläkten har slutat rotera.**

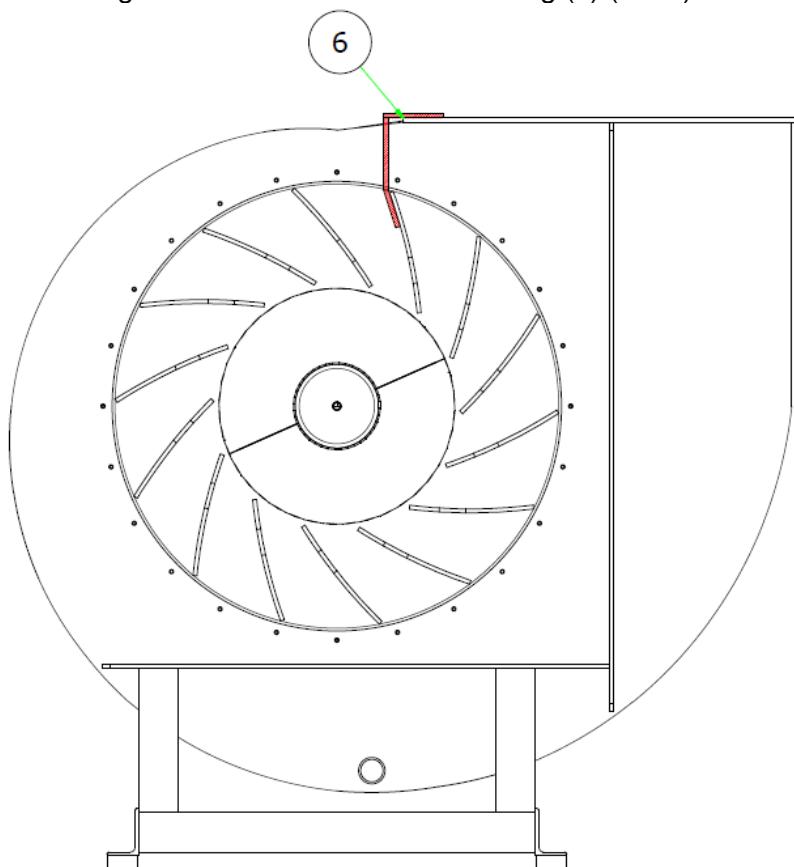
Rotationen kan orsakas av en luftström genom fläkten, till exempel på grund av drag från skorstenen eller en annan fläkt. För att undvika drag kan inloppet eller utloppet stängas med ett spjäll eller en platta.

- 3. Kontrollera att fläkten inte kan rotera efter att den har stoppats.**

Fläkten kan säkras genom att till exempel "låsa" fläkthjulet (1) med en solid anordning (3) via inspektionssluckan (4) eller utloppet (5).



Fläkthjulet kan även säkras genom att låsa det med låsbeslag (6) (tillval)



## 12.1 Checklista för underhåll

|   | 1 månad                    | 3 månader | 6 månader | 1 år |
|---|----------------------------|-----------|-----------|------|
| <b>Motor</b>  |                            |           |           |      |
| Kontrollera om buller och värmeutveckling har ändrats | X                          |           |           |      |
| Smörjning *)  | Se smörjskylten på motorn  |           |           |      |
| <b>Fläkthjul</b>                                      |                            |           |           |      |
| Kontrollera vibrationer, se avsnitt 11.2              | X                          |           |           |      |
| <b>Fläktlager **)</b>                                 |                            |           |           |      |
| Kontrollera om buller och värmeutveckling har ändrats | X                          |           |           |      |
| Smörjning   | Se smörjskylten på fläkten |           |           |      |
| <b>Remdrivning **)</b>                                |                            |           |           |      |
| Kontrollera   |                            | X         |           |      |
| <b>Vibrationsdämpare **)</b>                          |                            |           |           |      |
| Kontrollera   |                            |           |           | X    |

| Flexibla anslutningar **) |   |   |  |   |
|---------------------------|---|---|--|---|
| Kontrollera               |   | X |  |   |
| Axeltätningar **)         |   |   |  |   |
| Kontrollera               | X |   |  |   |
| Koppling **)              |   |   |  |   |
| Kontrollera               | X |   |  |   |
| Drev **)                  |   |   |  |   |
| Kontrollera               |   |   |  | X |
| Hastighetsvakt **)        |   |   |  |   |
| Kontrollera               | X |   |  |   |
| Vibrationsgivare **)      |   |   |  |   |
| Kontrollera               | X |   |  |   |
| Temperaturgivare **)      |   |   |  |   |
| Kontrollera               |   |   |  | X |
| Övergripande rengöring    |   |   |  |   |
| Kontrollera               | X |   |  |   |

\*) Om det inte finns smörjnipplar på motorlagren är de livstidssmorda – se motordokumentationen.



För mer information om motorer, se Dokumentation från underleverantör

\*\*) Är inte alltid en del av fläkten – se den tekniska specifikationen.



Se Teknisk specifikation

## 12.2 Felsökning

I tabellen nedan anges några av de vanligaste problemen.

| Problem  | Orsak   | Lösning   |
|--|---|---|
| Strömförbrukning, tryck eller luftvolym skiljer sig åt väsentligt från dimensioneringsvärden | Felaktig systemdesign   | Kontrollera systemdesignen                          |
|  | Felaktig rotationshastighet   | Kontrollera den rätta rotationshastigheten          |
|  | Felaktig rotationsriktning  | Kontrollera rotationsriktningen                     |
|  | Systemtrycket skiljer sig åt från dimensioneringsvärde/-temperatur    | Kontrollera systemtrycket                           |
|  | Mediets densitet/temperatur skiljer sig åt från dimensioneringsvärdet | Kontrollera värdena för mediets densitet/temperatur |



|                          |   |   |
|--------------------------|---|---|
|                          | Ej optimala inloppsförhållanden                           | Kontrollera rörledning vid inlopp   |
|                          | Felaktig motorspänning                                    | Kontrollera motorspänningen   |
|                          | För löst spända remmar                                    | Kontrollera remspänningen   |
| Vibrationer och missljud | För löst eller för hårt spända remmar                     | Kontrollera remspänningen   |
|                          | Slitna eller smutsiga remmar                              | Kontrollera remmarna  |
|                          | Obalanserat fläkthjul                                     | Kontrollera fläkthjulet   |
|                          | Skadat eller slitet fläkthjul                             | Kontrollera fläkthjulet   |
|                          | Ansamling av material på fläkthjul                        | Kontrollera fläkthjulet   |
|                          | Kontakt mellan fläkthjul och inlopp                       | Kontrollera avståndet mellan fläkthjul och inlopp                                     |
|                          | Skadade lager   | Kontrollera lagren  |
|                          | Lager behöver smörjning                                   | Kontrollera smörjningen av lagren   |
|                          | Skadad motor  | Kontrollera motorn  |
|                          | Slitna vibrationsdämpare                                  | Kontrollera vibrationsdämparna  |
|                          | Felaktigt monterade vibrationsdämpare                     | Kontrollera att vibrationsdämparna har identisk nedböjning/identiska monteringsbultar |
|                          | Fläkten kör i egenfrekvensområdet                         | Uteslut frekvensområdet på frekvensomvandlaren  |
|                          | Felaktig rotationsriktning                                | Kontrollera rotationsriktningen   |
|                          | Felaktig inpassning av koppling                           | Kontrollera inpassningen av kopplingen  |
|                          | Slitage på kopplingselement                               | Kontrollera kopplingselementet  |
|                          | Lösa bultar   | Kontrollera bultarna  |
| Läckage                  | Slitna eller felmonterade flexibla anslutningar           | Kontrollera de flexibla anslutningarna  |
|                          | Bristfällig tätning av flänsar                            | Kontrollera tätningen   |
|                          | Läckande axeltätning                                      | Kontrollera axeltätningen   |
| Höga lagertemperaturer   | Lager är slitna eller behöver smörjas                     | Kontrollera lagren  |
|                          | För hårt spända remmar                                    | Kontrollera remspänningen   |
|                          | Obalanserat fläkthjul                                     | Kontrollera fläkthjulet   |
|                          | Felaktig inpassning av koppling                           | Kontrollera inpassningen av kopplingen  |
|                          | Översmorda lager  | Avlägsna överflödigt fett från lagren   |
|                          | Hög vibrationsnivå  | Kontrollera balanseringen/inpassningen  |
| Hög motortemperatur      | Felaktigt ansluten motor                                  | Kontrollera elanslutningarna  |
|                          | Motorns ventilationsöppningar är igensatta eller smutsiga | Rengör motorns ventilationsöppningar  |
|                          | Felaktigt varvtal   | Kontrollera varvtalet   |

|  |  |  |
|--|--|--|
|  | Felaktig rotationsriktning                                     | <b>Kontrollera riktningen</b>                                      |
|  | För lågt varvtal<br>(< 25 Hz) vid drift med frekvensomvandlare | <b>Separat kylning kan vara nödvändig.<br/>Flytta driftpunkten</b> |
|  | Felaktig motorspänning   | <b>Kontrollera motorspänningen</b>                                 |

### 12.3 Motor



För mer information om motorunderhåll, se Dokumentation från underleverantör för motorer

### 12.4 Fläkthjul

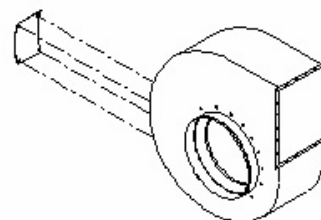
Om onödiga vibrationer uppstår i fläkten under drift kan det bero på att fläkthjulet är täckt med damm.

Om fläkten används för dammfylld luft eller materialtransport ska du kontrollera om det finns dammansamlingar på fläkthjulet minst en gång i månaden. Rengör vid behov.

#### 12.4.1 Rengöring av fläkthjulet

Fläkthjulet kan rengöras med en borste eller liknande genom inspektionsluckan – se figuren till höger.

**Använd verktyg för att demontera inspektionsluckan.**



#### 12.4.2 Balansering av fläkthjulet

Om vibrationerna inte minskar när smutsen har avlägsnats ska du snarast tillkalla en sakkunnig expert för att balansera fläkthjulet, eftersom onödiga vibrationer kan minska livslängden för lagren och fläkten.

Kontakta alltid BarkerBille för att balansera fläkthjulet.

### 12.5 Övrig utrustning



För mer information om underhåll av övrig utrustning (tillval), se Dokumentation från underleverantör

Gäller för:

- Lager
- Remdrivning
- Vibrationsdämpare
- Flexibla anslutningar
- Axeltätningar
- Kopplingar
- Drev
- Elutrustning

### 12.6 Övergripande rengöring

Fläkten måste rengöras enligt tillämpliga lokala arbetsmiljöregler. Fläkten kan vara förberedd för CIP-rengöring – se den tekniska specifikationen.



Se Teknisk specifikation

## 13. Bullerförhållanden

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Fläktens bullerförhållanden beror på anläggningens design. Se den tekniska specifikationen för teoretiska beräkningar av bullernivån.



Se Teknisk specifikation

Hörselskydd måste användas om fläkten monteras inomhus och bullernivån överstiger 80 dB.

## 14 Bortskaffande

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När fläkten fasas ut ska den demonteras och bortskaffas enligt tillämpliga nationella regler som gäller vid tillfället.

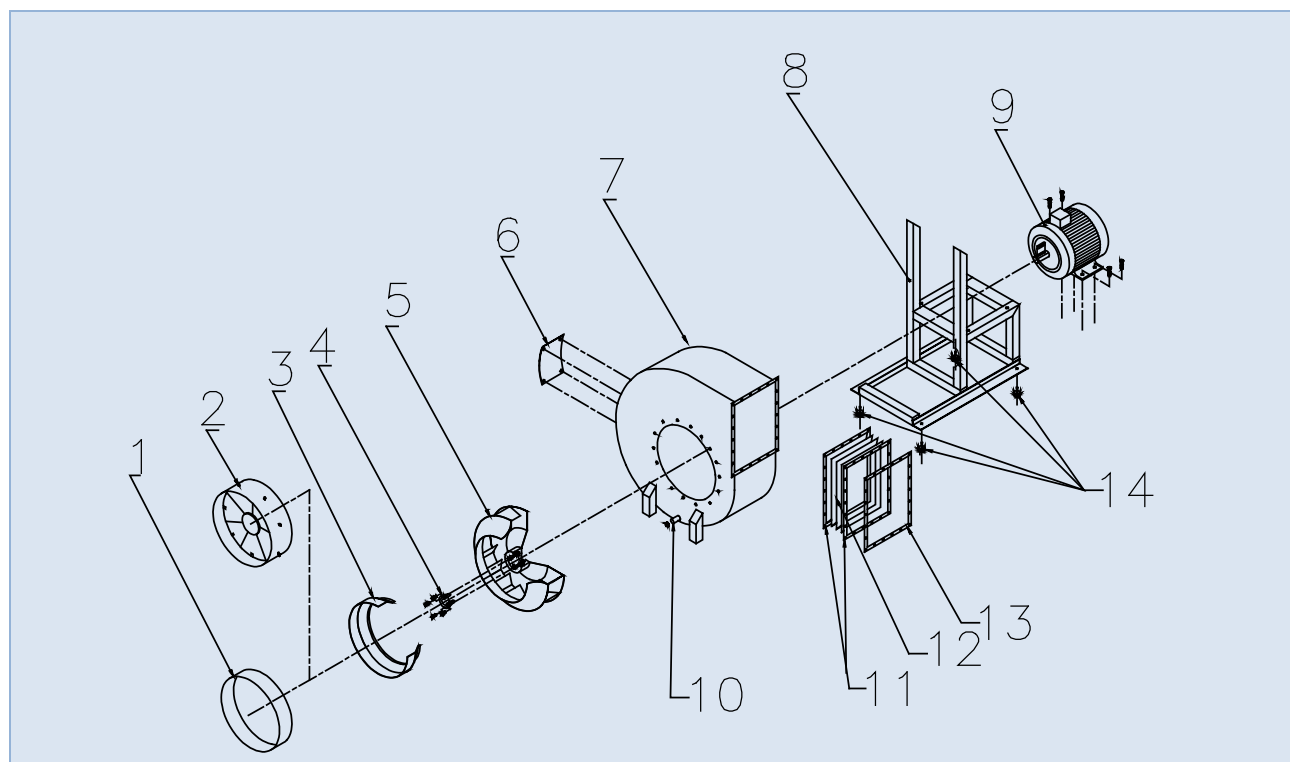
## 15 Reservdelar (generellt)

Reservdelarna är individuella för varje enskild fläkt – reservdelarna som anges nedan är generella.



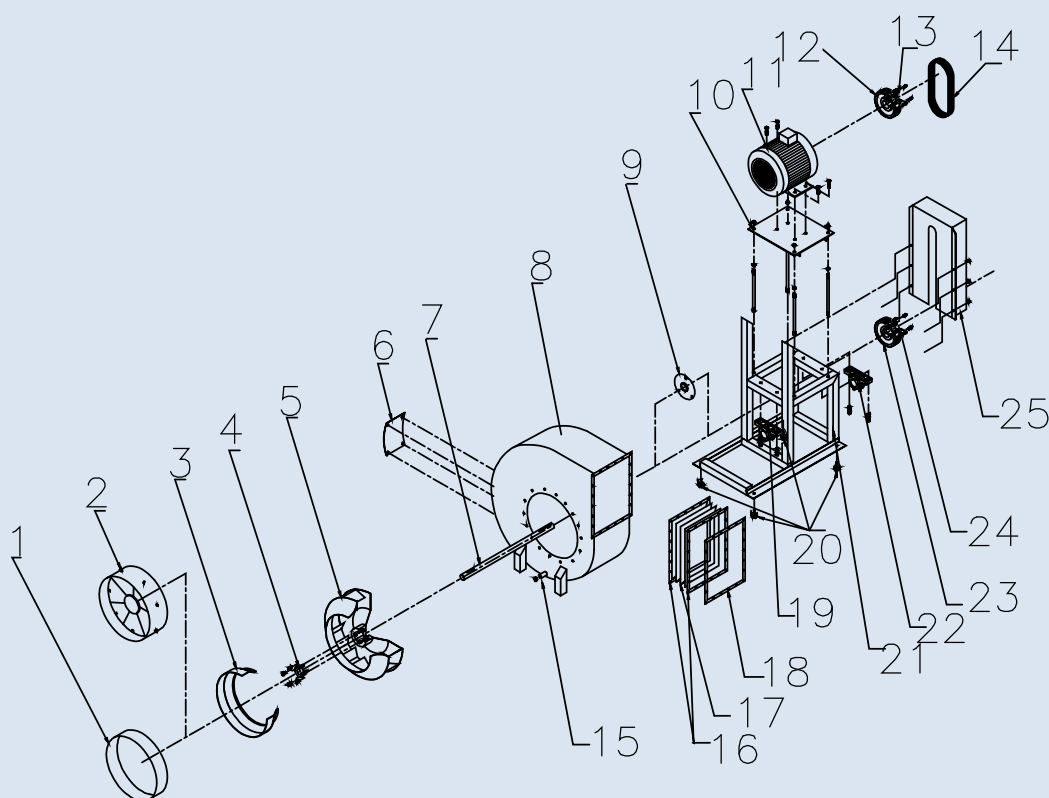
Se Teknisk specifikation

### 15.1 Direkt driven (exempel)



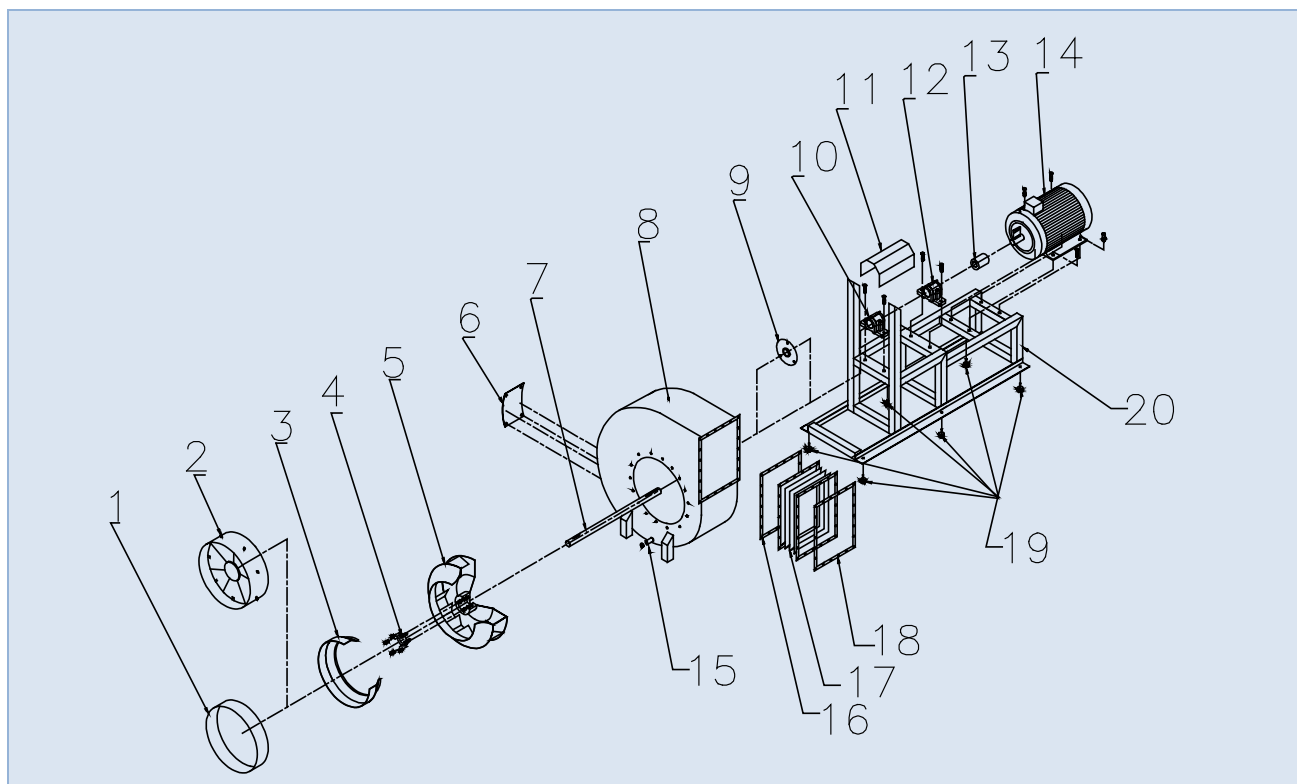
|                                 |                                    |
|---------------------------------|------------------------------------|
| 1: Flexibel anslutning, sugside | 8: Konsol                          |
| 2: Ledskeneanordning            | 9: Motor                           |
| 3: Inloppsring/-kona            | 10: Avlopp                         |
| 4: Konisk klämbussning          | 11: Motflänsar                     |
| 5: Fläkthjul                    | 12: Flexibel anslutning, trycksida |
| 6: Inspektionslucka             | 13: Fläns till kanal               |
| 7: Fläkthus                     | 14: Vibrationsdämpare              |

## 15.2 Remdriven (exempel)



|                                 |                                    |
|---------------------------------|------------------------------------|
| 1: Flexibel anslutning, sugside | 14: Kilremmar                      |
| 2: Ledskeneanordning            | 15: Avlopp                         |
| 3: Inloppsring/-kona            | 16: Lösa motflänsar                |
| 4: Konisk klämbussning          | 17: Flexibel anslutning, trycksida |
| 5: Fläkthjul                    | 18: Fläns till kanal               |
| 6: Inspektionslucka             | 19: Lager, fläktsida               |
| 7: Axel                         | 20: Vibrationsdämpare              |
| 8: Fläkthus                     | 21: Konsol                         |
| 9: Axeltätning                  | 22: Lager, motorsida               |
| 10: Motorplatta                 | 23: Remskiva på fläkt              |
| 11: Motor                       | 24: Konisk klämbussning            |
| 12: Remskiva på motor           | 25: Remskydd                       |
| 13: Konisk klämbussning         |                                    |

### 15.3 Direkt driven genom koppling och axel (exempel)



|                                  |                                    |
|----------------------------------|------------------------------------|
| 1: Flexibel anslutning, sug sida | 11: Axelskydd                      |
| 2: Ledskeneanordning             | 12: Lager, motorsida               |
| 3: Inloppsring/-kona             | 13: Koppling                       |
| 4: Konisk klämbussning           | 14: Motor                          |
| 5: Fläkthjul                     | 15: Avlopp                         |
| 6: Inspektionslucka              | 16: Lösa motflänsar                |
| 7: Axel                          | 17: Flexibel anslutning, trycksida |
| 8: Fläkthus                      | 18: Fläns till kanal               |
| 9: Axeltätning                   | 19: Vibrationsdämpare              |
| 10: Lager, fläktsida             | 20: Konsol                         |

**SV**

# ATEX-handbok

## BarkerBille-fläktar



**Revision: 2018-08-30**

**Doc-04-02-SV ATEX Instruction manual BarkerBille fans.docx**

## Innehåll

---

|  |           |
|--|-----------|
| <b>1. Allmänt.....</b>                                     | <b>3</b>  |
| <b>2. Försäkran om överensstämmelse och typskylt .....</b> | <b>4</b>  |
| 2.1 Typskylt.....  | 4         |
| 2.2 Försäkran om överensstämmelse (innehåll) .....         | 5         |
| 2.3 Ex-märkning.....                                       | 6         |
| <b>3. Fläkthjul .....</b>                                  | <b>7</b>  |
| <b>4. Axeltätning .....</b>                                | <b>8</b>  |
| <b>5. Frekvensområde och egenfrekvens.....</b>             | <b>8</b>  |
| <b>6. Vibrationer .....</b>                                | <b>8</b>  |
| <b>7. Vibrationsgivare.....</b>                            | <b>9</b>  |
| <b>8. Potentialutjämning.....</b>                          | <b>9</b>  |
| <b>9. Elutrustning.....</b>                                | <b>10</b> |
| <b>10. Övrig utrustning.....</b>                           | <b>10</b> |
| <b>11. Korrosion.....</b>                                  | <b>10</b> |
| <b>12. Medium .....</b>                                    | <b>10</b> |
| <b>13. Inlopp och utlopp.....</b>                          | <b>10</b> |
| <b>14. Underhåll och reparationer .....</b>                | <b>11</b> |



## 1. Allmänt

---

Denna handbok är ett komplement till den allmänna handboken och gäller för alla ATEX-fläktar från BarkerBille.

Generellt sett gäller följande för alla ATEX-fläktar från BarkerBille:

1. Fläkthuset är robust och lufttätt och har testats i enlighet med tillämpliga krav.
2. Inspektionsluckan är utformad med samma lufttätthet som fläkthuset.
3. Fläkthjul, lager, remskivor, kylskiva, inspektionslucka, remskydd, inlopp, axeltätningar, koppling, kopparring osv. är ordentligt fastsatta med låsbricka, låsmutter och/eller låslim.
4. De angivna minimi- och maximiavstånden mellan fläkthjulet och inloppet samt mellan fläkthjulet och den bakre plattan måste iakttas.
5. Fläkten monteras med axeltätning.
6. Fläktens invändiga medium anges i den tekniska specifikationen och fläkten får endast användas för detta medium.



**VIKTIGT:**

**Fläkten får inte användas för en högre kategori/EPL (utrustningens skyddsnivå) än den angivna**

## 2. Försäkran om överensstämmelse och typskylt

Försäkran om överensstämmelse är en del av slutdokumentationen för ATEX-fläktar och typskylten är fäst på konsolen på fläktens sida.





Se Försäkran om överensstämmelse

### 2.1 Typskylt

Typskylten anger fläktens tekniska detaljer, typ, position, tillverkningsår, kundreferens, produktionsnummer, totaltryck, temperatur, luftvolym, vikt, nominell hastighet, högsta hastighet, fläktens effektförbrukning, motorns effektförbrukning och CE-märkning.

När du kontaktar BarkerBille ska du alltid uppge produktionsnumret som anges på typskylten.

### Exempel på typskylt

|  |                                    |  |                      |
|--|------------------------------------|--|----------------------|
|   |                                    | <b>BarkerBille A/S</b><br>Tempovej 23 · DK-2750 Ballerup<br>Jørgen Hansens Vej 1 · DK-6670 Holsted<br>Tel. +45 44 97 41 92<br>info@barkerbille.com · www.barkerbille.com |                      |
| Type:  | Pos.                               | Year   |                      |
| <input type="text"/>   | <input type="text"/>               | <input type="text"/>   |                      |
| Ref:   | Production no:                     |  |                      |
| <input type="text"/>   | <input type="text"/>               |  | <input type="text"/> |
| Total pressure [Pa] / temp [°C]:   | Air volume [m³/h]:                 | Weight excl. motor [kg]:   |                      |
| <input type="text"/>   | <input type="text"/>               | <input type="text"/>   |                      |
| Fan speed [rpm] / speed max [rpm]:   | Fan power [kW] / motor power [kW]: |  |                      |
| <input type="text"/>   | <input type="text"/>               |  |                      |
| Media: Hexane + N2 mixture   |                                    | Amb. Temp.: -29°C - +40°C  |                      |
|   II 3/3 G Ex h IIA T3 Gc/Gc |                                    |  |                      |

## 2.2 Försäkran om överensstämmelse (innehåll)

Försäkran om överensstämmelse för en ATEX-fläkt anger fläkttypen, produktionsnumret och produktionsdatumet för den specifika fläkten samt en underskrift och Ex-märkning.



### EG-försäkran om överensstämmelse

**Tillverkare**

och behörig att  
sammanställa den tekniska dokumentationen:

**BarkerBille A/S**

Tempovej 23  
2750 Ballerup  
Danmark  
+45 44974192

**Maskin:**

Fläkt

**Typ:****Produktionsnr:**

försäkrar härmed att maskinen uppfyller alla relevanta bestämmelser i:

- EUROPAPARLAMENTETS OCH RÅDETS DIREKTIV 2006/42/EG av den 17 maj 2006 om maskiner
- EUROPAPARLAMENTETS OCH RÅDETS DIREKTIV 2014/35/EU av den 26 februari 2014 om harmoniseringen av medlemsländernas lagar som rör tillhandahållandet på marknaden av elektrisk utrustning som utformats för användning inom vissa spänningsgränser
- EUROPAPARLAMENTETS OCH RÅDETS DIREKTIV 2014/30/EU av den 26 februari 2014 om harmoniseringen av medlemsländernas lagar som rör elektromagnetisk kompatibilitet
- EUROPAPARLAMENTETS OCH RÅDETS DIREKTIV 2014/34/EU av den 26 februari 2014 om harmonisering av medlemsstaternas lagstiftning om utrustning och säkerhetssystem som är avsedda för användning i explosionsfarliga omgivningar
  - Maskinen är konstruerad enligt kraven i Grupp II.



Märkning:

Förvaring av teknisk dokumentation hos anmält organ XXXX

**Följande harmoniserade standarder har använts:**

- SS-EN ISO 12100:2011 Maskinsäkerhet - Allmänna konstruktionsprinciper - Riskbedömning och riskreducering
- SS-EN 1127-1:2011 Explosiv atmosfär - Förhindrande av och skydd mot explosion - Del 1: Grundläggande begrepp och metodik
- SS-EN ISO 80079-36:2016 Explosiv atmosfär - Del 36: Icke elektrisk utrustning avsedd för användning i explosiv atmosfär - Grundläggande metoder och krav
- SS-EN ISO 80079-37:2016 Explosiv atmosfär - Del 37: Icke elektrisk utrustning avsedd för användning i explosiv atmosfär - Icke-elektrisk typ av skydd genom säker konstruktion 'c', övervakning av tändkällor 'b', skydd genom inneslutning i vätska 'k'
- SS-EN 14986:2017 Konstruktion av fläktar för explosionsfarlig miljö

**Ort och datum:****Underskrift:**

## 2.3 Ex-märkning

Utöver CE-märkning ska ATEX-fläktar dessutom ha en Ex-märkning som indikerar den kategori/EPL som fläkten kan hantera invändigt och i vilket klassificerat område fläkten kan placeras.



### Exempel på Ex-märkning



**BarkerBille A/S**  
 Tempovej 23 · DK-2750 Ballerup  
 Jørgen Hansens Vej 1 · DK-6670 Holsted  
 Tel. +45 44 97 41 92  
 info@barkerbille.com · www.barkerbille.com

---

Type:

Pos.

Year

Ref:

Production no:

Total pressure [Pa] / temp [°C]:

Air volume [m³/h]:

Weight excl. motor [kg]:

Fan speed [rpm] / speed max [rpm]:

Fan power [kW] / motor power [kW]:

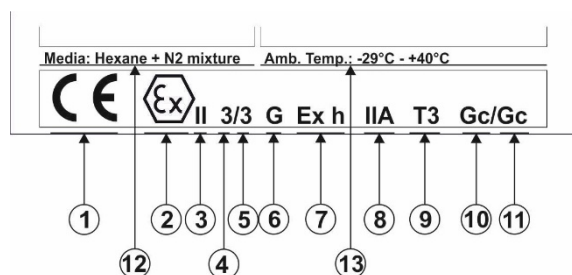
Media: Hexane + N2 mixture

Amb. Temp.: -29°C - +40°C



II 3/3 G Ex h IIA T3 Gc/Gc

### Förklaring av Ex-märkning, exempel:

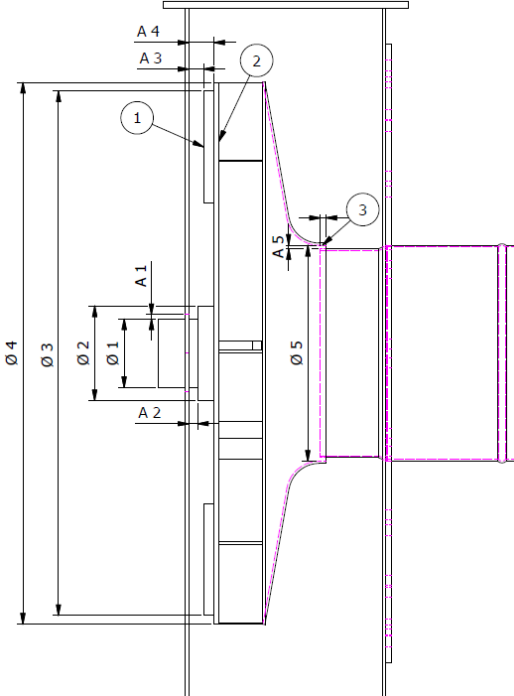


| Pos. | SV   |
|------|--|
| 1    | CE-märke   |
| 2    | Ex-märke   |
| 3    | Utrustningsgrupp   |
| 4    | Kategori invändigt   |
| 5    | Kategori utvändigt   |
| 6    | Grupp  |
| 7    | Skyddstyp  |
| 8    | Undergrupp   |
| 9    | Temperaturklass  |
| 10   | EPL (utrustningens skyddsnivå) invändigt   |
| 11   | EPL (utrustningens skyddsnivå) utvändigt   |
| 12   | Medieangivelse, om fläkten är specifik för ett visst medium                                      |
| 13   | Omgivningstemperatur, om den skiljer sig åt från kraven i SS-EN ISO 80079-36(-20 °C till +60 °C) |

### 3. Fläkthjul

För att minimera risken för gnistbildning har fläkthjulet monterats i fabriken och testats beträffande minimi- och maximiavstånden mellan fläkthjul och inlopp samt mellan fläkthjul och bakre platta.

Följande avstånd gäller för respektive fläkthjulsstorlek.

| Minimiavstånd till roterande del = 0,5 % av diametern, dock min. 2 mm och max. 13 mm. |                                | Illustration  |
|---|--------------------------------|---|
| Diameter, mm (Øx)   | Minimiavstånd, mm (Ax)         |  |
| 0–400   | 2,0                            |   |
| 401–455   | 2,3                            |   |
| 456–500   | 2,5                            |   |
| 501–560   | 2,8                            |   |
| 561–630   | 3,2                            |   |
| 631–710   | 3,6                            |   |
| 711–800   | 4,0                            |   |
| 801–900   | 4,5                            |   |
| 901–1 000   | 5,0                            |   |
| 1 001–1 120   | 5,6                            |   |
| 1 121–1 250   | 6,3                            |   |
| 1 251–1 400   | 7,0                            |   |
| 1 401–1 600   | 8,0                            |   |
| 1 601–1 800   | 9,0                            |   |
| 1 801–2 000   | 10,0                           |   |
| 2 001–2 250   | 11,3                           |   |
| 2 251–2 500   | 12,5                           |   |
| Position  | Beteckning                     |   |
| 1   | Vingar på fläkthjulets baksida |   |
| 2   | Fläkthjulets bakre platta      |   |
| 3   | Inlopp                         |   |

De ovannämnda avstånden +1 mm är de minsta godtagbara värdena för kontinuerlig drift.

Avstånden måste kontrolleras under servicestopp och minst en gång om året.

Fläkthjulet monteras enligt tillämpliga regler (fast nav, låsnav, konisk klämbussning osv.) och spänningen utförs med ett angivet moment.



#### VIKTIGT:

För att bibehålla fläktens givna kategorisering får fläkthjulet endast bytas ut av personer som certifierats av BarkerBille (gäller endast för kategori 2-fläktar).

## 4. Axeltätning

ATEX-fläktar monteras med en axeltätning. Axeltätningen måste kontrolleras beträffande synliga skador och läckage en gång i månaden.

För axeltätningar med fettspärr ska fettmängden kontrolleras en gång i månaden.

För axeltätningar med tryckluftsspärning ska tryckmätaren kontrolleras en gång i månaden.






Se Dokumentation från underleverantör

## 5. Frekvensområde och egenfrekvens

ATEX-fläktar testas vid övervarvning och det nominella varvtalet (r/min) som anges på typskylten får inte överskridas.

Vid drift med drivsystem med variabel frekvens (VFD) måste fläkten varvas upp till nominellt varvtal och eventuella varvtalsområden med kritiska egenfrekvenser ska "uteslutas". Detta måste utföras på frekvensomvandlaren så att drift i dessa frekvensområden undviks.

|  |      |                                    |  |                          |                |
|--|------|------------------------------------|--|--------------------------|----------------|
|    |      |                                    | <b>BarkerBille A/S</b><br>Tempovej 23 · DK-2750 Ballerup<br>Jørgen Hansens Vej 1 · DK-6670 Holsted<br>Tel: +45 44 97 41 92<br>info@barkerbille.com · www.barkerbille.com |                          |                |
| Type:  | Pos. | Year                               |  |                          |                |
| <input type="text"/>   |      | <input type="text"/>               |  | <input type="text"/>     |                |
| Ref:   |      |                                    |  |                          | Production no: |
| <input type="text"/>   |      | <input type="text"/>               |  |                          |                |
| Total pressure [Pa] / temp [°C]:   |      | Air volume [m³/h]:                 |  | Weight excl. motor [kg]: |                |
| <input type="text"/>   |      | <input type="text"/>               |  | <input type="text"/>     |                |
| Fan speed [rpm] / speed max [rpm]:   |      | Fan power [kW] / motor power [kW]: |  |                          |                |
| <input type="text"/>   |      | <input type="text"/>               |  |                          |                |
|   II 2/3 G h    II B T4 (135°C) |      |                                    |  |                          |                |



Se Handbok avsnitt 11.3

## 6. Vibrationer

För ATEX-fläktar i kategori 3G (zon 2), 3D (zon 22) och 2G (zon 1) måste vibrationsnivån kontrolleras under drift minst en gång i månaden.



Se Handbok avsnitt 11.3

## 7. Vibrationsgivare

ATEX-fläktar till kategori 2D inomhus (zon 21) monteras med en vibrationsgivare.

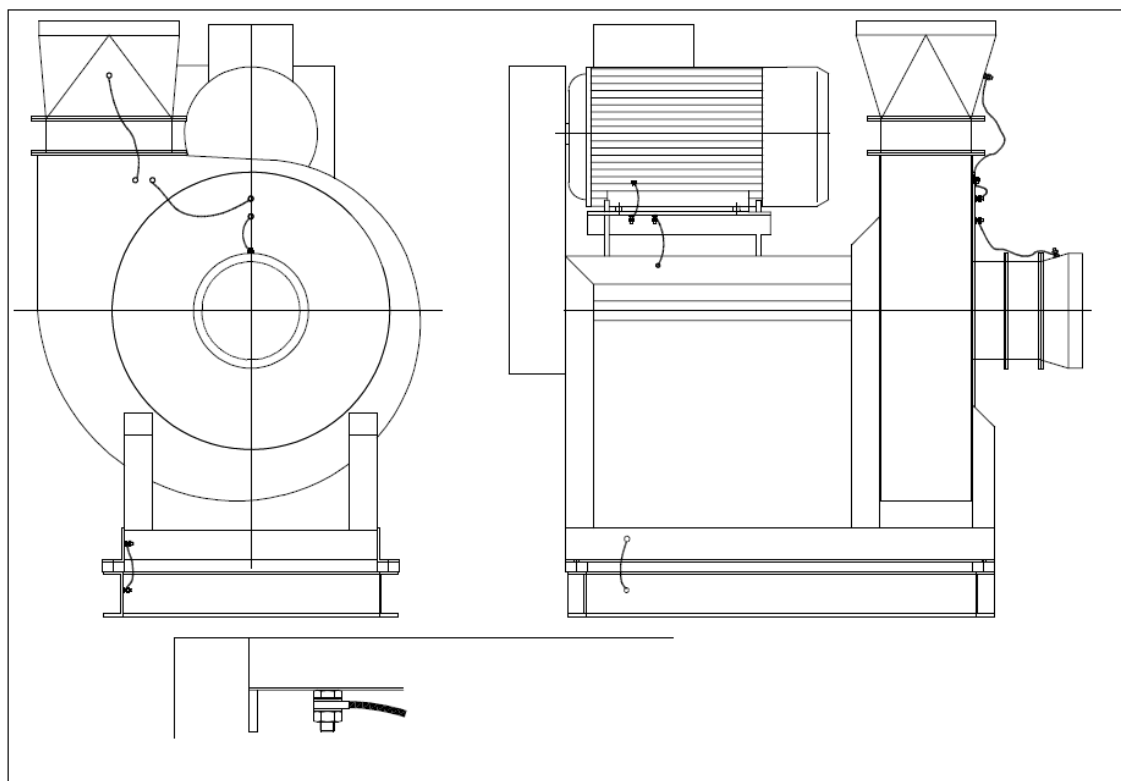
Använd värdena som uppmäts under uppstarten för att ställa in vibrationsgivaren. Börvärdet för larm (pre-warning) ska vara lägre eller lika med 6,3 mm/sek, medan börvärdet för avstängning (shut-down) ska vara lägre eller lika med 11,2 mm/sek.



Se Handbok avsnitt 11.2

## 8. Potentialutjämning

Fläktens alla ledande delar är internt sammankopplade med potentialutjämningskablar. ATEX-fläktar är förberedda för extern potentialutjämning och anslutningspunkten är markerad med en obligatorisk säkerhetsskylt.



För ATEX-fläktar i explosionsgrupp IIC (väte osv.) och IIIC (ledande damm) har kompletterande potentialutjämning utförts på axeln.



Se Dokumentation från underleverantör

## 9. Elutrustning

---

För ATEX-fläktar används endast elutrustning (motor, instrument och liknande) som utformats för skyddskategorin som anges på typskylten.

Elutrustningen måste anslutas på rätt sätt med följande i åtanke:

- Funktion
- Börvärden
- Kopplingsschema

Alla ATEX-installationer MÅSTE utföras enligt EN ISO 80079-14.



Se Dokumentation från underleverantör

## 10. Övrig utrustning

---

För ATEX-fläktar används endast utrustning (lager, transmission, koppling, bromsar och bromssystem) som utformats för skyddskategorin som anges på typskylten.

## 11. Korrosion

---

ATEX-fläktar måste kontrolleras beträffande korrosion minst en gång om året. Var särskilt uppmärksam på potentialutjämningspunkter.

## 12. Medium

---

ATEX-fläktar får endast användas för det medium som anges i den tekniska specifikationen. Om fläkten ska användas med öppet inlopp får det inte finnas partiklar i luftströmmen.



Se Teknisk specifikation

## 13. Inlopp och utlopp

---

Belastning på inloppet och utloppet måste undvikas eftersom fläkten annars kan deformeras.

Montera kanalanslutningarna så att de är centrerade i förhållande till fläktens inlopp och utlopp och stötta dem.



Se Kompletterande anvisningar



## 14. Underhåll och reparationer

---

För att bibehålla fläktens givna skyddskategorisering får fläkthjulet endast bytas ut av personer som certifierats av BarkerBille.

Dessutom ska endast originalreservdelar eller delar som godkänts av BarkerBille användas vid byte av elutrustning eller annan utrustning.

EN

# Motors ABB ATEX

**BarkerBille fans**



**Revision: 2018-09-27**

**Doc-10-02-EN Motors ABB ATEX.docx**

# Low voltage Motors for explosive atmospheres

## Installation, operation, maintenance and safety manual



|   |        |
|---|--------|
| Installation, operation, maintenance and safety manual.....               | EN 3   |
| Montage-, Betriebs-, Wartungs- und Sicherheitsanleitung.....              | DE 25  |
| Manuel d'installation, d'exploitation, de maintenance et de sécurité..... | FR 47  |
| Manual de instalación, funcionamiento, mantenimiento y seguridad .....    | ES 71  |
| Manuale d'installazione, funzionamento e manutenzione.....                | IT 95  |
| Manual de instalação, operação, manutenção e segurança .....              | PT 117 |
| Kurulum, işletim, bakım ve emniyet kılavuzu .....                         | TR 141 |

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for a better world™





# Low voltage Motors for explosive atmospheres

## Installation, operation, maintenance and safety manual

### Table of Contents

|           |  |           |
|-----------|--|-----------|
| <b>1.</b> | <b>Introduction .....</b>                              | <b>5</b>  |
| 1.1       | Declaration of Conformity .....                        | 5         |
| 1.2       | Validity.....  | 5         |
| 1.3       | Conformity .....                                       | 5         |
| <b>2.</b> | <b>Safety considerations .....</b>                     | <b>6</b>  |
| 2.1       | Motors in Group IIC and Group III .....                | 6         |
| <b>3.</b> | <b>Handling .....</b>                                  | <b>7</b>  |
| 3.1       | Reception check .....                                  | 7         |
| 3.2       | Transportation and storage .....                       | 7         |
| 3.3       | Lifting .....  | 7         |
| 3.4       | Motor weight.....                                      | 7         |
| <b>4.</b> | <b>Installation and commissioning .....</b>            | <b>8</b>  |
| 4.1       | General .....  | 8         |
| 4.2       | Motors with other than ball bearings.....              | 8         |
| 4.3       | Insulation resistance check.....                       | 8         |
| 4.4       | Foundation.....  | 8         |
| 4.5       | Balancing and fitting coupling halves and pulleys..... | 9         |
| 4.6       | Mounting and alignment of the motor .....              | 9         |
| 4.7       | Radial forces and belt drives.....                     | 9         |
| 4.8       | Motors with drain plugs for condensation.....          | 9         |
| 4.9       | Cabling and electrical connections .....               | 9         |
| 4.9.1     | Flameproof motors .....                                | 10        |
| 4.9.2     | Dust ignition protection motors Ex t.....              | 10        |
| 4.9.3     | Connections for different starting methods .....       | 11        |
| 4.9.4     | Connections of auxiliaries .....                       | 11        |
| 4.10      | Terminals and direction of rotation .....              | 11        |
| 4.11      | Protection against overload and stalling.....          | 11        |
| <b>5.</b> | <b>Operation .....</b>                                 | <b>12</b> |
| 5.1       | General .....  | 12        |

|            |   |           |
|------------|---|-----------|
| <b>6.</b>  | <b>Motors for explosive atmospheres and variable speed operation .....</b>      | <b>13</b> |
| 6.1        | Introduction.....   | 13        |
| 6.2        | Main requirements according to EN and IEC standards.....                        | 13        |
| 6.3        | Winding insulation .....  | 13        |
| 6.3.1      | Phase to phase voltages .....   | 13        |
| 6.3.2      | Phase to ground voltages.....   | 13        |
| 6.3.3      | Selection of winding insulation with frequency converters .....                 | 14        |
| 6.4        | Thermal protection of windings.....   | 14        |
| 6.5        | Bearing currents.....   | 14        |
| 6.5.1      | Elimination of bearing currents.....  | 14        |
| 6.6        | Cabling, grounding and EMC .....  | 14        |
| 6.7        | Load and speed limitations.....   | 14        |
| 6.7.1      | General .....   | 14        |
| 6.7.2      | Motor loadability with ACS800/880-series of converters with DTC-control.....    | 15        |
| 6.7.3      | Motor loadability with ACS500 –series and other voltage source converters ..... | 15        |
| 6.7.4      | Short time overloads .....  | 15        |
| 6.8        | Rating plates .....   | 15        |
| 6.8.1      | Content of standard VSD plate .....   | 15        |
| 6.8.2      | Content of customer specific VSD plate .....                                    | 15        |
| 6.9        | Commissioning the variable speed application .....                              | 16        |
| 6.9.1      | Setting parameters based on the VSD plate .....                                 | 16        |
| <b>7.</b>  | <b>Maintenance .....</b>  | <b>17</b> |
| 7.1        | General inspection .....  | 17        |
| 7.1.1      | Standby motors.....   | 17        |
| 7.2        | Lubrication .....   | 17        |
| 7.2.1      | Motors with permanently greased bearings .....                                  | 17        |
| 7.2.2      | Motors with re-greasable bearings.....  | 18        |
| 7.2.3      | Lubrication intervals and amounts .....   | 18        |
| 7.2.4      | Lubricants .....  | 20        |
| <b>8.</b>  | <b>After Sales support .....</b>  | <b>21</b> |
| 8.1        | Spare parts .....   | 21        |
| 8.2        | Dismantling, re-assembly and rewinding.....                                     | 21        |
| 8.3        | Bearings.....   | 21        |
| 8.4        | Gaskets and sealing .....   | 21        |
| <b>9.</b>  | <b>Environmental requirements .....</b>   | <b>21</b> |
| <b>10.</b> | <b>Troubleshooting.....</b>   | <b>22</b> |

# 1. Introduction

## NOTE!

These instructions must be followed to ensure safe and proper installation, operation and maintenance of the motor. They should be brought to the attention of anyone who installs, operates or maintains the motor or associated equipment. Ignoring these instructions may invalidate all applicable warranties.

## WARNING

Motors for explosive atmospheres are specially designed to comply with official regulations concerning the risk of explosion. The reliability of these motors may be impaired if they are used improperly, badly connected, or altered in any way no matter how minor.

Standards relating to the connection and use of electrical apparatus in hazardous areas must be taken into consideration, especially the national standards for installation in the country where the motors are being used. Only trained personnel familiar with these standards should handle this type of apparatus.

## 1.1 Declaration of Conformity

Declaration of Conformity with respect to the Directive 94/9/EC or 2014/34/EU (ATEX) is delivered separately with each motor.

The conformity of the end product according to the Directive 2006/42/EC (Machinery) has to be established by the commissioning party when the motor is fitted to the machinery.

## 1.2 Validity

These instructions are valid for the following ABB electrical motor types, when used in explosive atmospheres.

Non-sparking Ex nA  
series M2A\*/M3A\*  
series M3B\*/M3G\*

Increased safety Ex e  
series M3H\*

Flameproof enclosure Ex d, Ex de  
series M3KP/JP

Dust ignition protection (Ex t)  
series M2A\*/M3A\*  
series M2B\*/M3B\*/M3D\*/M3G\*

Flame proof enclosure for mines Exd / Ex de  
series M3JM/M3KM

(Additional information may be required by ABB when deciding on the suitability of certain motor types used in special applications or with special design modifications.)

These instructions are valid for motors installed and stored in ambient temperatures above  $-20\text{ }^{\circ}\text{C}$  and below  $+40\text{ }^{\circ}\text{C}$ . Note that the motor range in question is suitable for this whole range. In ambient temperatures exceeding these limits, please contact ABB.

## 1.3 Conformity

As well as conforming to the standards relating to mechanical and electrical characteristics, motors designed for explosive atmospheres must also conform to one or more of the following European or IEC-standards for the protection type in question:

### Product standards

|                 |   |
|-----------------|---|
| IEC/EN 60079-0  | Equipment - General requirements                    |
| IEC/EN 60079-1  | Equipment protection by flameproof enclosures "d"   |
| IEC/EN 60079-7  | Equipment protection by increased safety "e"        |
| IEC/EN 60079-15 | Equipment protection by type of protection "n"      |
| IEC/EN 60079-31 | Equipment dust ignition protection by enclosure "t" |
| IEC 60050-426   | Equipment for explosive atmospheres                 |

### Installation standards

|                 |   |
|-----------------|---|
| IEC/EN 60079-14 | Electrical installations design, selection and erection |
| IEC/EN 60079-17 | Electrical installations inspections and maintenance    |
| IEC/EN 60079-19 | Equipment repair, overhaul and reclamation              |
| IEC 60050-426   | Equipment for explosive atmospheres                     |
| IEC/EN 60079-10 | Classification of hazardous area (gas areas)            |
| IEC 60079-10-1  | Classification of areas – Explosive gas atmospheres     |
| IEC 60079-10-2  | Classification of areas – Combustible dust atmospheres  |
| EN 1127-1, -2   | Explosive prevention and protection                     |

ABB IEC LV motors (valid for Group I, II and III of the Directive 94/9/EC or 2014/34/EU) can be installed in areas corresponding to the following markings:

| Zone | Equipment protection levels (EPLs) | Category | Protection type       |
|------|------------------------------------|----------|-----------------------|
| 1    | 'Gb'                               | 2G       | Ex d/Ex de/Ex e       |
| 2    | 'Gb' or 'Gc'                       | 2G or 3G | Ex d/Ex de/Ex e/Ex nA |
| 21   | 'Db'                               | 2D       | Ex t                  |
| 22   | 'Db' or 'Dc'                       | 2D or 3D | Ex t                  |
| –    | 'Mb'                               | M2       | Ex d/Ex de            |

### Atmosphere:

**G** – explosive atmosphere caused by gases

**D** – explosive atmosphere caused by combustible dust

**M** – mines susceptible to firedamp

## 2. Safety considerations

The motor is intended for installation and use by qualified personnel, familiar with health and safety requirements and national legislation.

Safety equipment necessary for the prevention of accidents at the installation and operating site must be provided in accordance with local regulations.

### **WARNING!**

Emergency stop controls must be equipped with restart lockouts. After emergency stop a new start command can take effect only after the restart lockout has been intentionally reset.

### **Points to be observed**

1. Do not step on the motor.
2. The temperature of the outer casing of the motor may be hot to the touch during normal operation and especially after shut-down.
3. Some special motor applications may require additional instructions (e.g. when supplied with a frequency converter).
4. Observe rotating parts of the motor.
5. Do not open terminal boxes while energized.

### **NOTE!**

Additional Warnings and/or Notes related to safe use can be found in other chapters of this manual.

## 2.1 Motors in Group IIC and Group III

For motors in Group IIC and Group III which are certified according to EN60079-0 or IEC60079-0:

### **WARNING!**

In order to minimize the risk of hazards caused by electrostatic charges, a motor may be cleaned only with a wet rag or by non-frictional means.



## 3. Handling

### 3.1 Reception check

Immediately upon receipt, check the motor for external damage (e.g. shaft, -ends and flanges and painted surfaces) and, if found, inform the forwarding agent without delay.

Check all rating plate data, especially voltage, winding connections (star or delta), category, type of protection and temperature class. The type of bearing is specified on the rating plate of all motors except the smallest frame sizes.

In the case of a variable speed drive application, check the maximum loadability allowed according to the frequency stamped on the motor's second rating plate.

### 3.2 Transportation and storage

The motor should always be stored indoors (above -20 °C) in dry, vibration-free and dust-free conditions. During transportation, shocks, falls and humidity should be avoided. In other conditions, please contact ABB.

Unprotected machined surfaces (shaft-ends and flanges) should be treated against corrosion.

It is recommended that shafts are rotated periodically by hand to prevent grease migration.

Anti-condensation heaters, if fitted, are recommended to be energized to avoid water condensing in the motor.

The motor must not be subject to any external vibrations exceeding 0.5 mm/s at standstill so as to avoid causing damage to the bearings.

Motors fitted with cylindrical-roller and/or angular contact bearings must be fitted with locking devices during transport.

### 3.3 Lifting

All ABB motors above 25 kg are equipped with lifting lugs or eyebolts.

Only the main lifting lugs or eyebolts of the motor should be used for lifting the motor. They must not be used to lift the motor when it is attached to other equipment.

Lifting lugs for auxiliaries (e.g. brakes, separate cooling fans) or terminal boxes must not be used for lifting the motor.

Because of different frame lengths, mounting arrangements and auxiliary equipment, motors with the same frame may have a different center of gravity

Damaged lifting lugs must not be used. Check that eyebolts or integrated lifting lugs are undamaged before lifting.

Lifting eyebolts must be tightened before lifting. If needed, the position of the eyebolt can be adjusted using suitable washers as spacers.

Ensure that proper lifting equipment is used and that the sizes of the hooks are suitable for the lifting lugs.

Care must be taken not to damage auxiliary equipment and cables connected to the motor.

Remove eventual transport jigs fixing the motor to the pallet.

Specific lifting instructions are available from ABB.

#### **WARNING!**

During lifting, mounting or maintenance work, all necessary safety considerations shall be in place and special attention is to be taken so that nobody will be subject to lifted load.

### 3.4 Motor weight

The total motor weight can vary within the same frame size (center height) depending on different output, mounting arrangement and auxiliaries.

The following table shows the estimated maximum weights for motors in their basic versions as a function of their frame material.

The actual weight of all ABB's motors is shown on the rating plate.

| Frame Size | Aluminum<br>Max. weight kg | Cast iron<br>Max. weight kg | Flameproof<br>Max. weight kg |
|------------|----------------------------|-----------------------------|------------------------------|
| 71         | 7                          | 12                          | –                            |
| 80         | 15                         | 31                          | 40                           |
| 90         | 20                         | 44                          | 53                           |
| 100        | 31                         | 63                          | 72                           |
| 112        | 35                         | 72                          | 81                           |
| 132        | 93                         | 120                         | 120                          |
| 160        | 145                        | 260                         | 260                          |
| 180        | 180                        | 310                         | 310                          |
| 200        | 250                        | 340                         | 350                          |
| 225        | 320                        | 430                         | 450                          |
| 250        | 390                        | 530                         | 510                          |
| 280        | 430                        | 900                         | 850                          |
| 315        | –                          | 1600                        | 1300                         |
| 355        | –                          | 2600                        | 3000                         |
| 400        | –                          | 3500                        | 3700                         |
| 450        | –                          | 4800                        | 5000                         |

If the motor is equipped with a brake and/or separate fan, contact ABB for the weight.

## 4. Installation and commissioning

### WARNING

Disconnect and lock out before working on the motor or the driven equipment. Ensure no explosive atmosphere is present while executing insulation resistance check procedures.

### 4.1 General

All rating plate values relating to certification must be carefully checked to ensure that the motor protection, atmosphere and zone are compatible.

Special attention should be paid to dust ignition temperature and dust layer thickness in relation to the motor's temperature marking.

#### Motors requiring protective roof:

When fitted in a vertical position with the shaft pointing downwards, the motor must have a protective cover to prevent foreign objects and fluid from falling into the ventilation openings. This task can also be achieved by a separate cover not fixed to the motor. In this case, the motor must have a warning label.

### 4.2 Motors with other than ball bearings

Remove transport locking if employed. Turn the shaft of the motor by hand to check free rotation, if possible.

#### Motors equipped with roller bearings:

Running the motor with no radial force applied to the shaft may damage the roller bearing due to a "sliding" effect.

#### Motors equipped with angular contact bearing:

Running the motor with no axial force applied in the right direction in relation to the shaft may damage the angular contact bearing.

### WARNING

For Ex d and Ex de motors with angular contact bearings the axial force must not by any means change direction, because the flameproof gaps around the shaft change dimensions and may even cause contact!

The bearing types are specified on the rating plate.

#### Motors equipped with re-greasing nipples:

When starting the motor for the first time, or after long storage, apply the specified quantity of grease.

See section "7.2.2 Motors with re-greasing nipples" for more details.

### 4.3 Insulation resistance check

Measure insulation resistance before commissioning and when winding dampness is suspected.

Insulation resistance, corrected to 25 °C, may not in any cases be below 1 MΩ (measured with 500 or 1000 VDC). The insulation resistance value is halved for each 20°C increase in temperature.

Figure 1 can be used for the insulation correction to the desired temperature.

### WARNING

To avoid risk of electrical shock, the motor frame must be grounded and the windings should be discharged against the frame immediately after each measurement.

If the reference resistance value is not attained, the winding is too damp and must be oven dried. The oven temperature should be 90 °C for 12–16 hours followed by 105 °C for 6–8 hours.

If fitted, drain plugs must be removed and closing valves must be opened during heating. After heating, make sure the drain plugs are refitted. Even if the drain plugs are fitted, it is recommended to disassemble the end shields and terminal box covers for the drying process.

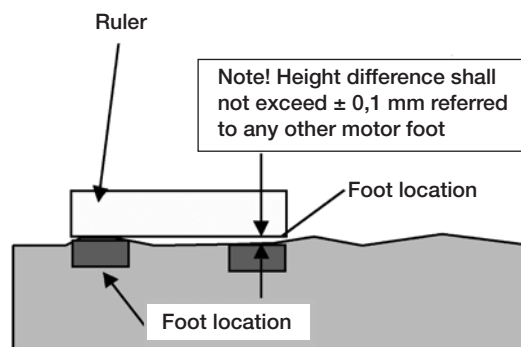
Windings drenched in seawater normally need to be rewound.

### 4.4 Foundation

The end user has full responsibility for the preparation of the foundation.

Metal foundations should be painted to avoid corrosion.

Foundations must be even, , and sufficiently rigid to withstand possible short circuit forces. They must be designed and dimensioned to avoid the transfer of vibration to the motor and vibration caused by resonance. See figure below.



## 4.5 Balancing and fitting coupling halves and pulleys

As standard, balancing of the motor has been carried out using a half key.

Coupling halves or pulleys must be balanced after machining the keyways. Balancing must be done in accordance with the balancing method specified for the motor.

Coupling halves and pulleys must be fitted on the shaft by using suitable equipment and tools which do not damage the bearings and seals.

Never fit a coupling half or pulley by hammering or remove it by using a lever pressed against the body of the motor

## 4.6 Mounting and alignment of the motor

Ensure that there is enough space for free airflow around the motor. It is recommended to have a clearance between the fan cover and the wall etc. of at least  $\frac{1}{2}$  of the air intake of the fan cover. Additional information may be found from the product catalog or from the dimension drawings available on our web pages: [www.abb.com/motors&generators](http://www.abb.com/motors&generators).

Correct alignment is essential to avoid bearing, vibration and possible shaft failures.

Mount the motor on the foundation using the appropriate bolts or studs and place shim plates between the foundation and the feet.

Align the motor using appropriate methods.

If applicable, drill locating holes and fix the locating pins into position.

Mounting accuracy of a coupling half: check that clearance **b** is less than 0.05 mm and that the difference **a1** to **a2** is also less than 0.05 mm. See figure 2.

Re-check the alignment after the final tightening of the bolts or studs.

Do not exceed permissible loading values for bearings as stated in the product catalogs.

Check that the motor has sufficient airflow. Ensure that no nearby objects or direct sunshine radiate additional heat to the motor.

For flange mounted motors (e.g. B5, B35, V1), make sure that the construction allows sufficient air flow on the outer surface of the flange.

## 4.7 Radial forces and belt drives

Belts must be tightened according to the instructions of the supplier of the driven equipment. However, do not exceed the maximum belt forces (i.e. radial bearing loading) stated in the relevant product catalogs.

### WARNING

Excessive belt tension will damage bearings and can cause shaft breakage. For Ex d and Ex de-motors excessive belt tension may even cause danger by eventual mutual contact of the flame path parts.

## 4.8 Motors with drain plugs for condensation

Check that drain holes and plugs face downwards. In vertical position mounted motors the drain plugs may be in horizontal position.

### Non-sparking & Increased safety motors

Motors with sealable plastic drain plugs are delivered with these in the closed position in aluminum motors and in the open position in cast iron motors. In clean environments, open the drain plugs before operating the motor. In very dusty environments, all drain holes should be closed.

### Flameproof motors

Drain plugs, if requested, are located at the lower part of the end shields in order to allow condensation to escape from the motor. Open the drain plug by turning it counter-clockwise, tap it to check free operation and close it by pressing and screwing it clockwise.

### Dust Ignition Protection Motors

The drain holes must be closed on all dust ignition protection motors.

## 4.9 Cabling and electrical connections

The terminal box on standard single speed motors normally contains six winding terminals and at least one earth terminal.

In addition to the main winding and earthing terminals, the terminal box can also contain connections for thermistors, heating elements or other auxiliary devices.

Suitable cable lugs must be used for the connection of all main cables. Wiring for auxiliaries can be connected into their terminal blocks as such.

Motors are intended for fixed installation only. Unless otherwise specified, cable entry threads are metric. The protection class and the IP-class of the cable gland must be at least the same as those of the terminal boxes.

Ensure only certified cable glands for increased safety and flameproof motors are used. For non-sparking motors, cable glands must comply with IEC/EN 60079-0. For Ex tD/Ex t motors, cable glands must comply with IEC/EN 60079-0 and IEC/EN 60079-31.

### NOTE!

Cables should be mechanically protected and clamped close to the terminal box to fulfill the appropriate requirements of IEC/EN 60079-0 and local installation standards.

Unused cable entries must be closed with blanking elements according to the protection and IP class of the terminal box.

The degree of protection and diameter are specified in the documents relating to the cable gland.

#### WARNING

Use appropriate cable glands and seals in the cable entries according to the protection type and the type and diameter of the cable.

Earthing must be carried out according to local regulations before the machine is connected to the supply voltage.

The earth terminal on the frame has to be connected to PE (protective earth) with a cable as shown in Table 5 of IEC/EN 60034-1:

#### Minimum cross-sectional area for protective conductors

| Cross-sectional area of phase conductors of the installation, $S$ , mm <sup>2</sup> | Minimum cross-sectional area of the corresponding protective conductor, $S_p$ , mm <sup>2</sup> |
|---|---|
| 4   | 4   |
| 6   | 6   |
| 10  | 10  |
| 16  | 16  |
| 25  | 25  |
| 35  | 25  |
| 50  | 25  |
| 70  | 35  |
| 95  | 50  |
| 120   | 70  |
| 150   | 70  |
| 185   | 95  |
| 240   | 120   |
| 300   | 150   |
| 400   | 185   |

In addition, earthing or bonding connection facilities on the outside of an electrical apparatus must provide an effective connection of a conductor with a cross-sectional area of at least 4 mm<sup>2</sup>.

The cable connection between the network and motor terminals must meet the requirements stated in the national standards for installation or in the standard IEC/EN 60204-1 according to the rated current indicated on the rating plate.

#### NOTE!

When the ambient temperature exceeds +50 °C, cables having a permissible operating temperature of +90 °C as minimum shall be used. Also all other conversion factors depending on the installation conditions shall be taken into account while sizing the cables.

Ensure that the motor protection corresponds to the environment and weather conditions.

The seals of terminal boxes (other than Ex d) must be placed correctly in the slots provided, to ensure the correct IP class. A leak could lead to penetration of dust or water, creating a risk of flashover to live elements. If seals or gaskets are replaced, original sealing solution materials must be used.

### 4.9.1 Flameproof motors

There are two different types of protection for the terminal box:

- Ex d for M3JP-motors and M3JM
- Ex de for M3KP-motors and M3KM

#### Ex d-motors; M3JP

Certain cable glands are approved for a maximum amount of free space in the terminal box. The amount of free space for the motor range and the number and type of gland threads are listed below.

| Motor type<br><b>M3JP /<br/>M3JM</b> | Pole<br>number | Terminal<br>box<br>type | Threaded<br>holes | Terminal<br>box<br>free<br>volume | Cover<br>bolt<br>size | Tightening<br>torque of<br>terminal<br>box bolts |
|--------------------------------------|----------------|-------------------------|-------------------|-----------------------------------|-----------------------|--|
| 80 – 90                              | 2 – 8          | 25                      | 1xM25             | 1.0 dm <sup>3</sup>               | M8                    | 23 Nm  |
| 100 – 132                            | 2 – 8          | 25                      | 2xM32             | 1.0 dm <sup>3</sup>               | M8                    | 23 Nm  |
| 160 – 180                            | 2 – 8          | 63                      | 2xM40             | 4.0 dm <sup>3</sup>               | M10                   | 46 Nm  |
| 200 – 250                            | 2 – 8          | 160                     | 2xM50             | 10.5 dm <sup>3</sup>              | M10                   | 46 Nm  |
| 280                                  | 2 – 8          | 210                     | 2xM63             | 24 dm <sup>3</sup>                | M8                    | 23 Nm  |
| 315                                  | 2 – 8          | 370                     | 2xM75             | 24 dm <sup>3</sup>                | M8                    | 23 Nm  |
| 355                                  | 2 – 8          | 750                     | 2xM75             | 79 dm <sup>3</sup>                | M12                   | 80 Nm  |
| 400 – 450                            | 2 – 8          | 750                     | 2xM75             | 79 dm <sup>3</sup>                | M12                   | 80 Nm  |

#### Auxiliary cable entries

| Motor type | Pole number | Threaded holes |
|------------|-------------|----------------|
| 80 – 132   | 2 – 8       | 1xM20          |
| 160 – 450  | 2 – 8       | 2xM20          |

When closing the terminal box cover ensure that no dust has settled on the surface gaps. Clean and grease the surface with non-hardening contacting grease.

#### WARNING

Do not open the motor or the terminal box while the motor is still warm and energized when an explosive atmosphere is present.

#### Ex de-motors; M3KP and M3KM

The letter 'e' or 'box Ex e' is shown on the terminal box cover.

Ensure that assembly of the terminal connection is carried out precisely in the order described in the connection instructions, which are found inside the terminal box.

The creepage distance and clearance must conform to IEC/ EN 60079-7.

### 4.9.2 Dust ignition protection motors Ex t

As standard, motors have the terminal box fitted on the top with a cable entry possible from both sides. A full description is contained in the product catalogs.

Pay special attention to the sealing of the terminal box and cables to prevent the access of combustible dust into the terminal box. It is important to check that the external sealing is in good condition and well placed because they can be damaged or moved during handling.

When closing the terminal box cover, ensure that no dust has settled on the surface gaps and check that the sealing is in good condition – if not, it has to be replaced with an identical seal.

#### **WARNING**

Do not open the motor or the terminal box while the motor is still warm and energized when an explosive atmosphere is present.

### **4.9.3 Connections for different starting methods**

The terminal box on single speed motors normally contains a terminal block with six winding terminals and at least one separate earth terminal. This enables the use of DOL- or Y/D -starting. See Figure 3.

For two-speed and special motors, the terminal connection must follow the instructions inside the terminal box or in the motor manual.

The voltage and connection are stamped on the rating plate.

#### **Direct-on-line starting (DOL):**

Y or D winding connections may be used.

For example, 690 VY, 400 VD indicates Y-connection for 690 V and D-connection for 400 V.

#### **Star/Delta (Wye/Delta) starting (Y/D):**

The supply voltage of the motor must be equal to the rated voltage when using a D-connection.

Remove all connection straps from the terminal block.

For increased safety motors (Ex e), both direct-on-line and star-delta starting of motors are allowed. In the case of star-delta starting, only Ex-approved equipment is allowed.

#### **Other starting methods and severe starting conditions:**

In the case where other starting methods (e.g. converter or soft starter) will be used in the duty types of S1 and S2, it is considered that the device is “isolated from the power system when the electrical machine is running” as in the standard IEC 60079-0 and thermal protection is optional.

### **4.9.4 Connections of auxiliaries**

If a motor is equipped with thermistors or other RTDs (Pt100, thermal relays, etc.) and auxiliary devices, it is recommended they be used and connected by appropriate means. For certain applications, it is mandatory to use thermal protection. More detailed information can be found in the documents delivered with the motor. Connection diagrams for auxiliary elements and connection parts can be found inside the terminal box.

The maximum measuring voltage for the thermistors is 2.5 V. The maximum measuring current for Pt100 is 5 mA. Using a higher measuring voltage or current may cause errors in readings or a damaged temperature detector.

The insulation of thermal sensors fulfills the requirements of basic insulation.

### **4.10 Terminals and direction of rotation**

The shaft rotates clockwise when viewing the shaft face at the motor drive end, and the line phase sequence – L1, L2, L3 – is connected to the terminals as shown in figure 3.

To alter the direction of rotation, interchange any two connections on the supply cables.

If the motor has a unidirectional fan, ensure that it rotates in the same direction as the arrow marked on the motor.

### **4.11 Protection against overload and stalling**

All motors for explosive atmospheres must be protected against overloads, see installation standards IEC/EN 60079-14 and local installation requirements.

For increased safety motors (Ex e), the maximum tripping time for protective devices must not be longer than the time  $t_E$  shown on the motor rating plate.

For Ex nA- and Ex t -type of motors, no additional safety devices above normal industrial protection(s) are required.

## 5. Operation

### 5.1 General

The motors are designed for the following conditions unless otherwise stated on the rating plate:

- Motors are to be installed in fixed installations only.
- Normal ambient temperature range is from  $-20\text{ }^{\circ}\text{C}$  to  $+40\text{ }^{\circ}\text{C}$ .
- Maximum altitude is 1000 m above sea level.
- The variation of the supply voltage and frequency may not exceed the limits mentioned in relevant standards. Tolerance for supply voltage is  $\pm 5\%$ , and for frequency  $\pm 2\%$  according to Figure 4 (EN / IEC 60034-1, paragraph 7.3, Zone A). Both extreme values are not supposed to occur at the same time.

The motor can only be used in applications for which it is intended. The rated nominal values and operational conditions are shown on the motor rating plates. In addition, all requirements of this manual and other related instructions and standards must be followed.

If these limits are exceeded, motor data and construction data must be checked. Please contact ABB for further information.

Particular attention must be paid to corrosive atmospheres when using flameproof motors; ensure that the paint protection is suitable for the ambient conditions as corrosion can damage the explosion-proof enclosure.

#### **WARNING!**

Ignoring any instructions or maintenance of the apparatus may jeopardize safety and thus prevent the use of the machine in explosive atmospheres.



## 6. Motors for explosive atmospheres and variable speed operation

### 6.1 Introduction

This part of the manual provides additional instructions for motors, later Ex motors, used in explosive atmospheres in a frequency converter supply. Ex motor is intended to operate from a single frequency converter supply and not motors running in parallel from one frequency converter. In addition to these instructions in this manual, additional instructions provided by the converter manufacturer shall be followed.

ABB manufactured Ex motors; Ex nA, Ex t, Ex d and Ex de have been type tested with ACS800/ACS880 converters in DTC control and ACS550 converters, so these combinations can be selected using the dimensioning instructions provided in Chapter 6.8.2. The minimum switching frequency is 3 kHz for all type of Ex motors and is the basis for the dimensioning guidelines in the following chapters.

### 6.2 Main requirements according to EN and IEC standards

#### Flameproof motors Ex d, Ex de

The motor must be dimensioned so that the maximum surface temperature of the motor is limited according to the temperature or temperature class. In most cases, this requires either type tests or controlling the surface temperature of the motor.

If the temperature class T5 or T6 for Ex d or Ex de motor is requested, please contact your local sales office for assistance.

In case of other voltage source converters with pulse width modulation type of control (PWM), combined tests are usually needed to confirm the correct thermal performance of the motor. These tests can be avoided if flameproof motors are equipped with thermal sensors intended for control of surface temperatures. Such motors have the following additional markings on the rating plate: – “PTC” with the tripping temperature and “DIN 44081/82”.

#### Increased safety motors Ex e

ABB does not recommend the use of random wound low voltage increased safety motors with variable speed drives. This manual does not cover these motors in variable speed drives.

#### Non-sparking motors Ex nA

The combination of a motor and converter must be tested as a unit or dimensioned by calculation.

In case of other voltage source PWM converters with a minimum switching frequency of 3 kHz or higher, preliminary dimensioning instructions provided in Chapter 6.8.3 in this manual can be used. The final values must be verified by combined tests.

#### Dust ignition protection motors, Ex t (Ex tD)

The motor must be dimensioned so that the maximum outer surface temperature of the motor is limited according to the temperature class (e.g. T125 °C or T150 °C). For more information on a temperature class lower than 125 °C, please contact ABB.

In case of other voltage source converters with pulse width modulation type of control (PWM), combined tests are usually needed to confirm the correct thermal performance of the motor. These tests can be avoided if Ex t motors are equipped with thermal sensors intended for control of the surface temperatures. Such motors have the following additional markings on the rating plate: – “PTC” with the tripping temperature and “DIN 44081/82”.

In case of voltage source PWM converters with a minimum switching frequency of 3 kHz or higher, instructions provided in Chapter 6.8.3 can be used for preliminary dimensioning.

### 6.3 Winding insulation

#### 6.3.1 Phase to phase voltages

The maximum allowed phase to phase voltage peaks on the motor terminal as a function of the rise time of the pulse is shown in Figure 5.

The highest curve “ABB Special Insulation” (variant code 405) applies to motors with a special winding insulation for a frequency converter supply.

The “ABB Standard Insulation” applies to all other motors covered by this manual.

#### 6.3.2 Phase to ground voltages

The allowed phase to ground voltage peaks at motor terminals are:

- Standard Insulation 1300 V peak
- Special Insulation 1800 V peak

### 6.3.3 Selection of winding insulation with frequency converters

The selection of winding insulation and filters can be made according to table below:

| Nominal supply voltage $U_N$ of the converter | Winding insulation and filters required   |
|---|---|
| $U_N \leq 500$ V                              | ABB Standard insulation   |
| $U_N \leq 600$ V                              | ABB Standard insulation + dU/dt filters OR<br>ABB Special insulation (variant code 405) |
| $U_N \leq 690$ V                              | ABB Special insulation (variant code 405)<br>AND<br>dU/dt-filters at converter output   |

## 6.4 Thermal protection of windings

All cast iron Ex -motors are equipped with PTC thermistors to prevent the winding temperatures exceeding the thermal limits of used insulation system. In all cases it is recommended to connect them.

#### NOTE!

If not otherwise indicated on the rating plate, these thermistors do not prevent motor surface temperatures exceeding their temperature classes (T4 or T5).

ATEX-countries:

If the motor certificate requires, the thermistors must be connected to a thermistor circuit relay functioning independently and that is dedicated to reliably trip off the supply to the motor according to the requirements of the "Essential Health and Safety Requirements" in Annex II, item 1.5.1 of the ATEX Directive 94/9/EC or 2014/34/EU.

Non-ATEX countries:

It is recommended that the thermistors are connected to a thermistor circuit relay functioning independently and that is dedicated to reliably trip off the supply to the motor.

#### NOTE!

According to the local installation rules, it may be possible to also connect the thermistors to equipment other than a thermistor relay; for example, to the control inputs of a frequency converter.

## 6.5 Bearing currents

Bearing voltages and currents must be avoided in all variable speed applications to ensure the reliability and safety of the application. For this purpose, insulated bearings or bearing constructions, common mode filters and suitable cabling and grounding methods (see chapter 6.6) must be used.

### 6.5.1 Elimination of bearing currents

The following methods must be used to avoid harmful bearing currents in frequency converter driven motors:

| Frame size      |   |
|-----------------|---|
| 250 and smaller | No actions needed   |
| 280 – 315       | Insulated non-drive end bearing   |
| 355 – 450       | Insulated non-drive end bearing<br>AND<br>Common mode filter at the converter |

For the exact type of bearing insulation, see the motor's rating plate. Changing the bearing type or insulation method without ABB's permission is prohibited.

## 6.6 Cabling, grounding and EMC

To provide proper grounding and to ensure compliance with any applicable EMC requirements, motors above 30 kW must be cabled using shielded symmetrical cables and EMC glands, i.e. cable glands providing 360° bonding. Also for smaller motors, symmetrical and shielded cables are highly recommended. Make the 360° grounding arrangement at all cable entries as described in the instructions for the glands. Twist the cable shields into bundles and connect to the nearest ground terminal/busbar inside the terminal box, converter cabinet, etc.

#### NOTE!

Proper cable glands providing 360° bonding must be used at all termination points, e.g. at motor, converter, possible safety switch, etc.

For motors of frame size IEC 280 and upward, additional potential equalization between the motor frame and the driven equipment is needed, unless both are mounted on a common steel base. In this case, the high frequency conductivity of the connection provided by the steel base should be checked by, for example, measuring the potential difference between the components.

More information about grounding and cabling of variable speed drives can be found in the manual "Grounding and cabling of the drive system" (Code: 3AFY 61201998) and material on fulfilling the EMC requirements can be found in respective converter manuals.

## 6.7 Load and speed limitations

### 6.7.1 General

#### NOTE!

The maximum speed of the motor must not be exceeded even if the loadability curves are given up to 100 Hz.



### 6.7.2 Motor loadability with ACS800/880-series of converters with DTC-control

The loadability curves (or load capacity curves) presented in Figures 6 and 7 show the maximum allowed continuous output torque of the motors as a function of supply frequency. The output torque is given as a percentage of the nominal torque of the motor.

### 6.7.3 Motor loadability with ACS500 –series and other voltage source converters

The loadability curves (or load capacity curves) presented in Figures 10 and 11 show the maximum allowed continuous output torque of the motors as a function of supply frequency. The output torque is given as a percentage of the nominal torque of the motor.

#### NOTE!

The loadability curves in Figures 10 and 11 are based on 3 kHz switching frequency.

For constant torque applications, the lowest allowed continuous operating frequency is 15 Hz.

For quadratic torque applications, the lowest continuous operating frequency is 5 Hz.

The combination of other voltage source converters than the ACS 500 –series must either be tested or thermal sensors to control the surface temperatures must be connected.

### 6.7.4 Short time overloads

ABB flameproof motors usually provide a possibility for short time overloading. For exact values, please see the motor's rating plate or contact ABB.

Overloadability is specified by three factors:

|            |  |
|------------|--|
| $I_{OL}$   | Maximum short time current   |
| $T_{OL}$   | The length of allowed overload period  |
| $T_{COOL}$ | Cooling time required after each overload period.<br>During the cooling period motor current and torque must stay below the limit of allowed continuous loadability. |

## 6.8 Rating plates

A VSD plate is mandatory for variable speed operation and shall contain the necessary data to define the allowed duty range in variable speed operation. At least the following parameters must be shown on the rating plates of motors for explosive atmospheres intended for variable speed operation:

- Duty type
- Type of load (constant or quadratic)
- Type of converter and minimum switching frequency
- Power or torque limitation
- Speed or frequency limitation

### 6.8.1 Content of standard VSD plate

The standard VSD plate, Figure 14, contains following information:

- Supply voltage or voltage range (VALID FOR) and supply frequency (FWP) of the drive
- Motor type
- Minimum switching frequency for PWM converters (MIN. SWITCHING FREQ. FOR PWM CONV.)
- Limits for short time overloads ( $I_{OL}$ ,  $T_{OL}$ ,  $T_{COOL}$ ), see chapter 6.7.4
- Allowed load torque for DTC controlled ACS800 converters (DTC-CONTROL). The load torque is provided as percent of the nominal torque of the motor.
- Allowed load torque for PWM controlled ACS550 converters (PWM-CONTROL). The load torque is provided as percent of the nominal torque of the motor. See also chapter 6.7.3.

The standard VSD plate requires calculation by the customer to convert the generic data into motor specific data. The hazardous motor catalogue will be required to convert the frequency limits to speed limits, and the torque limits into current limits. Customer specific plates can be requested from ABB if preferred.

### 6.8.2 Content of customer specific VSD plate

Customer specific VSD plates, Figures 15 and 16, contain application and motor specific data for variable speed application as follows:

- Motor type
- Motor serial number
- Frequency converter type (FC Type)
- Switching frequency (Switc. freq.)
- Field weakening or nominal point of the motor (F.W.P.)
- List of specific duty points
- Type of load (CONSTANT TORQUE, QUADRATIC TORQUE, etc.)
- Speed range
- If the motor is equipped with thermal sensors suitable for direct thermal control, a text "PTC xxx C DIN44081/-82", where "xxx" denotes the tripping temperature of the sensors.

In customer specific VSD plates, the values are for the specific motor and application. The duty point values can in most cases be used for programming the converters' protective functions as such.

## 6.9 Commissioning the variable speed application

The commissioning of the variable speed application must be done according to the instructions provided in this manual, in the respective frequency converter manuals and local laws and regulations. The requirements and limitations set by the application must also be taken into account.

The most often needed parameters to set up the converter are:

- Motor nominal
  - voltage
  - current
  - frequency
  - speed
  - power

These parameters may be taken from a single line of the standard rating plate fixed on the motor, see Figure 13 for an example.

### NOTE!

In the case of missing or inaccurate information, do not operate the motor before ensuring correct settings!

It is recommended to use all suitable protective features provided by the converter to improve the safety of the application. Converters usually provide features such as:

- Minimum speed
- Maximum speed
- Stall protection
- Acceleration and deceleration times
- Maximum current
- Maximum power
- Maximum torque
- User load curve

### WARNING

These features are only additional and do not replace the safety functions required by local safety regulations or standards.

### 6.9.1 Setting parameters based on the VSD plate

Check that the VSD plate is valid for the application in question, i.e. that the supply network corresponds to the data of “FWP” and that the requirements set for the converter are met (type and control type of the converter, as well as the switching frequency)

Check that the load complies with allowed loading for the converter in use.

Feed in the basic start-up data. The basic start-up data needed in converters shall be taken from a rating plate (See Figure 13 for an example). Detailed instructions are available in the manuals of respective frequency converters.

In case of converters supplied by ABB, e.g. ACS800, ACS880, ACS550 etc., all parameter settings can be found from the respective manuals. In all frequency converters, at least the following parameter settings influence motor temperatures; minimum switching frequency, preventing over modulation at and above the field weakening point must be checked.

## 7. Maintenance

### WARNING

Voltage may be connected at standstill inside the terminal box for heating elements or direct winding heating.

### WARNING

Standards IEC/EN 60079-17 and -19 relating to repair and maintenance of electrical apparatus in explosive atmospheres must be taken into consideration. Only competent personnel acquainted with these standards should handle this type of apparatus.

Depending on the nature of the work in question, disconnect and lock out before working on motor or driven equipment. Ensure no explosive gas or dust is present while work is in progress.

IEC/EN 60079-17 is not applicable for M3JM and M3KM motors.

### 7.1 General inspection

1. For inspection and maintenance, use standards IEC/EN 60079-17 (especially tables 1-4) as a guideline.
2. Inspect the motor at regular intervals. The frequency of checks depends on, for example, the humidity level of the ambient air and on the local weather conditions. This can initially be determined experimentally and must then be strictly adhered to.
3. Keep the motor clean and ensure free ventilation airflow. If the motor is used in a dusty environment, the ventilation system must be regularly checked and cleaned.
4. Check the condition of shaft seals (e.g. V-ring or radial seal) and replace if necessary.
5. For Ex t motors, carry out a detailed inspection according to IEC/EN 60079-17 table 4 with a recommended interval of 2 years or 8,000 h.
6. Check the condition of the connections, and mounting and assembly bolts.
7. Check the bearing condition by listening for any unusual noise, vibration measurement, bearing temperature, inspection of spent grease or SPM bearing monitoring. Pay special attention to bearings when their calculated rated life time is coming to an end.

When signs of wear are noticed, dismantle the motor, check the parts and replace if necessary. When bearings are changed, replacement bearings must be of the same type as those originally fitted. The shaft seals have to be replaced with seals of the same quality and characteristics as the originals when changing the bearings.

For flameproof motors, periodically open the drain plug, if equipped, by turning it counterclockwise, tap it to check free operation and close it by pressing and screwing it clockwise. This operation must be done when the motor is at standstill. The frequency of checks depends on the humidity level of the ambient air and on the local weather conditions. This can initially be determined experimentally and must then be strictly adhered to.

In the case of the IP 55 motor and when the motor has been delivered with a plug closed, it is advisable to periodically open the drain plugs in order to ensure that the way out for condensation is not blocked and allows condensation to escape from the motor. This operation must be done when the motor is at a standstill and has been made safe to work on

#### 7.1.1 Standby motors

If the motor is in standby for a longer period of time on a ship or in other vibrating environment the following measures have to be taken:

1. The shaft must be rotated regularly every 2 weeks (to be reported) by means of starting of the system. In case a startup is not possible, for any reason, at least the shaft has to be turned by hand in order to achieve a different position once a week. Vibrations caused by other vessel equipment will cause bearing pitting which should be minimized by regular operation/hand turning.
2. The bearing must be greased while rotating the shaft every year (to be reported). If the motor has been provided with roller bearing at the driven end, the transport lock must be removed before rotating the shaft. The transport locking must be remounted in case of transportation.
3. All vibrations must be avoided to prevent a bearing from failing. All instructions in the motor instruction manual for commissioning and maintenance have to be followed. The warranty will not cover the winding and bearing damages if these instructions have not been followed.

### 7.2 Lubrication

#### WARNING

Beware of all rotating parts.

#### WARNING

Grease can cause skin irritation and eye inflammation. Follow all safety precautions specified by the manufacturer of the grease.

Bearing types are specified in the respective product catalogs and on the rating plate of all motors except smaller frame sizes.

Reliability is a vital issue for bearing lubrication intervals. ABB uses the L1-principle (i.e. that 99 % of the motors are certain to make the life time) for lubrication.

#### 7.2.1 Motors with permanently greased bearings

Bearings are usually permanently greased bearings of 1Z, 2Z, 2RS or equivalent.

As a guide, adequate lubrication for sizes up to 250 can be achieved for the following duration, according to  $L_1$ . For duties with higher ambient temperatures, please contact ABB. The informative formula to change the  $L_1$  values roughly to  $L_{10}$  values:  $L_{10} = 2.7 \times L_1$ .

Duty hours for permanently greased bearings at ambient temperatures of 25 °C and 40 °C are:

| Frame size | Poles | Duty hours at 25 °C | Duty hours at 40 °C |
|------------|-------|---------------------|---------------------|
| 71         | 2     | 67 000              | 42 000              |
| 71         | 4 – 8 | 100 000             | 56 000              |
| 80-90      | 2     | 100 000             | 65 000              |
| 80-90      | 4 – 8 | 100 000             | 96 000              |
| 100-112    | 2     | 89 000              | 56 000              |
| 100-112    | 4 – 8 | 100 000             | 89 000              |
| 132        | 2     | 67 000              | 42 000              |
| 132        | 4 – 8 | 100 000             | 77 000              |
| 160        | 2     | 60 000              | 38 000              |
| 160        | 4 – 8 | 100 000             | 74 000              |
| 180        | 2     | 55 000              | 34 000              |
| 180        | 4 – 8 | 100 000             | 70 000              |
| 200        | 2     | 41 000              | 25 000              |
| 200        | 4 – 8 | 95 000              | 60 000              |
| 225        | 2     | 36 000              | 23 000              |
| 225        | 4 – 8 | 88 000              | 56 000              |
| 250        | 2     | 31 000              | 20 000              |
| 250        | 4 – 8 | 80 000              | 50 000              |

Data is valid up to 60 Hz.

## 7.2.2 Motors with re-greasable bearings

### Lubrication information plate and general lubrication advice

If the machine is equipped with a lubrication information plate, follow the given values.

Greasing intervals regarding mounting, ambient temperature and rotational speed are defined on the lubrication information plate.

During the first start or after a bearing lubrication, a temporary temperature rise may appear, approximately 10 to 20 hours.

Some motors may be equipped with a collector for old grease. Follow the special instructions given for the equipment.

After re-greasing a Ex t motor, clean the motor end shields so they are free of any dust layer.

### A. Manual lubrication

#### Re-greasing while the motor is running

- Remove grease outlet plug or open closing valve if fitted.
- Be sure that the lubrication channel is open
- Inject the specified amount of grease into the bearing.
- Let the motor run for 1-2 hours to ensure that all excess grease is forced out of the bearing. Close the grease outlet plug or closing valve if fitted.

### Regreasing while the motor is at a standstill

If it is not possible to re-grease the bearings while the motors are running, lubrication can be carried out while the machine is at a standstill.

- In this case use only half the quantity of grease and then run the motor for a few minutes at full speed.
- When the motor has stopped, apply the rest of the specified amount of grease to the bearing.
- After 1–2 running hours, close the grease outlet plug or closing valve if fitted.

### B. Automatic lubrication

The grease outlet plug must be removed permanently with automatic lubrication or open closing valve if fitted.

ABB recommends only the use of electromechanical systems.

The amount of grease per lubrication interval stated in the table should be multiplied by three if a central lubrication system is used. When using a smaller automatic re-grease unit (one or two cartridges per motor) the normal amount of grease can be used.

When 2-pole motors are automatically re-greased, the note concerning lubricant recommendations for 2-pole motors in the Lubricants chapter should be followed.

The used grease should be suitable for automatic lubrication. The automatic lubrication system deliverer and the grease manufacturer's recommendations should be checked.

### Calculation example of amount of grease for automatic lubrication system

Central lubrication system: Motor IEC M3\_P 315\_ 4-pole in 50 Hz network, re-lubrication interval according to table below is 7600 h/55 g (DE) and 7600 h/40g (NDE):

$$(DE) RLI = 55 \text{ g}/7600\text{h} \cdot 3 \cdot 24 = 0,52 \text{ g/day}$$

$$(NDE) RLI = 40 \text{ g}/7600\text{h} \cdot 3 \cdot 24 = 0,38 \text{ g/day}$$

### Calculation example of amount of grease for single automation lubrication unit (cartridge)

$$(DE) RLI = 55 \text{ g}/7600 \text{ h} \cdot 24 = 0,17 \text{ g/day}$$

$$(NDE) RLI = 40 \text{ g}/7600 \text{ h} \cdot 24 = 0,13 \text{ g/day}$$

RLI = Re-lubricaion interval, DE = Drive end, NDE = Non drive end

## 7.2.3 Lubrication intervals and amounts

Lubrication intervals for vertical machines are half of the values shown in the table below.

As a guide, adequate lubrication can be achieved for the following duration, according to L1. For duties with higher ambient temperatures please contact ABB. The informative formula to change the L1 values roughly to L10 values is:  $L10 = 2.0 \times L1$  with manual lubrication

The lubrication intervals are based on a bearing operating temperature of 80 °C (ambient temperature +25 °C).

**NOTE!**

An increase in the ambient temperature raises the temperature of the bearings correspondingly. The interval values should be halved for a 15 °C increase in bearing temperature and may be doubled for a 15 °C decrease in bearing temperature.

Higher speed operation, e.g. in frequency converter applications, or lower speed with heavy load will require shorter lubrication intervals.

**WARNING**

The maximum operating temperature of the grease and bearings, +110°C, must not be exceeded.

The designed maximum speed of the motor must not be exceeded.

**Ball bearings**

| Frame size | Amount of grease DE-bearing [g] | Amount of grease NDE-bearing [g] | 3600 r/min                          | 3000 r/min | 1800 r/min | 1500 r/min | 1000 r/min | 500-900 r/min |
|------------|---------------------------------|----------------------------------|-------------------------------------|------------|------------|------------|------------|---------------|
|            |                                 |                                  | Lubrication intervals in duty hours |            |            |            |            |               |
| 160        | 13                              | 13                               | 7 100                               | 8 900      | 14 300     | 16 300     | 20 500     | 21 600        |
| 180        | 15                              | 15                               | 6 100                               | 7 800      | 13 100     | 15 100     | 19 400     | 20 500        |
| 200        | 20                              | 15                               | 4 300                               | 5 900      | 11 000     | 13 000     | 17 300     | 18 400        |
| 225        | 23                              | 20                               | 3 600                               | 5 100      | 10 100     | 12 000     | 16 400     | 17 500        |
| 250        | 30                              | 23                               | 2 400                               | 3 700      | 8 500      | 10 400     | 14 700     | 15 800        |
| 280        | 35                              | 35                               | 1 900                               | 3 200      | –          | –          | –          | –             |
| 280        | 40                              | 40                               | –                                   | –          | 7 800      | 9 600      | 13 900     | 15 000        |
| 315        | 35                              | 35                               | 1 900                               | 3 200      | –          | –          | –          | –             |
| 315        | 55                              | 40                               | –                                   | –          | 5 900      | 7 600      | 11 800     | 12 900        |
| 355        | 35                              | 35                               | 1 900                               | 3 200      | –          | –          | –          | –             |
| 355        | 70                              | 40                               | –                                   | –          | 4 000      | 5 600      | 9 600      | 10 700        |
| 400        | 40                              | 40                               | 1 500                               | 2 700      | –          | –          | –          | –             |
| 400        | 85                              | 55                               | –                                   | –          | 3 200      | 4 700      | 8 600      | 9 700         |
| 450        | 40                              | 40                               | 1 500                               | 2 700      | –          | –          | –          | –             |
| 450        | 95                              | 70                               | –                                   | –          | 2 500      | 3 900      | 7 700      | 8 700         |

**Roller bearings**

| Frame size | Amount of grease DE-bearing [g] | Amount of grease NDE-bearing [g] | 3600 r/min                          | 3000 r/min | 1800 r/min | 1500 r/min | 1000 r/min | 500-900 r/min |
|------------|---------------------------------|----------------------------------|-------------------------------------|------------|------------|------------|------------|---------------|
|            |                                 |                                  | Lubrication intervals in duty hours |            |            |            |            |               |
| 160        | 13                              | 13                               | 3 600                               | 4 500      | 7 200      | 8 100      | 10 300     | 10 800        |
| 180        | 15                              | 15                               | 3 000                               | 3 900      | 6 600      | 7 500      | 9 700      | 10 200        |
| 200        | 20                              | 15                               | 2 100                               | 3 000      | 5 500      | 6 500      | 8 600      | 9 200         |
| 225        | 23                              | 20                               | 1 800                               | 1 600      | 5 100      | 6 000      | 8 200      | 8 700         |
| 250        | 30                              | 23                               | 1 200                               | 1 900      | 4 200      | 5 200      | 7 300      | 7 900         |
| 280        | 35                              | 35                               | 900                                 | 1 600      | –          | –          | –          | –             |
| 280        | 40                              | 40                               | –                                   | –          | 4 000      | 5 300      | 7 000      | 8 500         |
| 315        | 35                              | 35                               | 900                                 | 1 600      | –          | –          | –          | –             |
| 315        | 55                              | 40                               | –                                   | –          | 2 900      | 3 800      | 5 900      | 6 500         |
| 355        | 35                              | 35                               | 900                                 | 1 600      | –          | –          | –          | –             |
| 355        | 70                              | 40                               | –                                   | –          | 2 000      | 2 800      | 4 800      | 5 400         |
| 400        | 40                              | 40                               | –                                   | 1300       | –          | –          | –          | –             |
| 400        | 85                              | 55                               | –                                   | –          | 1 600      | 2 400      | 4 300      | 4 800         |
| 450        | 40                              | 40                               | –                                   | 1 300      | –          | –          | –          | –             |
| 450        | 95                              | 70                               | –                                   | –          | 1 300      | 2 000      | 3 800      | 4 400         |

## 7.2.4 Lubricants

### WARNING

#### Do not mix different types of grease.

Incompatible lubricants may cause bearing damage.

When regreasing, use only special ball bearing grease with the following properties:

- good quality grease with lithium complex soap and with mineral- or PAO-oil
- base oil viscosity 100-160 cST at 40 °C
- consistency NLGI grade 1.5 – 3 \*)
- temperature range –30 °C – +140 °C, continuously.

\*) A stiffer end of scale is recommended for vertical mounted motors or in hot conditions..

The above mentioned grease specification is valid if the ambient temperature is above –30 °C or below +55 °C, and the bearing temperature is below 110 °C, otherwise consult ABB regarding suitable grease.

Grease with the correct properties is available from all major lubricant manufacturers.

Admixtures are recommended, but a written guarantee must be obtained from the lubricant manufacturer, especially concerning EP admixtures, that admixtures do not damage bearings or the properties of lubricants at the operating temperature range.

### WARNING

Lubricants containing EP admixtures are not recommended in high bearing temperatures in frame sizes 280 to 450.

The following high performance greases can be used:

- Mobil Unirex N2 or N3 (lithium complex base)
- Mobil Mobilith SHC 100 (lithium complex base)
- Shell Gadus S5 V 100 2 (lithium complex base)
- Klüber Klüberplex BEM 41-132 (special lithium base)
- FAG Arcanol TEMP110 (lithium complex base)
- Lubcon Turmogrease L 802 EP PLUS (special lithium base)
- Total Multiplex S2 A (lithium complex base)
- Rhenus Rhenus LKZ 2 (lithium complex base)

### NOTE!

Always use high speed grease for high speed 2-pole machines where the speed factor is higher than 480,000 (calculated as  $D_m \times n$  where  $D_m$  = average bearing diameter, mm;  $n$  = rotational speed, r/min).

The following greases can be used for high speed cast iron motors but not mixed with lithium complex greases:

- Klüber Klüber Quiet BQH 72-102 (polyurea base)
- Lubcon Turmogrease PU703 (polyurea base)

If other lubricants are used, check with the manufacturer that the qualities correspond to those of the above mentioned lubricants. The lubrication intervals are based on the listed high performance greases above. Using other greases can reduce the interval.



## 8. After Sales support

### 8.1 Spare parts

Unless otherwise stated, spare parts must be original parts or approved by ABB.

Requirements in standard IEC/EN 60079-19 must be followed.

When ordering spare parts, the motor's serial number, full type designation and product code, as stated on the rating plate, must be specified.

### 8.2 Dismantling, re-assembly and rewinding

Follow the instructions given in standard IEC/EN 60079-19 regarding dismantling, re-assembly and rewinding. **Any operation must be undertaken by the manufacturer, i.e. ABB, or by an ABB authorized repair partner.**

No manufacturing alterations are permitted on the parts that make up the explosion-proof enclosure and the parts that ensure dust-tight protection. Also ensure that the ventilation is never obstructed.

Rewinding must always be carried out by an ABB authorized repair partner.

### 8.3 Bearings

Special care should be taken with the bearings.

These must be removed using pullers and fitted by heating or using special tools.

Bearing replacement is described in detail in a separate instruction leaflet available from the ABB Sales Office. Special recommendations apply when changing the bearings of dust ignition protection Ex t-motors (as the seals should be changed at the same time).

Any directions placed on the motor, such as labels, must be followed. The bearing types indicated on the rating plate must not be changed.

#### **NOTE!**

Any repair by the end user, unless expressly approved by the manufacturer, releases the manufacturer from responsibility to conformity.

### 8.4 Gaskets and sealing

Terminal boxes others than Ex d boxes are equipped with tested and approved sealing. When gaskets and/or sealing need to be renewed, they have to be replaced by original spare parts.

## 9. Environmental requirements

Most of ABB's motors have a sound pressure level not exceeding 82 dB(A) ( $\pm 3$  dB) at 50 Hz.

Values for specific machines can be found in the relevant product catalogs. At 60 Hz, sinusoidal supply the values are approximately 4 dB(A) higher compared to 50 Hz values stated in the product catalogs.

For sound pressure levels at frequency converter supplies, please contact ABB.

When motor(s) need to be scrapped or recycled, appropriate means, local regulations and laws must be followed.

## 10. Troubleshooting

These instructions do not cover all details or variations in equipment nor provide information for every possible condition to be met in connection with installation, operation or maintenance. Should additional information be required, please contact the nearest ABB Sales Office.

### Motor troubleshooting chart

Your motor service and any troubleshooting must be handled by qualified persons who have the proper tools and equipment.

| TROUBLE                                       | CAUSE   | WHAT TO DO   |
|---|---|--|
| Motor fails to start                          | Blown fuses   | Replace fuses with proper type and rating.   |
|   | Overload trips  | Check and reset overload in starter.   |
|   | Improper power supply                                   | Check to see that power supplied agrees with motor rating plate and load factor.   |
|   | Improper line connections                               | Check connections against diagram supplied with motor.   |
|   | Open circuit in winding or control switch               | Indicated by humming sound when switch is closed. Check for loose wiring connections and ensure that all control contacts are closing. |
|   | Mechanical failure                                      | Check to see if motor and drive turn freely. Check bearings and lubrication.   |
|   | Short circuited stator<br>Poor stator coil connection   | Indicated by blown fuses. Motor must be rewound. Remove end shields and locate fault.  |
|   | Rotor defective   | Look for broken bars or end rings.   |
|   | Motor may be overloaded                                 | Reduce load.   |
| Motor stalls                                  | One phase may be open                                   | Check lines for open phase.  |
|   | Wrong application                                       | Change type or size. Consult equipment supplier.   |
|   | Overload  | Reduce load.   |
|   | Low voltage   | Ensure the rating plate voltage is maintained. Check connection.   |
|   | Open circuit  | Fuses blown. Check the overload relay, stator and push buttons.  |
| Motor runs and then dies down                 | Power failure   | Check for loose connections to line, fuses and control.  |
| Motor does not accelerate up to nominal speed | Not applied properly                                    | Consult equipment supplier for proper type.  |
|   | Voltage too low at motor terminals because of line drop | Use higher voltage or transformer terminals or reduce load. Check connections. Check conductors for proper size.                       |
|   | Starting load too high                                  | Check the motor's starts against "no load".  |
|   | Broken rotor bars or loose rotor                        | Look for cracks near the rings. A new rotor may be required as repairs are usually temporary.  |
|   | Open primary circuit                                    | Locate fault with testing device and repair.   |



| <b>TROUBLE</b>   | <b>CAUSE</b>  | <b>WHAT TO DO</b>   |
|--|---|---|
| Motor takes too long to accelerate and/or draws high current | Excessive load  | Reduce load.  |
|  | Low voltage during start  | Check for high resistance. Make sure that an adequate cable size is used. |
|  | Defective squirrel cage rotor   | Replace with a new rotor.   |
|  | Applied voltage too low   | Correct power supply.   |
| Wrong rotation direction                                     | Wrong sequence of phases  | Reverse connections at motor or at switchboard.                           |
| Motor overheats while running                                | Overload  | Reduce load.  |
|  | Frame or ventilation openings may be full of dirt and prevent proper ventilation of motor | Open vent holes and check for a continuous stream of air from the motor.  |
|  | Motor may have one phase open   | Check that all leads and cables are well connected.                       |
|  | Grounded coil   | Motor must be rewound.  |
|  | Unbalanced terminal voltage   | Check for faulty leads, connections and transformers.                     |
| Motor vibrates   | Motor misaligned  | Realign.  |
|  | Weak support  | Strengthen base.  |
|  | Coupling out of balance   | Balance coupling.   |
|  | Driven equipment unbalanced   | Rebalance driven equipment.   |
|  | Defective bearings  | Replace bearings.   |
|  | Bearings not in line  | Repair motor.   |
|  | Balancing weights shifted   | Rebalance rotor.  |
|  | Contradiction between balancing of rotor and coupling (half key – full key)               | Rebalance coupling or rotor.  |
|  | Poly-phase motor running single phase   | Check for open circuit.   |
|  | Excessive end play  | Adjust bearing or add shim.   |
| Scraping noise   | Fan rubbing end shield or fan cover   | Correct fan mounting.   |
|  | Loose on bedplate   | Tighten holding bolts.  |
| Noisy operation  | Air gap not uniform   | Check and correct end shield fits or bearing fits.                        |
|  | Rotor unbalance   | Rebalance rotor.  |

| <b>TROUBLE</b> | <b>CAUSE</b>                                      | <b>WHAT TO DO</b>  |
|----------------|---|--|
| Hot bearings   | Bent or sprung shaft                              | Straighten or replace shaft.   |
|                | Excessive belt pull                               | Decrease belt tension.   |
|                | Pulleys too far away from shaft shoulder          | Move pulley closer to motor bearing.   |
|                | Pulley diameter too small                         | Use larger pulleys.  |
|                | Misalignment                                      | Correct by realigning the drive.   |
|                | Insufficient grease                               | Maintain proper quality and amount of grease in bearing.                             |
|                | Deterioration of grease or lubricant contaminated | Remove old grease, wash bearings thoroughly in kerosene and replace with new grease. |
|                | Excess lubricant                                  | Reduce quantity of grease: bearing should not be more than half full.                |
|                | Overloaded bearing                                | Check alignment, side and end thrust.  |
|                | Broken ball or rough races                        | Clean housing thoroughly, and then replace bearing.                                  |

# 11. Figures

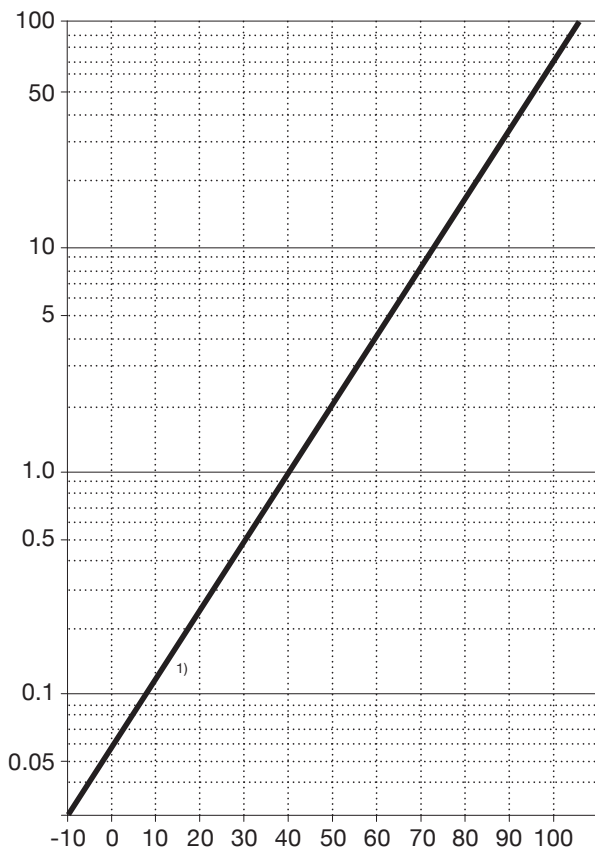


Figure 1. Diagram illustrating the insulation resistance dependence from the temperature and how to correct the measured insulation resistance to the temperature of 40 °C.

Abb. 1. Das Diagramm zeigt die Abhängigkeit des Isolationswiderstands von der Temperatur und wie der gemessene Isolationswiderstand auf die Temperatur von 40 °C korrigiert werden kann.

Figure 1. Diagramme illustrant la dépendance de la résistance de l'isolation à la température et comment corriger la résistance d'isolation mesurée à la température de 40 °C.

Figura 1. Diagrama que ilustra la dependencia de la resistencia de aislamiento respecto a la temperatura y cómo corregir la resistencia de aislamiento medida a la temperatura de 40 °C.

Figura 1. Diagramma che illustra la dipendenza della resistenza di isolamento dalla temperatura e come correggere la resistenza di isolamento misurata per 40 °C.

Figura 1. Diagrama que ilustra a dependência da resistência de isolamento em relação à temperatura, e como corrigir a resistência de isolamento medida para a temperatura de 40 °C.

Tablo 1. Yalıtım direncinin sıcaklık ile olan bağıntısını ve ölçülen yalıtım direncinin 40 °C sıcaklığa göre nasıl düzeltileceğini gösteren diyagram.

## Key

X-axis: Winding temperature, Celsius Degrees

Y-axis: Insulation Resistance Temperature Coefficient, ktc

1) To correct observed insulation resistance,  $R_i$ , to 40 °C multiply it by the temperature coefficient  $k_{tc}$ .  $R_{i\ 40\ ^\circ C} = R_i \times k_{tc}$

## Key

x-Achse: Wicklungstemperatur, Grad Celsius

y-Achse: Temperaturkoeffizient des Isolationswiderstandes, ktc

1) Zur Korrektur des gefundenen Isolationswiderstandes,  $R_i$ , auf 40 °C multiplizieren Sie ihn mit dem Temperaturkoeffizienten  $k_{tc}$ .  $R_{i\ 40\ ^\circ C} = R_i \times k_{tc}$

## Clé

Axe X : Température de bobine en degrés Celsius

Axe Y : Coefficient de température de la résistance de l'isolation, ktc

1) Pour corriger la résistance de l'isolation observée,  $R_i$ , à 40 °C multiplié par le coefficient de température  $k_{tc}$ .  $R_{i\ 40\ ^\circ C} = R_i \times k_{tc}$

## Clave

Eje X: Temperatura de devanado, grados centígrados

Eje Y: Coeficiente de temperatura de resistencia de aislamiento, ktc

1) Para corregir una resistencia de aislamiento medida,  $R_i$ , a 40 °C, multiplíquela por el coeficiente de temperatura  $k_{tc}$ .  $R_{i\ 40\ ^\circ C} = R_i \times k_{tc}$

## Chiavetta

Asse X: Temperatura dell'avvolgimento, gradi Celsius

Asse Y: Coefficiente di resistenza della temperatura d'isolamento. ktc

1) Per correggere la resistenza di isolamento osservata,  $R_i$ , di 40 °C moltiplicarla per il coefficiente di temperatura  $k_{tc}$ .  $R_{i\ 40\ ^\circ C} = R_i \times k_{tc}$

## Explicação

Eixo X: Temperatura dos enrolamentos, Graus Celsius

Eixo Y: Coeficiente de Temperatura da Resistência de Isolamento, ktc

1) Para corrigir a resistência de isolamento observada,  $R_i$ , para 40 °C, deverá ser multiplicada pelo coeficiente de temperatura  $k_{tc}$ .  $R_{i\ 40\ ^\circ C} = R_i \times k_{tc}$

## Tuş

X eksen: Sargı sıcaklığı, Santigrat Derece

Y eksen: Yalıtım Direnci Sıcaklık Katsayısı, ktc

1) Gözlenen yalıtım direncini düzeltmek için,  $R_i$ , 40 °C'ye  $k_{tc}$  sıcaklık katsayısı ile çarpın.  $R_{i\ 40\ ^\circ C} = R_i \times k_{tc}$

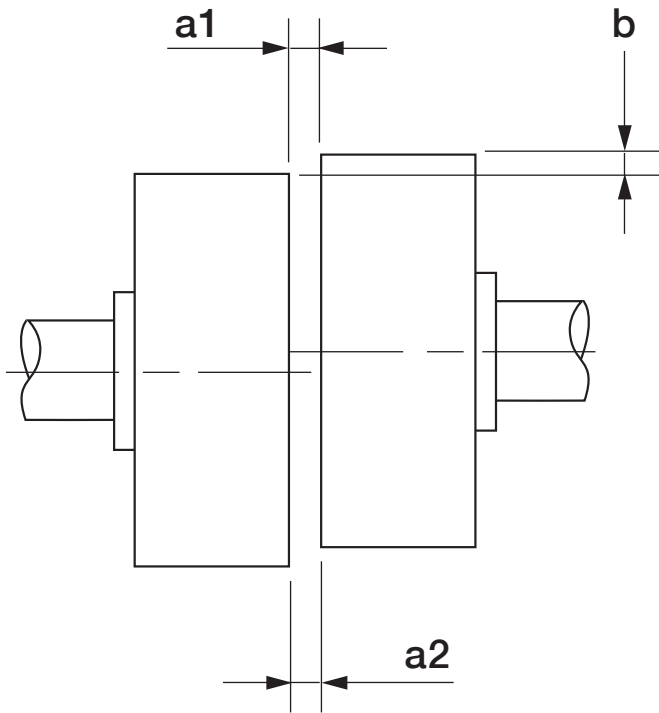


Figure 2. Mounting of half-coupling or pulley

Abb. 2. Montage von Kupplungshälften und Riemenscheiben

Figure 2. Montage d'un demi-accouplement ou d'une poulie

Figura 2. Montaje de acoplamiento o polea

Figure 2. Montaggio di semigiunto o puleggia

Figura 2. Montagem dos meios-acoplamentos ou polias

Tablo 2. Yarım kaplin veya kasnağın montajı

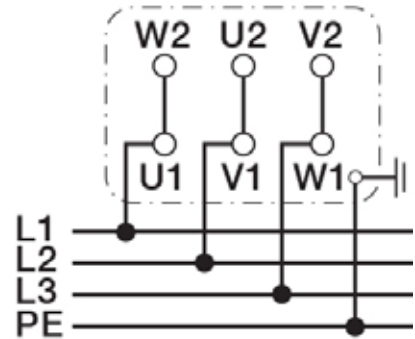
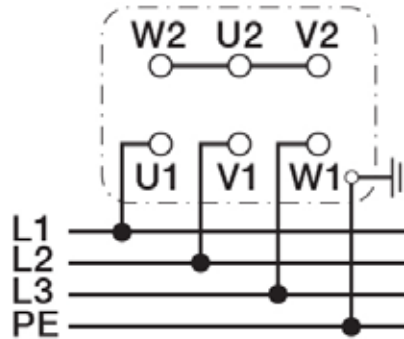
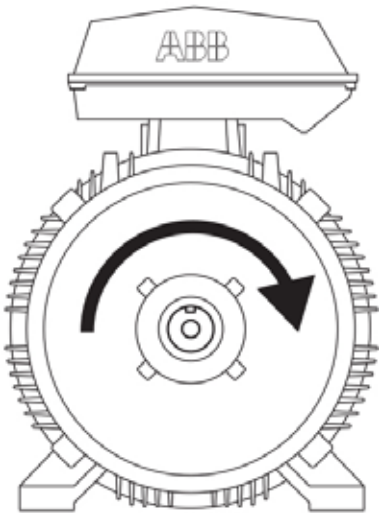


Figure 3. Connection of terminals for main supply

Abb. 3. Anschluss der Klemmen für die Hauptversorgung

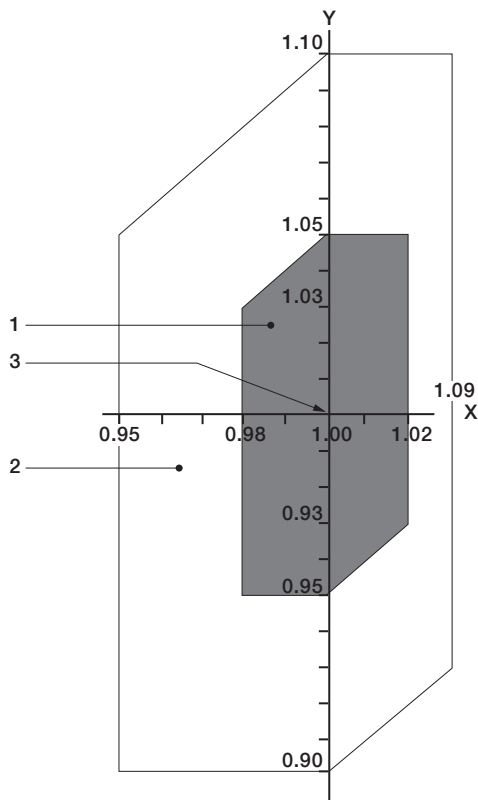
Figure 3. Connexion des bornes pour l'alimentation principale

Figura 3. Conexión de terminales de la alimentación principal

Figura 3. Connessione dei terminali per l'alimentazione di rete

Figura 3. Ligação de terminais para alimentação

Tablo 3. Ana besleme için terminal bağlantıları



### Key

|        |                         |
|--------|-------------------------|
| X axis | frequency p.u.          |
| Y axis | voltage p.u.            |
| 1      | zone A                  |
| 2      | zone B (outside zone A) |
| 3      | rating point            |

### Key

|         |                               |
|---------|-------------------------------|
| x-Achse | Frequenz p.u.                 |
| y-Achse | Spannung p.u.                 |
| 1       | Zone A                        |
| 2       | Zone B (außerhalb von Zone A) |
| 3       | Bewertungspunkt               |

### Clé

|       |                                     |
|-------|-------------------------------------|
| Axe X | fréquence p.u.                      |
| Axe Y | tension p.u.                        |
| 1     | zone A                              |
| 2     | zone B (à l'extérieur de la zone A) |
| 3     | point de mesure                     |

### Clave

|       |                             |
|-------|-----------------------------|
| Eje X | frecuencia p.u.             |
| Eje Y | tensión p.u.                |
| 1     | zona A                      |
| 2     | zona B (fuera de la zona A) |
| 3     | punto nominal               |

### Chiavetta

|        |                                   |
|--------|-----------------------------------|
| Asse X | frequenza p.u.                    |
| Asse Y | tensione p.u.                     |
| 1      | zona A                            |
| 2      | zona B (al di fuori della zona A) |
| 3      | punto di valutazione              |

### Explicação

|        |                         |
|--------|-------------------------|
| Eixo X | frequência p.u.         |
| Eixo Y | tensão p.u.             |
| 1      | zona A                  |
| 2      | zona B (fora da zona A) |
| 3      | ponto de avaliação      |

### Tuş

|         |                       |
|---------|-----------------------|
| X eksen | frekans p.u.          |
| Y eksen | voltaj p.u.           |
| 1       | zon A                 |
| 2       | zon B (zon A dışında) |
| 3       | değerlendirme noktası |

Figure 4. Voltage and frequency deviation in zones A and B

Abb. 4. Spannungs- und Frequenzabweichung in den Zonen A und B

Figure 4. Déviation de tension et de fréquence dans les zones A et B

Figura 4. Desviación de tensión y frecuencia en zonas A y B

Figura 4. Deviazione di tensione e frequenza nelle zone A e B

Figura 4. Desvio de tensão e frequência nas zonas A e B

Tablo 4. Zon A ve B'de voltaj ve frekans sapması

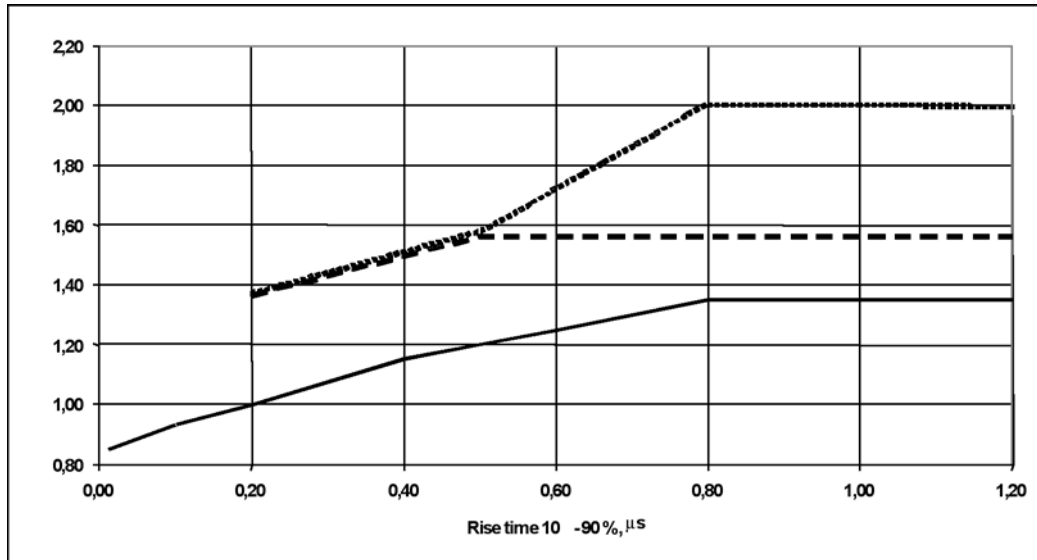


Figure 5. Allowed phase to phase voltage peaks at motor terminals as a function of rise time.

Abb. 5. Zulässige Phase-zu-Phase-Spannungsspitzen an Motorklemmen als Funktion der Anstiegszeit

Figure 5. Pics de tension phase-phase au niveau des bornes du moteur en tant que fonction de temps de hausse.

Figura 5. Picos de tensión permitidos entre fases en los bornes del motor en función del tiempo de incremento.

Figura 5. Picchi di tensione di fase massimi ammessi ai morsetti del motore in funzione del tempo di salita.

Figura 5. Picos de tensão admissíveis entre fases nos terminais do motor em função do tempo de subida.

Şekil 5. Artan zamanın bir işlevi olarak motor terminallerindeki izin verilen fazlar arası gerilim pikleri.

## **Loadability curves with ACS800 converters utilizing DTC control**

### **Belastbarkeitskurven für ACS800-Frequenzumrichter mit DTC-Steuerung**

### **Courbes de capacité de charge avec des convertisseurs ACS800 utilisant la commande DTC**

### **Curvas de capacidad de carga con convertidores ACS800 que utilizan un control DTC**

### **Curve di caricabilità con convertitori ACS800 che utilizzano il controllo DTC**

### **Curvas de capacidade de carga com conversores ACS800 utilizando controle DTC**

### **DTC kontrolüne sahip ACS800 konvertörlerindeki yüklenebilirlik eğrileri**

Loadability with ABB ACS 800/880 converters, DTC control, Flameproof motors Ex d / Ex de T4, frame size 80 - 400 and Dust ignition protection motors Ex t T150°C, frame sizes 71 - 400 / 50Hz

Belastbarkeit mit ABB ACS 800/880-Frequenzumrichtern, DTC-Steuerung, Motoren mit druckfester Kapselung Ex d / Ex de T4, Baugröße 80–400 und Staubexplosionsschutz-Niederspannungsmotoren, Ex t T150 °C, Baugröße 71–400/50 Hz

Capacité de charge avec convertisseurs ABB ACS 800/880, commande DTC, Moteurs antidéflagrants Ex d / Ex de T4, hauteur d'axe 80 - 400 et moteurs pour atmosphères de poussières combustibles Ex t T150 °C, hauteurs d'axe 71 - 400 / 50 Hz

Capacidad de carga con convertidores ACS 800/880 de ABB, control DTC, Motores antideflagrantes Ex d / Ex de T4 con tamaños de carcasa de 80 a 400 y motores con protección contra ignición de polvo Ex t T150 °C con tamaños de carcasa de 71 a 400 / 50 Hz

Caricabilità con convertitori ABB ACS 800/880, controllo DTC, Motori a prova d'esplosione Ex d / Ex de T4 con carcassa 80 - 400 e motori con protezione da polveri combustibili Ex t T150 °C, carcassa serie 71-400 / 50 Hz

Capacidade de carga com conversores ABB ACS 800/880, controle DTC, Motores antideflagrantes Ex d / Ex de T4, tamanho de estrutura 80 - 400, e Motores com proteção contra poeira explosiva Ex t T150 °C, tamanho de estrutura 71 - 400 / 50 Hz

**ABB ACS 800/880 konvertörlerinde yüklenebilirlik, DTC kontrolü, Patlama korumalı motorlar Ex d / Ex de T4, gövde boyutu 80 - 400 ve Toz tutuşma koruması motorları Ex t T150 °C, gövde boyutları 71 - 400 / 50Hz**

Loadability with ABB ACS 800/880 converters, DTC control, Flameproof motors Ex d / Ex de T4, frame size 80 - 400 and Dust ignition protection motors Ex t T150°C, frame sizes 71 - 400 / 60Hz

Belastbarkeit mit ABB ACS 800/880-Frequenzumrichtern, DTC-Steuerung, Motoren mit druckfester Kapselung Ex d / Ex de T4, Baugröße 80–400 und Staubexplosionsschutz-Niederspannungsmotoren Ex t T150 °C, Baugröße 71–400 / 60 Hz

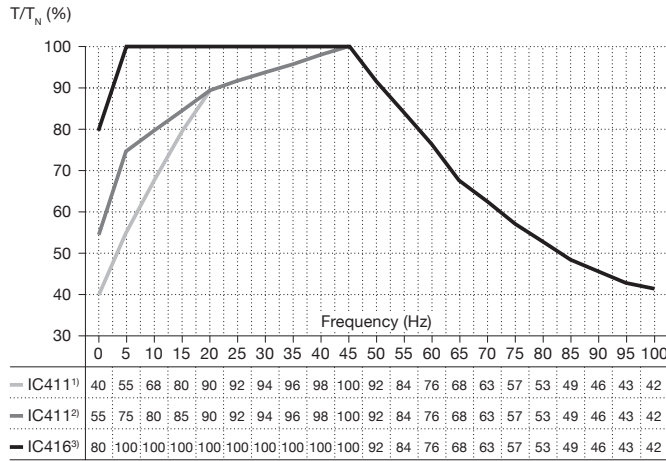
Capacité de charge avec convertisseurs ABB ACS 800/880, commande DTC, Moteurs antidéflagrants Ex d / Ex de T4, hauteur d'axe 80 - 400 et Moteurs pour atmosphères de poussières combustibles Ex t T150 °C, hauteurs d'axe 71 - 400 / 60 Hz

Capacidad de carga con convertidores ACS 800/880 de ABB, control DTC, Motores antideflagrantes Ex d / Ex de T4 con tamaños de carcasa de 80 a 400 y motores con protección contra ignición de polvo Ex t T150 °C con tamaños de carcasa 71 a 400 / 60 Hz

Caricabilità con convertitori ABB ACS 800/880, controllo DTC, Motori a prova d'esplosione Ex d / Ex de T4, carcasse 80 - 400 e Motori con protezione da polveri combustibili Ex t T150 °C, misure carcasse 71 - 400 / 60 Hz

Capacidade de carga com conversores ABB ACS 800/880, controle DTC, Motores com proteção contra poeira explosiva Ex d / Ex de T4, tamanho de estrutura 80 - 400, e Motores com proteção contra poeira explosiva Ex t T150 °C, tamanho de estrutura 71 - 400 / 60 Hz

**ABB ACS 800/880 konvertörlerinde yüklenebilirlik, DTC kontrolü, Patlama korumalı motorlar Ex d / Ex de T4, gövde boyutu 80 - 400 ve Toz tutuşma korumalı motorlar Ex t T150 °C, gövde boyutları 71 - 400 / 60Hz**



- <sup>1)</sup> Self ventilated, IEC frame size 71 - 132  
<sup>2)</sup> Self ventilated, IEC frame size 160 - 400  
<sup>3)</sup> Separate motor cooling (force ventilated), IEC frame size 160 - 400

- <sup>1)</sup> Eigenbelüftet, IEC Baugröße 71–132  
<sup>2)</sup> Eigenbelüftet, IEC Baugröße 160–400  
<sup>3)</sup> Separate Motorkühlung (zwangsbeflüftet), IEC Baugröße 160–400

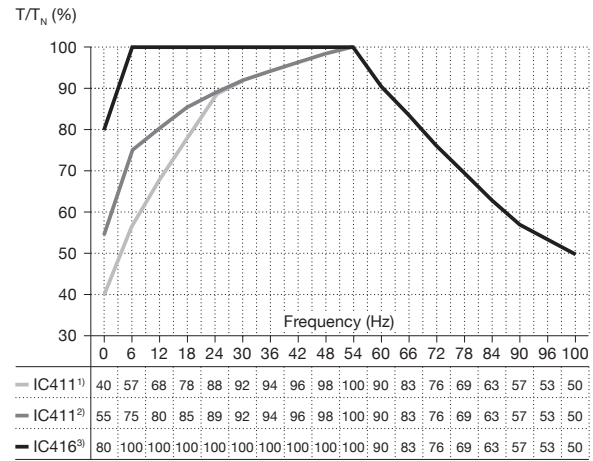
- <sup>1)</sup> Auto-ventilé, hauteur d'axe CEI 71 - 132  
<sup>2)</sup> Auto-ventilé, hauteur d'axe CEI 160 - 400  
<sup>3)</sup> Refroidissement séparé du moteur (ventilation forcée), hauteur d'axe CEI 160 - 400

- <sup>1)</sup> Autoventilado, tamaño de carcasa IEC de 71 a 132  
<sup>2)</sup> Autoventilado, tamaño de carcasa IEC de 160 a 400  
<sup>3)</sup> Refrigeración de motor separada (ventilación forzada), tamaño de carcasa IEC de 160 a 400

- <sup>1)</sup> Ventilazione autonoma, carcassa IEC 71 - 132  
<sup>2)</sup> Ventilazione autonoma, carcassa IEC 160 - 400  
<sup>3)</sup> Raffreddamento del motore separato (ventilazione forzata) carcassa IEC 160 - 400

- <sup>1)</sup> Auto-ventilação, tamanho de estrutura IEC 71 - 132  
<sup>2)</sup> Auto-ventilação, tamanho de estrutura IEC 160 - 400  
<sup>3)</sup> Arrefecimento separado do motor (ventilação forçada), tamanho de estrutura IEC 160 - 400

- <sup>1)</sup> Kendinden soğutmalı, IEC gövde boyutu 71 - 132  
<sup>2)</sup> Kendinden soğutmalı, IEC gövde boyutu 160 - 400  
<sup>3)</sup> Harici soğutmalı (harici güç soğutmalı), IEC gövde boyutu 160 - 400



- <sup>1)</sup> Self ventilated, IEC frame size 71 - 132  
<sup>2)</sup> Self ventilated, IEC frame size 160 - 400  
<sup>3)</sup> Separate motor cooling (force ventilated), IEC frame size 160 - 400

- <sup>1)</sup> Eigenbelüftet, IEC Baugröße 71–132  
<sup>2)</sup> Eigenbelüftet, IEC Baugröße 160–400  
<sup>3)</sup> Separate Motorkühlung (zwangsbeflüftet), IEC Baugröße 160–400

- <sup>1)</sup> Auto-ventilé, hauteur d'axe CEI 71 - 132  
<sup>2)</sup> Auto-ventilé, hauteur d'axe CEI 160 - 400  
<sup>3)</sup> Refroidissement séparé du moteur (ventilation forcée), hauteur d'axe CEI 160 - 400

- <sup>1)</sup> Autoventilado, tamaño de carcasa IEC de 71 a 132  
<sup>2)</sup> Autoventilado, tamaño de carcasa IEC de 160 a 400  
<sup>3)</sup> Refrigeración de motor separada (ventilación forzada), tamaño de carcasa IEC de 160 a 400

- <sup>1)</sup> Ventilazione autonoma, carcassa IEC 71 - 132  
<sup>2)</sup> Ventilazione autonoma, carcassa IEC 160 - 400  
<sup>3)</sup> Raffreddamento del motore separato (ventilazione forzata) carcassa IEC 160 - 400

- <sup>1)</sup> Auto-ventilação, tamanho de estrutura IEC 71 - 132  
<sup>2)</sup> Auto-ventilação, tamanho de estrutura IEC 160 - 400  
<sup>3)</sup> Arrefecimento separado do motor (ventilação forçada), tamanho de estrutura IEC 160 - 400

- <sup>1)</sup> Kendinden soğutmalı, IEC gövde boyutu 71 - 132  
<sup>2)</sup> Kendinden soğutmalı, IEC gövde boyutu 160 - 400  
<sup>3)</sup> Harici soğutmalı (harici güç soğutmalı), IEC gövde boyutu 160 - 400

Figure 6. Flameproof motors Ex d, Ex de T4, cast iron dust ignition protection motors Ex t T150 °C; nominal frequency of motor 50/60 Hz

Abb. 6. Motoren mit druckfester Kapselung Ex d, Ex de T4, Grauguss-Staubexplosionsschutzmotoren Ex t T150 °C; Nennfrequenz des Motors 50/60 Hz

Figure 6. Moteurs à enveloppe antidéflagrante Ex d, Ex de T4, moteurs en fonte pour atmosphères de poussières combustibles Ex t T150 °C ; fréquence nominale du moteur de 50/60 Hz

Figura 6. Motores antideflagrantes Ex d, Ex de T4, motores de hierro fundido a prueba de ignición de polvo Ex t T150 °C; frecuencia nominal del motor 50/60 Hz

Figura 6. Motori a prova d'esplosione Ex d, Ex de T4, motori in ghisa con protezione da polveri combustibili Ex t T150 °C; frequenza nominale del motore 50/60 Hz

Figura 6. Motores antideflagrantes Ex d, Ex de T4, Motores de ferro fundido com protecção contra poeira explosiva Ex t T150 °C; frequência nominal do motor 50/60 Hz

Şekil 6. Patlama korumalı motorlar Ex d, Ex de T4, döküm gövde toz tutuşma korumalı motorlar Ex t T150 °C; motor nominal frekansı 50/60 Hz



Loadability with ABB ACS 800/880 converters, DTC control, Non-sparking motors Ex nA T3, frame size 71 - 450 and Dust ignition protection motors Ex t T125°C, frame sizes 71 - 450 / 50Hz

Belastbarkeit mit ABB ACS 800/880-Frequenzumrichtern, DTC-Steuerung, Nicht funkende Motoren Ex nA T3, Baugröße 71–450 und Staubexplosionsschutzmotoren Ex t T125 °C, Baugröße 71–450/50 Hz

Capacité de charge avec convertisseurs ABB ACS 800/880, commande DTC, Moteurs non producteurs d'étincelles Ex nA T3, hauteur d'axe 71 - 450 et moteurs pour atmosphères de poussières combustibles Ex t T125 °C, hauteurs d'axe 71 - 450 / 50 Hz

Capacidad de carga con convertidores ACS 800/880 de ABB, control DTC, Motores antichispas Ex nA T3 con tamaños de carcasa de 71 a 450 y motores con protección contra ignición de polvo Ex t T125 °C con tamaños de carcasa de 71 a 450 / 50 Hz

Caricabilità con convertitori ABB ACS 800/880, controllo DTC, Motori antiscintilla Ex nA T3, carcassa 71 - 450 e motori con protezione da polveri combustibili Ex t T125 °C, carcassa serie 71-400 / 50 Hz

Capacidade de carga com conversores ABB ACS 800/880, controlo DTC, Motores sem chispas Ex nA T3, tamanho de estrutura 71 - 450, e Motores com protecção contra poeira explosiva Ex t T125 °C, tamanho de estrutura 71 - 450 / 50 Hz

**ABB ACS 800/880 konvertörlerinde yüklenebilirlik, DTC kontrolü, Tutuşma korumalı motorlar Ex nA T3, gövde boyutu 71 - 450 ve Toz tutuşma korumalı motorlar Ex t T125 °C, gövde boyutları 71 - 450 / 50Hz**

Loadability with ABB ACS 800/880 converters, DTC control, Non-sparking motors Ex nA T3, frame size 71 - 450 and Dust ignition protection motors Ex t T125°C, frame sizes 71 - 450 / 60Hz

Belastbarkeit mit ABB ACS 800/880-Frequenzumrichtern, DTC-Steuerung, Nicht funkende Motoren Ex nA T3, Baugröße 71–450 und Staubexplosionsschutzmotoren Ex t T125 °C, Baugröße 71–450/60 Hz

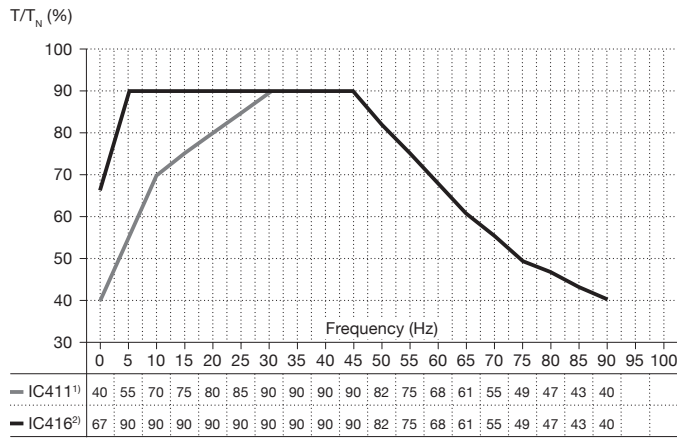
Capacité de charge avec convertisseurs ABB ACS 800/880, commande DTC, Moteurs non producteurs d'étincelles Ex nA T3, hauteur d'axe 71 - 450 et moteurs pour atmosphères de poussières combustibles Ex t T125 °C, hauteurs d'axe 71 - 450 / 60 Hz

Capacidad de carga con convertidores ACS 800/880 de ABB, control DTC, Motores antichispas Ex nA T3 con tamaños de carcasa de 71 a 450 y motores con protección contra ignición de polvo Ex t T125 °C con tamaños de carcasa de 71 a 450 / 60 Hz

Caricabilità con convertitori ABB ACS 800/880, controllo DTC, Motori antiscintilla Ex nA T3, carcassa 71 - 450 e motori con protezione da polveri combustibili Ex t T125 °C, carcassa serie 71-400 / 60 Hz

Capacidade de carga com conversores ABB ACS 800/880, controlo DTC, Motores sem chispas Ex nA T3, tamanho de estrutura 71 - 450, e Motores com protecção contra poeira explosiva Ex t T125 °C, tamanho de estrutura 71 - 450 / 60 Hz

**ABB ACS 800/880 konvertörlerinde yüklenebilirlik, DTC kontrolü, Tutuşma korumalı motorlar Ex nA T3, gövde boyutu 71 - 450 ve Toz tutuşma korumalı motorlar Ex t T125 °C, gövde boyutları 71 - 450 / 60Hz**



<sup>1)</sup> Self ventilated, IEC frame size 71 - 450

<sup>2)</sup> Separate motor cooling (force ventilated)

<sup>1)</sup> Eigenbelüftet, IEC Baugröße 71–450

<sup>2)</sup> Separate Motorkühlung (zwangsbelüftet)

<sup>1)</sup> Auto-ventilé, hauteur d'axe CEI 71 - 450

<sup>2)</sup> Refroidissement séparé du moteur (ventilation forcée)

<sup>1)</sup> Autoventilado, tamaño de carcasa IEC de 71 a 450

<sup>2)</sup> Refrigeración de motor separada (ventilación forzada)

<sup>1)</sup> Ventilazione autonoma, carcassa IEC 71 - 450

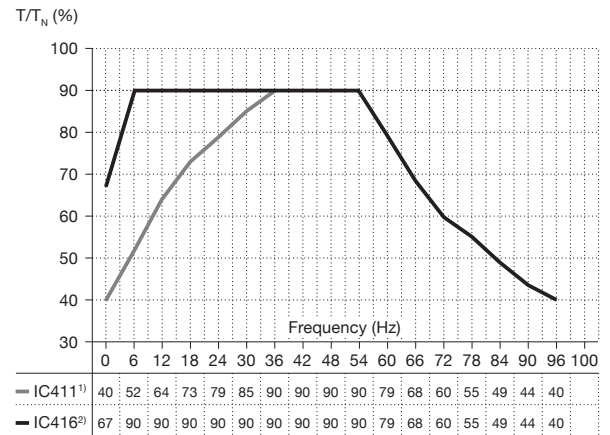
<sup>2)</sup> Raffreddamento del motore separato (ventilazione forzata)

<sup>1)</sup> Auto-ventilação, tamanho de estrutura IEC 71 - 450

<sup>2)</sup> Arrefecimento separado do motor (ventilação forçada)

<sup>1)</sup> Kendinden soğutmalı, IEC gövde boyutu 71 - 450

<sup>2)</sup> Harici soğutmalı (harici güç soğutmalı)



<sup>1)</sup> Self ventilated, IEC frame size 71 - 450

<sup>2)</sup> Separate motor cooling (force ventilated)

<sup>1)</sup> Eigenbelüftet, IEC Baugröße 71–450

<sup>2)</sup> Separate Motorkühlung (zwangsbelüftet)

<sup>1)</sup> Auto-ventilé, hauteur d'axe CEI 71 - 450

<sup>2)</sup> Refroidissement séparé du moteur (ventilation forcée)

<sup>1)</sup> Autoventilado, tamaño de carcasa IEC de 71 a 450

<sup>2)</sup> Refrigeración de motor separada (ventilación forzada)

<sup>1)</sup> Ventilazione autonoma, carcassa IEC 71 - 450

<sup>2)</sup> Raffreddamento del motore separato (ventilazione forzata)

<sup>1)</sup> Auto-ventilação, tamanho de estrutura IEC 71 - 450

<sup>2)</sup> Arrefecimento separado do motor (ventilação forçada)

<sup>1)</sup> Kendinden soğutmalı, IEC gövde boyutu 71 - 450

<sup>2)</sup> Harici soğutmalı (harici güç soğutmalı)

Figure 7. Non-sparking motors Ex nA, cast iron and aluminum dust ignition protection motors Ex t T125 °C; nominal frequency of motor 50/60 Hz

Abb. 7. Nicht funkende Motoren Ex nA, Aluminium- und Grauguss-Staubexplosionsschutzmotoren Ex t T125 °C; Nennfrequenz des Motors 50/60 Hz

Figure 7. Moteurs non producteurs d'étincelles Ex nA, moteurs en fonte et en aluminium pour atmosphères de poussières combustibles Ex t T125 °C ; fréquence nominale du moteur 50/60 Hz

Figura 7. Motores antichispas Ex nA, motores de hierro fundido y aluminio a prueba de ignición de polvo Ex t T125 °C; frecuencia nominal del motor 50/60 Hz

Figura 7. Motori antiscintilla Ex nA, motori in ghisa e alluminio con protezione da polveri combustibili Ex t T125 °C; frequenza nominale del motore 50/60 Hz

Figura 7. Motores sem chispas Ex nA, Motores de ferro fundido com protecção contra poeira explosiva Ex t T125 °C; frequência nominal do motor 50/60 Hz

Şekil 7. Tutuşma korumalı motorlar Ex nA, döküm gövde ve alüminyum toz tutuşma korumalı motorlar Ex t T125 °C; motor nominal frekansı 50/60 Hz

Loadability with ABB ACS 800/880 in scalar control mode and any other PWM voltage-source converters, Flameproof motors Ex d / Ex de T4, frame size 80 - 400 and Dust ignition protection motors Ex t T150°C, frame sizes 71 - 400 / 50Hz

Belastbarkeit mit ABB ACS 800/880 im skalaren Kontrollmodus und jegliche andere spannungsgespeiste PWM-Frequenzumrichter, Motoren mit druckfester Kapselung Ex d / Ex de T4, Baugröße 80–400 und Staubexplosionsschutz-Niederspannungsmotoren Ex t T150 °C, Baugröße 71–400/50 Hz

Capacité de charge avec ABB ACS 800/880 en mode de contrôle scalaire et tous les autres convertisseurs PWM de source de tension, moteurs antidéflagrants Ex d / Ex de T4, hauteur d'axe 80 - 400 et moteurs pour atmosphères de poussières combustibles Ex t T150 °C, hauteurs d'axe 71 - 400 / 50 Hz

Capacidad de carga con convertidores ACS 800/880 de ABB en modo de control escalar y cualquier otro tipo de convertidores de fuente de tensión PWM; motores antideflagrantes Ex d / Ex de T4 con tamaños de carcasa de 80 a 400 y motores con protección contra ignición de polvo Ex t T150 °C con tamaños de carcasa de 71 a 400/50 Hz

Caricabilità con ABB ACS 800/880 in modalità di controllo scalare e qualsiasi altro convertitore di tensione, motori a prova d'esplosione Ex d / Ex de T4 con carcassa 80 - 400 e motori con protezione da polveri combustibili Ex t T150 °C, carcassa 71-400 / 50 Hz

Capacidade de carga com conversores ABB ACS 800/880 em modo de controlo escalar e quaisquer outros conversores de fonte de tensão PWM, Motores antideflagrantes Ex d / Ex de T4, tamanho de estrutura 80 - 400 e Motores com protecção contra poeira explosiva Ex t T150 °C, tamanho de estrutura 71 - 400 / 50 Hz

**ABB ACS 800/880 skalar kontrol modunda ya da diğer PWM gerilim kaynaklı konvertörlerle yüklenebilirlik, Patlama korumalı motorlar Ex d / Ex de T4, gövde boyutu 80 - 400 ve Toz tutuşma korumalı motorlar Ex t T150 °C, gövde boyutları 71 - 400 / 50Hz**

Loadability with ABB ACS 800/880 in scalar control mode and any other PWM voltage-source converters, Flameproof motors Ex d / Ex de T4, frame size 80 - 400 and Dust ignition protection motors Ex t T150°C, frame sizes 71 - 400 / 50Hz

Belastbarkeit mit ABB ACS 800/880 im skalaren Kontrollmodus und jegliche andere spannungsgespeiste PWM-Frequenzumrichter, Motoren mit druckfester Kapselung Ex d / Ex de T4, Baugröße 80–400 und Staubexplosionsschutz-Niederspannungsmotoren Ex t T150 °C, Baugröße 71–400/50 Hz

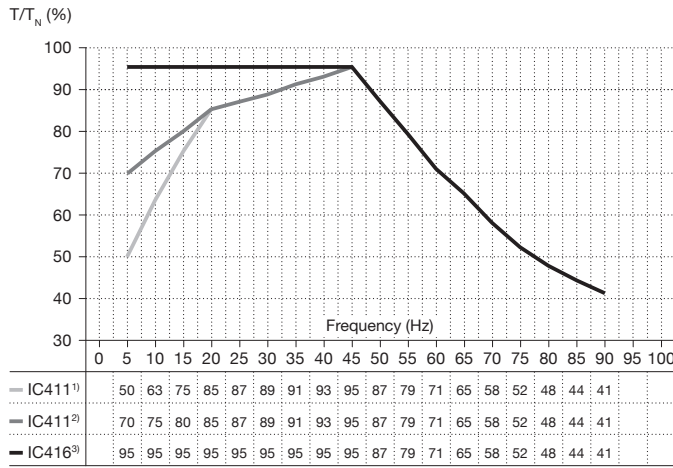
Capacité de charge avec ABB ACS 800/880 en mode de contrôle scalaire et tous les autres convertisseurs PWM de source de tension, moteurs antidéflagrants Ex d / Ex de T4, hauteur d'axe 80 - 400 et moteurs pour atmosphères de poussières combustibles Ex t T150 °C, hauteurs d'axe 71 - 400 / 50 Hz

Capacidad de carga con convertidores ACS 800/880 de ABB en modo de control escalar y cualquier otro tipo de convertidores de fuente de tensión PWM; motores antideflagrantes Ex d / Ex de T4 con tamaños de carcasa de 80 a 400 y motores con protección contra ignición de polvo Ex t T150 °C con tamaños de carcasa de 71 a 400/50 Hz

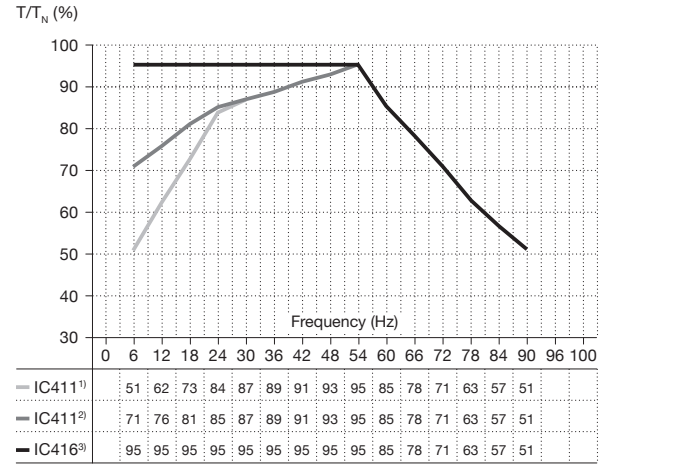
Caricabilità con ABB ACS 800/880 in modalità di controllo scalare e qualsiasi altro convertitore di tensione, motori a prova d'esplosione Ex d / Ex de T4 con carcassa 80 - 400 e motori con protezione da polveri combustibili Ex t T150 °C, carcassa 71-400 / 50 Hz

Capacidade de carga com conversores ABB ACS 800/880 em modo de controlo escalar e quaisquer outros conversores de fonte de tensão PWM, Motores antideflagrantes Ex d / Ex de T4, tamanho de estrutura 80 - 400 e Motores com protecção contra poeira explosiva Ex t T150 °C, tamanho de estrutura 71 - 400 / 50 Hz

**ABB ACS 800/880 skalar kontrol modunda ya da diğer PWM gerilim kaynaklı konvertörlerle yüklenebilirlik, Patlama korumalı motorlar Ex d / Ex de T4, gövde boyutu 80 - 400 ve Toz tutuşma korumalı motorlar Ex t T150 °C, gövde boyutları 71 - 400 / 50Hz**



- <sup>1)</sup> Self ventilated, IEC frame size 71 - 132  
<sup>2)</sup> Self ventilated, IEC frame size 160 - 400  
<sup>3)</sup> Separate motor cooling (force ventilated), IEC frame size 160 - 400
- <sup>1)</sup> Eigenbelüftet, IEC Baugröße 71–132  
<sup>2)</sup> Eigenbelüftet, IEC Baugröße 160–400  
<sup>3)</sup> Separate Motorkühlung (zwangsbelüftet), IEC Baugröße 160–400
- <sup>1)</sup> Auto-ventilé, hauteur d'axe CEI 71 - 132  
<sup>2)</sup> Auto-ventilé, hauteur d'axe CEI 160 - 400  
<sup>3)</sup> Refroidissement séparé du moteur (ventilation forcée), hauteur d'axe CEI 160 - 400
- <sup>1)</sup> Autoventilado, tamaño de carcasa IEC de 71 a 132  
<sup>2)</sup> Autoventilado, tamaño de carcasa IEC de 160 a 400  
<sup>3)</sup> Refrigeración de motor separada (ventilación forzada), tamaño de carcasa IEC de 160 a 400
- <sup>1)</sup> Ventilazione autonoma, carcassa IEC 71 - 132  
<sup>2)</sup> Ventilazione autonoma, carcassa IEC 160 - 400  
<sup>3)</sup> Raffreddamento del motore separato (ventilazione forzata) carcassa IEC 160 - 400
- <sup>1)</sup> Auto-ventilação, tamanho de estrutura IEC 71 - 132  
<sup>2)</sup> Auto-ventilação, tamanho de estrutura IEC 160 - 400  
<sup>3)</sup> Arrefecimento separado do motor (ventilação forçada), tamanho de estrutura IEC 160 - 400
- <sup>1)</sup> Kendinden soğutmalı, IEC gövde boyutu 71 - 132  
<sup>2)</sup> Kendinden soğutmalı, IEC gövde boyutu 160 - 400  
<sup>3)</sup> Harici soğutmalı (harici güç soğutmalı), IEC gövde boyutu 160 - 400



- <sup>1)</sup> Self ventilated, IEC frame size 71 - 132  
<sup>2)</sup> Self ventilated, IEC frame size 160 - 400  
<sup>3)</sup> Separate motor cooling (force ventilated), IEC frame size 160 - 400
- <sup>1)</sup> Eigenbelüftet, IEC Baugröße 71–132  
<sup>2)</sup> Eigenbelüftet, IEC Baugröße 160–400  
<sup>3)</sup> Separate Motorkühlung (zwangsbelüftet), IEC Baugröße 160–400
- <sup>1)</sup> Auto-ventilé, hauteur d'axe CEI 71 - 132  
<sup>2)</sup> Auto-ventilé, hauteur d'axe CEI 160 - 400  
<sup>3)</sup> Refroidissement séparé du moteur (ventilation forcée), hauteur d'axe CEI 160 - 400
- <sup>1)</sup> Autoventilado, tamaño de carcasa IEC de 71 a 132  
<sup>2)</sup> Autoventilado, tamaño de carcasa IEC de 160 a 400  
<sup>3)</sup> Refrigeración de motor separada (ventilación forzada), tamaño de carcasa IEC de 160 a 400
- <sup>1)</sup> Ventilazione autonoma, carcassa IEC 71 - 132  
<sup>2)</sup> Ventilazione autonoma, carcassa IEC 160 - 400  
<sup>3)</sup> Raffreddamento del motore separato (ventilazione forzata) carcassa IEC 160 - 400
- <sup>1)</sup> Auto-ventilação, tamanho de estrutura IEC 71 - 132  
<sup>2)</sup> Auto-ventilação, tamanho de estrutura IEC 160 - 400  
<sup>3)</sup> Arrefecimento separado do motor (ventilação forçada), tamanho de estrutura IEC 160 - 400
- <sup>1)</sup> Kendinden soğutmalı, IEC gövde boyutu 71 - 132  
<sup>2)</sup> Kendinden soğutmalı, IEC gövde boyutu 160 - 400  
<sup>3)</sup> Harici soğutmalı (harici güç soğutmalı), IEC gövde boyutu 160 - 400

Figure 8. Flameproof motors Ex d, Ex de T4, cast iron dust ignition protection motors Ex tD T150°C; nominal frequency of motor 50/60Hz

Abb. 8. Motoren mit druckfester Kapselung Ex d, Ex de T4, Grauguss-Staubexplosionsschutzmotoren Ex tD T150 °C; Nennfrequenz des Motors 50/60 Hz

Figure 8. Moteurs à enveloppe antidéflagrante Ex d, Ex de T4, moteurs en fonte pour atmosphères de poussières combustibles Ex tD T150 °C ; fréquence nominale du moteur de 50/60 Hz

Figura 8. Motores antideflagrantes Ex d, Ex de T4, motores de hierro fundido a prueba de ignición de polvo Ex tD T150 °C; frecuencia nominal del motor 50/60 Hz

Figura 8. Motori a prova d'esplosione Ex d, Ex de T4, motori in ghisa con protezione da polveri combustibili Ex tD T150 °C; frequenza nominale del motore 50/60 Hz

Figura 8. Motores antideflagrantes Ex d, Ex de T4, Motores de ferro fundido com protecção contra poeira explosiva Ex tD T150 °C; frequência nominal do motor 50/60 Hz

Şekil 8. Patlama korumalı motorlar Ex d, Ex de T4, döküm gövde toz tutuşma korumalı motorlar Ex tD T150 °C; motor nominal frekansı 50/60 Hz

Loadability with ABB ACS 800/880 converters, DTC control, Flameproof motors Ex d / Ex de T4, frame size 450 and Dust ignition protection motors Ex t T150°C, frame sizes 450 / 50Hz

Belastbarkeit mit ABB ACS 800/880-Frequenzumrichtern, DTC-Steuerung, Motoren mit druckfester Kapselung Ex d/Ex de T4, Baugröße 450 und Staubexplosionsschutzmotoren Ex t T150 °C, Baugröße 450/50 Hz

Capacité de charge avec convertisseurs ABB ACS 800/880, commande DTC, Moteurs antidéflagrants Ex d / Ex de T4, hauteur d'axe 450 et moteurs pour atmosphères de poussières combustibles Ex t T150 °C, hauteurs d'axe 450 / 50 Hz

Capacidad de carga con convertidores ACS 800/880 de ABB, control DTC, Motores antideflagrantes Ex d/Ex de T4 con tamaños de carcasa de 450 y motores con protección contra ignición de polvo Ex t T150 °C con tamaños de carcasa de 450 / 50 Hz

Caricabilità con convertitori ABB ACS 800/880, controllo DTC, Motori a prova d'esplosione Ex d / Ex de T4 con carcassa 450 e motori con protezione da polveri combustibili Ex t T150 °C, carcassa 450 / 50 Hz

Capacidade de carga com conversores ABB ACS 800/880, controlo DTC, Motores antideflagrantes Ex d / Ex de T4, tamanho de estrutura 450, e Motores com protecção contra poeira explosiva Ex t T150 °C, tamanho de estrutura 450 / 50 Hz

**ABB ACS 800/880 konvertörlerinde yüklenebilirlik, DTC kontrolü, Patlama korumalı motorlar Ex d / Ex de T4, gövde boyutu 450 ve Toz tutuşma korumalı motorlar Ex t T150 °C, gövde boyutları 450 / 50Hz**

Loadability with ABB ACS 800/880 converters, DTC control, Flameproof motors Ex d / Ex de T4, frame size 450 and Dust ignition protection motors Ex t T150°C, frame sizes 450 / 60Hz

Belastbarkeit mit ABB ACS 800/880-Frequenzumrichtern, DTC-Steuerung, Motoren mit druckfester Kapselung Ex d/Ex de T4, Baugröße 450 und Staubexplosionsschutzmotoren Ex t T150 °C, Baugröße 450/60 Hz

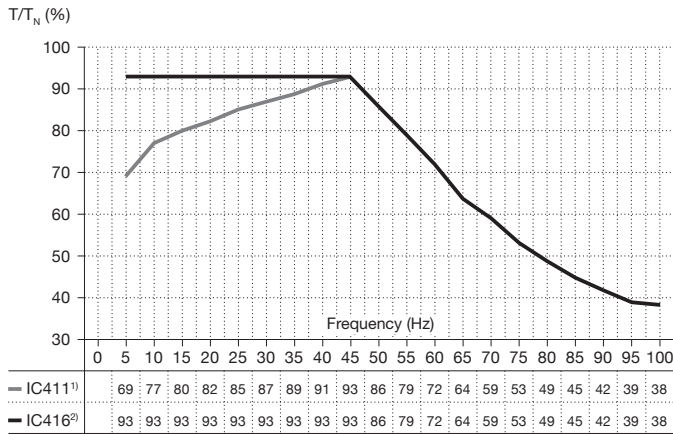
Capacité de charge avec convertisseurs ABB ACS 800/880, commande DTC, Moteurs antidéflagrants Ex d / Ex de T4, hauteur d'axe 450 et moteurs pour atmosphères de poussières combustibles Ex t T150 °C, hauteurs d'axe 450 / 60 Hz

Capacidad de carga con convertidores ACS 800/880 de ABB, control DTC, Motores antideflagrantes Ex d / Ex de T4 con tamaños de carcasa de 450 y motores con protección contra ignición de polvo Ex t T150 °C con tamaños de carcasa de 450 / 60 Hz

Caricabilità con convertitori ABB ACS 800/880, controllo DTC, Motori a prova d'esplosione Ex d / Ex de T4 con carcassa 450 e motori con protezione da polveri combustibili Ex t T150 °C, carcassa 450 / 60 Hz

Capacidade de carga com conversores ABB ACS 800/880, controlo DTC, Motores antideflagrantes Ex d / Ex de T4, tamanho de estrutura 450, e Motores com protecção contra poeira explosiva Ex t T150 °C, tamanho de estrutura 450 / 60 Hz

**ABB ACS 800/880 konvertörlerinde yüklenebilirlik, DTC kontrolü, Patlama korumalı motorlar Ex d / Ex de T4, gövde boyutu 450 ve Toz tutuşma korumalı motorlar Ex t T150 °C, gövde boyutları 450 / 60Hz**



<sup>1)</sup> Self ventilated, IEC frame size 450

<sup>2)</sup> Separate motor cooling (force ventilated)

<sup>1)</sup> Eigenbelüftet, IEC Baugröße 450

<sup>2)</sup> Separate Motorkühlung (zwangsbelüftet)

<sup>1)</sup> Auto-ventilé, hauteur d'axe CEI 450

<sup>2)</sup> Refroidissement séparé du moteur (ventilation forcée)

<sup>1)</sup> Autoventilado, tamaño de carcasa IEC de 450

<sup>2)</sup> Refrigeración de motor separada (ventilación forzada)

<sup>1)</sup> Ventilazione autonoma, carcassa IEC 450

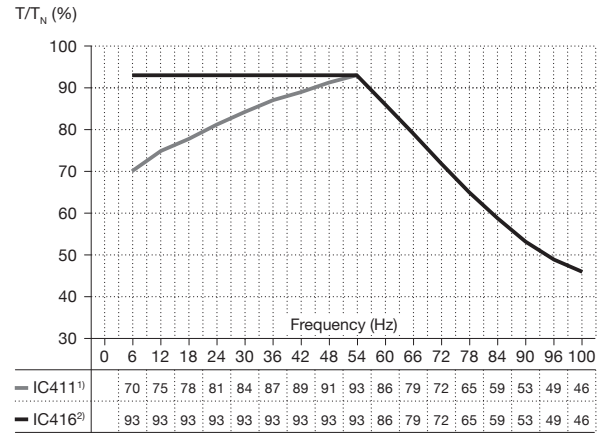
<sup>2)</sup> Raffreddamento del motore separato (ventilazione forzata)

<sup>1)</sup> Auto-ventilação, tamanho de estrutura IEC 450

<sup>2)</sup> Arrefecimento separado do motor (ventilação forçada)

<sup>1)</sup> Kendinden soğutmalı, IEC gövde boyutu 450

<sup>2)</sup> Harici soğutmalı (harici güç soğutmalı)



<sup>1)</sup> Self ventilated, IEC frame size 450

<sup>2)</sup> Separate motor cooling (force ventilated)

<sup>1)</sup> Eigenbelüftet, IEC Baugröße 450

<sup>2)</sup> Separate Motorkühlung (zwangsbelüftet)

<sup>1)</sup> Auto-ventilé, hauteur d'axe CEI 450

<sup>2)</sup> Refroidissement séparé du moteur (ventilation forcée)

<sup>1)</sup> Autoventilado, tamaño de carcasa IEC de 450

<sup>2)</sup> Refrigeración de motor separada (ventilación forzada)

<sup>1)</sup> Ventilazione autonoma, carcassa IEC 450

<sup>2)</sup> Raffreddamento del motore separato (ventilazione forzata)

<sup>1)</sup> Auto-ventilação, tamanho de estrutura IEC 450

<sup>2)</sup> Arrefecimento separado do motor (ventilação forçada)

<sup>1)</sup> Kendinden soğutmalı, IEC gövde boyutu 450

<sup>2)</sup> Harici soğutmalı (harici güç soğutmalı)

Figure 9. Flameproof motors Ex d / Ex de T4, cast iron dust ignition protection motors Ex tD T150°C; nominal frequency of motor 50/60Hz

Abb. 9. Motoren mit druckfester Kapselung Ex d / Ex de T4, Grauguss-Staubexplosionsschutzmotoren Ex tD T150 °C; Nennfrequenz des Motors 50/60 Hz

Figure 9. Moteurs à enveloppe antidéflagrante Ex d / Ex de T4, moteurs en fonte pour atmosphères de poussières combustibles Ex tD T150 °C ; fréquence nominale du moteur de 50/60 Hz

Figura 9. Motores antideflagrantes Ex d / Ex de T4, motores de hierro fundido a prueba de ignición de polvo Ex tD T150 °C; frecuencia nominal del motor 50/60 Hz

Figura 9. Motori a prova d'esplosione Ex d / Ex de T4, motori in ghisa con protezione da polveri combustibili Ex tD T150 °C; frequenza nominale del motore 50/60 Hz

Figura 9. Motores antideflagrantes Ex d / Ex de T4, Motores de ferro fundido com protecção contra poeira explosiva Ex tD T150 °C; frequência nominal do motor 50/60 Hz

Şekil 9. Patlama korumalı motorlar Ex d / Ex de T4, döküm gövde toz tutuşma korumalı motorlar Ex tD T150 °C; motor nominal frekansı 50/60 Hz

## **Guideline loadability curves with ACS550 converters and other voltage source PWM-type converters**

### **Belastbarkeitskurven mit ACS550-Frequenzumrichtern als Richtlinie für spannungsgespeiste PWM-Frequenzumrichter**

### **Courbes de capacité de charge de référence avec convertisseurs ACS550 et d'autres convertisseurs PWM de source de tension**

### **Curvas indicativas de capacidad de carga con convertidores ACS550 y otros convertidores de fuente de tensión de tipo PWM**

### **Linee guida curve di caricabilità con convertitori ACS550 e altri convertitori di tensione tipo PWM.**

### **Curvas de capacidade de carga orientadoras com conversores ACS550 e outros conversores de fonte de tensão PWM**

### **ACS550 konvertörlerinin ve diğer gerilim kaynağı PWM tipi konvertörlerin kılavuz yüklenebilirlik eğrileri**

Loadability with ABB ACS 550 (vector or scalar control) converters, Flameproof motors Ex d / Ex de T4, frame size 80 - 400 and Dust ignition protection motors Ex t T150 °C, frame sizes 71 - 400 / 50Hz

Belastbarkeit mit ABB ACS 550-Frequenzumrichtern (Vektor- oder Skalarontrolle), Motoren mit druckfester Kapselung Ex d / Ex de T4, Baugröße 80–400 und Staubexplosionsschutz-Niederspannungsmotoren Ex t T150 °C, Baugröße 71–400/50 Hz

Capacité de charge avec convertisseurs ABB ACS 550 (contrôle vectoriel ou scalaire), moteurs antidéflagrants Ex d / Ex de T4, hauteur d'axe 80 - 400 et moteurs pour atmosphères de poussières combustibles Ex t T150 °C, hauteurs d'axe 71 - 400 / 50 Hz

Capacidad de carga con convertidores ACS 550 de ABB (control vectorial o escalar), motores antideflagrantes Ex d / Ex de T4 con tamaños de carcasa de 80 a 400 y motores con protección contra ignición de polvo Ex t T150 °C con tamaños de carcasa de 71 a 400 / 50 Hz

Caricabilità con convertitori ABB ACS 550 (controllo vettoriale o scalare), motori a prova d'esplosione Ex d / Ex de T4 con carcassa 80 - 400 e motori con protezione da polveri combustibili Ex t T150 °C, carcassa 71-400 / 50 Hz

Capacidade de carga com conversores ABB ACS 550 (controle vectorial ou escalar), Motores antideflagrantes Ex d / Ex de T4, tamanho de estrutura 80 - 400 e Motores com proteção contra poeira explosiva Ex t T150 °C, tamanho de estrutura 71 - 400 / 50 Hz

**ABB ACS 550 (vektör veya skalar kontrol) konvertörleriyle yüklenebilirlik, Patlama korumalı motorlar Ex d / Ex de T4, gövde boyutu 80 - 400 ve Toz tutuşma korumalı motorlar Ex t T150 °C, gövde boyutları 71 - 400 / 50Hz**

Loadability with ABB ACS 550 (vector or scalar control) converters, Flameproof motors Ex d / Ex de T4, frame size 80 - 400 and Dust ignition protection motors Ex t T150 °C, frame sizes 71 - 400 / 60Hz

Belastbarkeit mit ABB ACS 550-Frequenzumrichtern (Vektor- oder Skalarontrolle), Motoren mit druckfester Kapselung Ex d / Ex de T4, Baugröße 80–400 und Staubexplosionsschutz-Niederspannungsmotoren Ex t T150 °C, Baugröße 71–400/60 Hz

Capacité de charge avec convertisseurs ABB ACS 550 (contrôle vectoriel ou scalaire), moteurs antidéflagrants Ex d / Ex de T4, hauteur d'axe 80 - 400 et moteurs pour atmosphères de poussières combustibles Ex t T150 °C, hauteurs d'axe 71 - 400 / 60 Hz

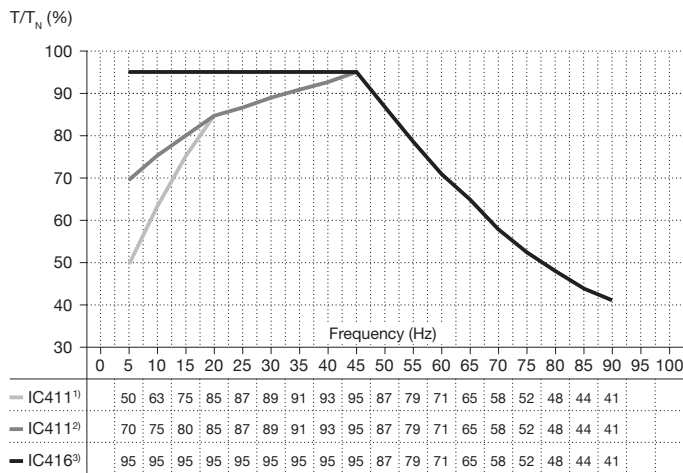
Capacidad de carga con convertidores ACS 550 de ABB (control vectorial o escalar), motores antideflagrantes Ex d / Ex de T4 con tamaños de carcasa de 80 a 400 y motores con protección contra ignición de polvo Ex t T150 °C con tamaños de carcasa de 71 a 400 / 60 Hz

Caricabilità con convertitori ABB ACS 550 (controllo vettoriale o scalare), motori a prova d'esplosione Ex d / Ex de T4 con carcassa 80 - 400 e motori con protezione da polveri combustibili Ex t T150 °C, carcassa 71-400 / 60 Hz

Capacidade de carga com conversores ABB ACS 550 (controle vectorial ou escalar), Motores antideflagrantes Ex d / Ex de T4, tamanho de estrutura 80 - 400 e Motores com proteção contra poeira explosiva Ex t T150 °C, tamanho de estrutura 71 - 400 / 60 Hz

**ABB ACS 550 (vektör veya skalar kontrol) konvertörleriyle yüklenebilirlik, Patlama korumalı motorlar Ex d / Ex de T4, gövde boyutu 80 - 400 ve Toz tutuşma korumalı motorlar Ex t T150 °C, gövde boyutları 71 - 400 / 60Hz**





- <sup>1)</sup> Self ventilated, IEC frame size 71 - 132  
<sup>2)</sup> Self ventilated, IEC frame size 160 - 400  
<sup>3)</sup> Separate motor cooling (force ventilated), IEC frame size 160 - 400

- <sup>1)</sup> Eigenbelüftet, IEC Baugröße 71-132  
<sup>2)</sup> Eigenbelüftet, IEC Baugröße 160-400  
<sup>3)</sup> Separate Motorkühlung (zwangsbelüftet), IEC Baugröße 160-400

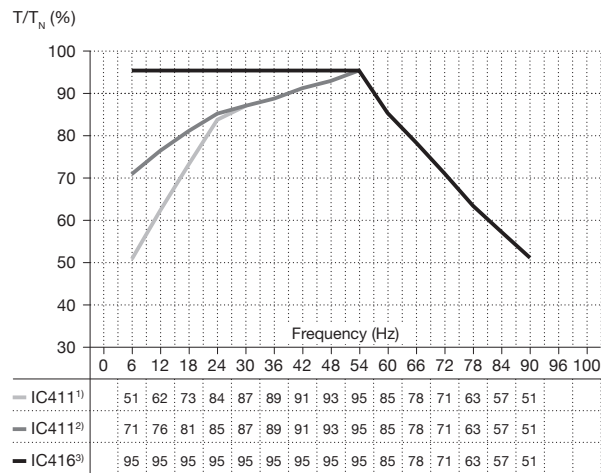
- <sup>1)</sup> Auto-ventilé, hauteur d'axe CEI 71 - 132  
<sup>2)</sup> Auto-ventilé, hauteur d'axe CEI 160 - 400  
<sup>3)</sup> Refroidissement séparé du moteur (ventilation forcée), hauteur d'axe CEI 160 - 400

- <sup>1)</sup> Autoventilado, tamaño de carcasa IEC de 71 a 132  
<sup>2)</sup> Autoventilado, tamaño de carcasa IEC de 160 a 400  
<sup>3)</sup> Refrigeración de motor separada (ventilación forzada), tamaño de carcasa IEC de 160 a 400

- <sup>1)</sup> Ventilazione autonoma, carcassa IEC 71 - 132  
<sup>2)</sup> Ventilazione autonoma, carcassa IEC 160 - 400  
<sup>3)</sup> Raffreddamento del motore separato (ventilazione forzata) carcassa IEC 160 - 400

- <sup>1)</sup> Auto-ventilação, tamanho de estrutura IEC 71 - 132  
<sup>2)</sup> Auto-ventilação, tamanho de estrutura IEC 160 - 400  
<sup>3)</sup> Arrefecimento separado do motor (ventilação forçada), tamanho de estrutura IEC 160 - 400

- <sup>1)</sup> Kendinden soğutmalı, IEC gövde boyutu 71 - 132  
<sup>2)</sup> Kendinden soğutmalı, IEC gövde boyutu 160 - 400  
<sup>3)</sup> Harici soğutmalı (harici güç soğutmalı), IEC gövde boyutu 160 - 400



- <sup>1)</sup> Self ventilated, IEC frame size 71 - 132  
<sup>2)</sup> Self ventilated, IEC frame size 160 - 400  
<sup>3)</sup> Separate motor cooling (force ventilated), IEC frame size 160 - 400

- <sup>1)</sup> Eigenbelüftet, IEC Baugröße 71-132  
<sup>2)</sup> Eigenbelüftet, IEC Baugröße 160-400  
<sup>3)</sup> Separate Motorkühlung (zwangsbelüftet), IEC Baugröße 160-400

- <sup>1)</sup> Auto-ventilé, hauteur d'axe CEI 71 - 132  
<sup>2)</sup> Auto-ventilé, hauteur d'axe CEI 160 - 400  
<sup>3)</sup> Refroidissement séparé du moteur (ventilation forcée), hauteur d'axe CEI 160 - 400

- <sup>1)</sup> Autoventilado, tamaño de carcasa IEC de 71 a 132  
<sup>2)</sup> Autoventilado, tamaño de carcasa IEC de 160 a 400  
<sup>3)</sup> Refrigeración de motor separada (ventilación forzada), tamaño de carcasa IEC de 160 a 400

- <sup>1)</sup> Ventilazione autonoma, carcassa IEC 71 - 132  
<sup>2)</sup> Ventilazione autonoma, carcassa IEC 160 - 400  
<sup>3)</sup> Raffreddamento del motore separato (ventilazione forzata) carcassa IEC 160 - 400

- <sup>1)</sup> Auto-ventilação, tamanho de estrutura IEC 71 - 132  
<sup>2)</sup> Auto-ventilação, tamanho de estrutura IEC 160 - 400  
<sup>3)</sup> Arrefecimento separado do motor (ventilação forçada), tamanho de estrutura IEC 160 - 400

- <sup>1)</sup> Kendinden soğutmalı, IEC gövde boyutu 71 - 132  
<sup>2)</sup> Kendinden soğutmalı, IEC gövde boyutu 160 - 400  
<sup>3)</sup> Harici soğutmalı (harici güç soğutmalı), IEC gövde boyutu 160 - 400

Figure 10. Flameproof motors Ex d, Ex de T4, cast iron dust ignition protection motors Ex t T150 °C; nominal frequency of motor 50/60 Hz

Abb. 10. Motoren mit druckfester Kapselung Ex d, Ex de T4, Grauguss-Staubexplosionsschutzmotoren Ex t T150 °C; Nennfrequenz des Motors 50/60 Hz

Figure 10. Moteurs à enveloppe antidéflagrante Ex d, Ex de T4, moteurs en fonte pour atmosphères de poussières combustibles Ex t T150 °C ; fréquence nominale du moteur de 50/60 Hz

Figura 10. Motores antideflagrantes Ex d, Ex de T4, motores de hierro fundido a prueba de ignición de polvo Ex t T150 °C; frecuencia nominal del motor 50/60 Hz

Figura 10. Motori a prova d'esplosione Ex d, Ex de T4, motori in ghisa con protezione da polveri combustibili Ex t T150 °C; frequenza nominale del motore 50/60 Hz

Figura 10. Motores antideflagrantes Ex d, Ex de T4, Motores de ferro fundido com protecção contra poeira explosiva Ex t T150 °C; frequência nominal do motor 50/60 Hz

Şekil 10. Patlama korumalı motorlar Ex d, Ex de T4, döküm gövde toz tutuşma korumalı motorlar Ex t T150 °C; motor nominal frekansı 50/60 Hz



Loadability with ABB ACS 550 (vector or scalar control) converters, Non-sparking motors Ex nA T3, frame size 71 - 450 and Dust ignition protection motors Ex t T125°C, frame sizes 71 - 450 / 50Hz

Belastbarkeit mit ABB ACS 550-Frequenzumrichtern (Vektor- oder Skalarontrolle), Nicht funkende Motoren Ex nA T3, Baugröße 71–450 und Staubexplosionsschutzmotoren Ex t T125 °C, Baugröße 71–450/50 Hz

Capacité de charge avec convertisseurs ABB ACS 550 (contrôle vectoriel ou scalaire), moteurs non producteurs d'étincelles Ex nA T3, hauteur d'axe 71 - 450 et moteurs pour atmosphères de poussières combustibles Ex t T125 °C, hauteurs d'axe 71 - 450 / 50 Hz

Capacidad de carga con convertidores ACS 550 de ABB (control vectorial o escalar), motores antichispas Ex nA T3 con tamaños de carcasa de 71 a 450 y motores con protección contra ignición de polvo Ex t T125 °C con tamaños de carcasa de 71 a 450 / 50 Hz

Caricabilità con convertitori ABB ACS 550 (controllo vettoriale o scalare), motori antiscintilla Ex nA T3 con carcassa 71 - 450 e motori con protezione da polveri combustibili Ex t T125 °C, carcassa 71-450 / 50 Hz

Capacidade de carga com conversores ABB ACS 550 (controlo vectorial ou escalar), Motores sem chispas Ex nA T3, tamanho de estrutura 71 - 450 e Motores com protecção contra poeira explosiva Ex t T125 °C, tamanho de estrutura 71 - 450 / 50 Hz

**ABB ACS 550 (vektör veya skalar kontrol) konvertörleriyle yüklenebilirlik, Tutuşma korumalı motorlar Ex nA T3, gövde boyutu 71 - 450 ve Toz tutuşma korumalı motorlar Ex t T125 °C, gövde boyutları 71 - 450 / 50Hz**

Loadability with ABB ACS 550 (vector or scalar control) converters, Non-sparking motors Ex nA T3, frame size 71 - 450 and Dust ignition protection motors Ex t T125°C, frame sizes 71 - 450 / 60Hz

Belastbarkeit mit ABB ACS 550-Frequenzumrichtern (Vektor- oder Skalarontrolle), Nicht funkende Motoren Ex nA T3, Baugröße 71–450 und Staubexplosionsschutzmotoren Ex t T125 °C, Baugröße 71–450/60 Hz

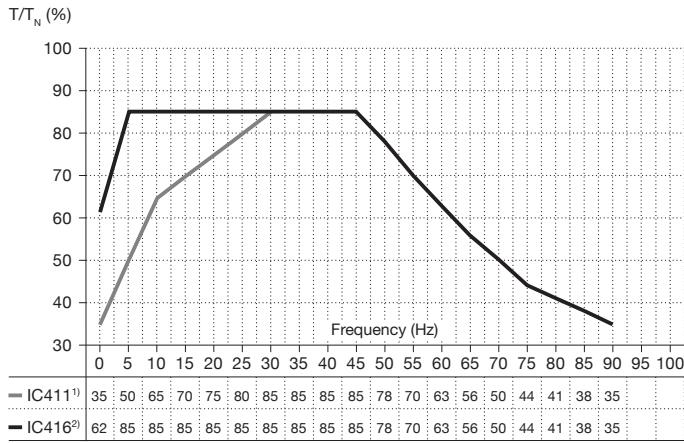
Capacité de charge avec convertisseurs ABB ACS 550 (contrôle vectoriel ou scalaire), moteurs non producteurs d'étincelles Ex nA T3, hauteur d'axe 71 - 450 et moteurs pour atmosphères de poussières combustibles Ex t T125 °C, hauteurs d'axe 71 - 450 / 60 Hz

Capacidad de carga con convertidores ACS 550 de ABB (control vectorial o escalar), motores antichispas Ex nA T3 con tamaños de carcasa de 71 a 450 y motores con protección contra ignición de polvo Ex t T125 °C con tamaños de carcasa de 71 a 450 / 60 Hz

Caricabilità con convertitori ABB ACS 550 (controllo vettoriale o scalare), motori antiscintilla Ex nA T3 con carcassa 71 - 450 e motori con protezione da polveri combustibili Ex t T125 °C, carcassa 71-450 / 60 Hz

Capacidade de carga com conversores ABB ACS 550 (controlo vectorial ou escalar), Motores sem chispas Ex nA T3, tamanho de estrutura 71 - 450 e Motores com protecção contra poeira explosiva Ex t T125 °C, tamanho de estrutura 71 - 450 / 60 Hz

**ABB ACS 550 (vektör veya skalar kontrol) konvertörleriyle yüklenebilirlik, Tutuşma korumalı motorlar Ex nA T3, gövde boyutu 71 - 450 ve Toz tutuşma korumalı motorlar Ex t T125 °C, gövde boyutları 71 - 450 / 60Hz**



<sup>1)</sup> Self ventilated, IEC frame size 71 - 450

<sup>2)</sup> Separate motor cooling (force ventilated)

<sup>1)</sup> Eigenbelüftet, IEC Baugröße 71-450

<sup>2)</sup> Separate Motorkühlung (zwangsbelüftet)

<sup>1)</sup> Auto-ventilé, hauteur d'axe CEI 71 - 450

<sup>2)</sup> Refroidissement séparé du moteur (ventilation forcée)

<sup>1)</sup> Autoventilado, tamaño de carcasa IEC de 71 a 450

<sup>2)</sup> Refrigeración de motor separada (ventilación forzada)

<sup>1)</sup> Ventilazione autonoma, carcassa IEC 71 - 450

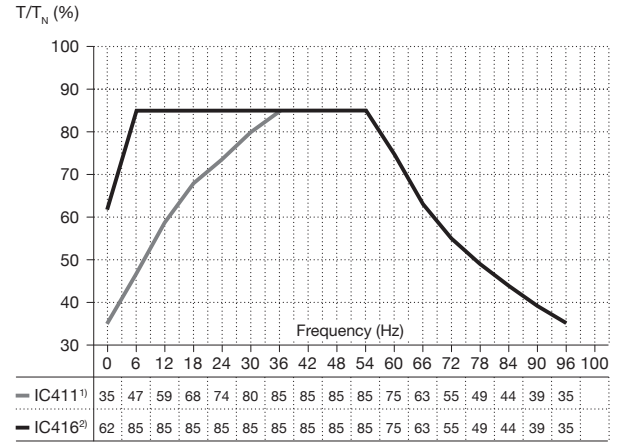
<sup>2)</sup> Raffreddamento del motore separato (ventilazione forzata)

<sup>1)</sup> Auto-ventilação, tamanho de estrutura IEC 71 - 450

<sup>2)</sup> Arrefecimento separado do motor (ventilação forçada)

<sup>1)</sup> Kendinden soğutmalı, IEC gövde boyutu 71 - 450

<sup>2)</sup> Harici soğutmalı (harici güç soğutmalı)



<sup>1)</sup> Self ventilated, IEC frame size 71 - 450

<sup>2)</sup> Separate motor cooling (force ventilated)

<sup>1)</sup> Eigenbelüftet, IEC Baugröße 71-450

<sup>2)</sup> Separate Motorkühlung (zwangsbelüftet)

<sup>1)</sup> Auto-ventilé, hauteur d'axe CEI 71 - 450

<sup>2)</sup> Refroidissement séparé du moteur (ventilation forcée)

<sup>1)</sup> Autoventilado, tamaño de carcasa IEC de 71 a 450

<sup>2)</sup> Refrigeración de motor separada (ventilación forzada)

<sup>1)</sup> Ventilazione autonoma, carcassa IEC 71 - 450

<sup>2)</sup> Raffreddamento del motore separato (ventilazione forzata)

<sup>1)</sup> Auto-ventilação, tamanho de estrutura IEC 71 - 450

<sup>2)</sup> Arrefecimento separado do motor (ventilação forçada)

<sup>1)</sup> Kendinden soğutmalı, IEC gövde boyutu 71 - 450

<sup>2)</sup> Harici soğutmalı (harici güç soğutmalı)

Figure 11. Non-sparking motors Ex nA , cast iron dust ignition protection motors Ex t T125 °C;  
nominal frequency of motor 50/60 Hz

Abb. 11. Nicht funkende Motoren Ex nA, Grauguss-Staubexplosionsschutzmotoren Ex t T125 °C;  
Nennfrequenz des Motors 50/60 Hz

Figure 11. Moteurs non producteurs d'étincelles Ex nA, moteurs en fonte pour atmosphères de poussières  
combustibles Ex t T125 °C ; fréquence nominale du moteur 50/60 Hz

Figura 11. Motores antichispas Ex nA, motores de hierro fundido a prueba de ignición de polvo Ex t T125 °C;  
frecuencia nominal del motor 50/60 Hz

Figura 11. Motori antiscentilla Ex nA, motori in ghisa con protezione da polveri combustibili Ex t T125 °C;  
frequenza nominale del motore 50/60 Hz

Figura 11. Motores sem chispas Ex nA , Motores de ferro fundido com protecção contra poeira explosiva  
Ex t T125 °C; frequência nominal do motor 50/60 Hz

Şekil 11. Tutuşma korumalı motorlar Ex nA, döküm gövde toz tutuşma korumalı motorlar Ex t T125 °C;  
motor nominal frekansı 50/60 Hz

Loadability with ABB ACS 850 converters, DTC control, Non-sparking synchronous reluctance motors Ex nA T3, frame size 160 - 315 and Dust ignition protection synchronous reluctance motors Ex t T125 °C, frame sizes 160 - 315

Belastbarkeit mit ABB ACS 850-Frequenzumrichtern, DTC-Regelung, Nicht funkende Synchron-Reluktanzmotoren Ex nA T3, Baugröße 160–315 und Staubexplosionsschutz-Synchron-Reluktanzmotoren Ex t T125 °C, Baugröße 160–315

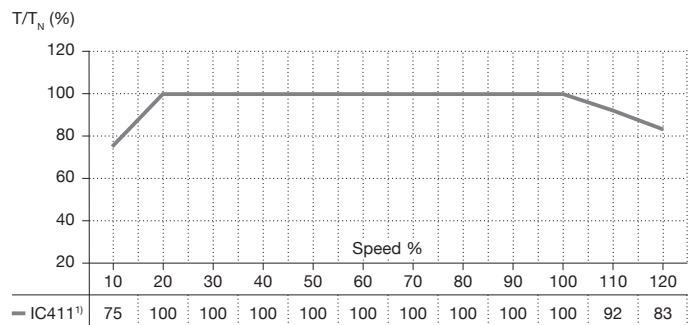
Capacité de charge avec convertisseurs ABB ACS 850, commande DTC, moteurs non producteurs d'étincelles à réluctance synchrone Ex nA T3, hauteur d'axe 160 - 315 et moteurs pour atmosphères de poussières combustibles à réluctance synchrone Ex t T125 °C, hauteurs d'axe 160 - 315

Capacidad de carga con convertidores ACS 850 de ABB, control DTC, motores síncronos de reluctancia antichispas Ex nA T3 con tamaños de carcasa de 160 a 315 y motores con protección contra ignición de polvo Ex t T125 °C con tamaños de carcasa de 160 a 315

Caricabilità con convertitori ABB ACS 850, controllo DTC, motori antiscintilla a riluttanza sincrona Ex aA T3 con carcassa 160 - 315 e motori con protezione da polveri combustibili a riluttanza sincrona Ex t T125 °C, carcassa 160 - 315

Capacidade de carga com conversores ABB ACS 850, controlo DTC, Motores síncronos de relutância sem chispas Ex nA T3, tamanho de estrutura 160 - 315 e Motores síncronos de relutância com protecção contra poeira explosiva Ex t T125 °C, tamanho de estrutura 160 - 315

ABB ACS 850 konvertörleriyle yüklenebilirlik, DTC kontrolü, Tutuşma korumalı senkron relüktans motorlar Ex nA T3, gövde boyutu 160 - 315 ve Toz tutuşma korumalı senkron relüktans motorlar Ex t T125 °C, gövde boyutları 160 - 315



<sup>1)</sup> Self ventilated, IEC frame size 160 - 315

<sup>1)</sup> Eigenbelüftet, IEC Baugröße 160–315

<sup>1)</sup> Auto-ventilé, hauteur d'axe CEI 160 - 315

<sup>1)</sup> Autoventilado, tamaño de carcasa IEC de 160 a 315

<sup>1)</sup> Ventilazione autonoma, carcassa IEC 160 - 315

<sup>1)</sup> Auto-ventilação, tamanho de estrutura IEC 160 - 315

<sup>1)</sup> Kendinden soğutmalı, IEC gövde boyutu 160 - 315

Figure 12. Non-sparking synchronous reluctance motors Ex nA T3, cast iron dust ignition protection synchronous reluctance motors Ex tD T125 °C; nominal frequency of motor 50Hz

Abb. 12. Nicht funkende Synchron-Reluktanzmotoren Ex nA T3, Grauguss-Staubexplosionsschutzmotoren Synchron-Reluktanzmotoren Ex tD T125 °C; Nennfrequenz des Motors 50 Hz

Figure 12. Moteurs non producteurs d'étincelles à réluctance synchrone Ex nA T3, moteurs en fonte pour atmosphères de poussières combustibles à réluctance synchrone Ex tD T125 °C ; fréquence nominale du moteur 50 Hz

Figura 12. Motores síncronos de reluctancia antichispas Ex nA T3, motores síncronos de reluctancia de hierro fundido a prueba de ignición de polvo Ex tD T125 °C; frecuencia nominal del motor 50 Hz

Figura 12. Motori a riluttanza sincrona a prova d'esplosione Ex nA T3, motori a riluttanza sincrona in ghisa con protezione da polveri combustibili Ex tD T125 °C; frequenza nominale del motore 50 Hz

Figura 12. Motores síncronos de relutância sem chispas Ex nA T3, Motores de ferro fundido, síncronos de relutância com protecção contra poeira explosiva Ex tD T125 °C; frequência nominal do motor 50 Hz

Şekil 12. Tutuşma korumalı senkron relüktans motorlar Ex nA T3, döküm gövde toz tutuşma korumalı senkron relüktans motorlar Ex tD T125 °C; motor nominal frekansı 50Hz

|   |    |     |            |             |                 |       |
|---|----|-----|------------|-------------|-----------------|-------|
| ABB Oy, Motors and Generators<br>Vaasa, Finland |    |     |            |             |                 |       |
| CE 0081 IE2                                     |    |     |            | Ex II 2G    |                 |       |
| 3~Motor M3KP 132SMB 2 IMB3/ IM1001              |    |     |            |             |                 |       |
| Ex de II B T4 Gb                                |    |     |            |             |                 | ↔     |
| 500475-10                                       |    |     |            | 2011        | No. 3GF11061082 |       |
|   |    |     |            | Ins.cl. F   |                 | IP 55 |
| V   | Hz | kW  | r/min      | A           | cosφ            | Duty  |
| 690 Y   | 50 | 5.5 | 2905       | 6           | 0.90            | S1    |
| 400 D   | 50 | 5.5 | 2905       | 10.1        | 0.90            | S1    |
| 415 D   | 50 | 5.5 | 2911       | 9.9         | 0.98            | S1    |
| IE2-87.0%(100%)-87.2%(75%)-85.8%(50%)           |    |     |            |             |                 |       |
| Prod. code 3GKP131220-ADH                       |    |     |            |             |                 |       |
| LCIE 10 ATEX 3093 X 7 IECEx LCI 04.0009         |    |     |            |             |                 |       |
| Manual: 3GZF500730-47                           |    |     |            | Nmax        |                 | r/min |
| 6208-2Z/C3                                      |    |     | 6208-2Z/C3 |             | 92 kg           |       |
| ABB   |    |     |            | IEC 60034-1 |                 |       |

Figure 13. Standard rating plate

Abb. 13. Standard-Leistungsschild

Figure 13. Plaque signalétique standard

Figura 13. Placa de características estándar

Figura 13. Targhetta standard

Şekil 13. Standart motor plakası

|  |    |    |     |    |    |  |
|--|----|----|-----|----|----|--|
| CONVERTER SUPPLY                         |    |    |     |    |    |  |
| VALID FOR 400-415 V FWP 50 HZ            |    |    |     |    |    |  |
| 3~Motor M3KP 225SMC 4 IMB3 / IM1001      |    |    |     |    |    |  |
| 3GF1000002                               |    |    |     |    |    |  |
| MIN. SWITCHING FREQ. FRO PWN CONV. 3 kHz |    |    |     |    |    |  |
| IOL= 1.5 x In tol= 10 s tcool= 10 min    |    |    |     |    |    |  |
| Duty S9                                  |    |    |     |    |    |  |
| ACS800 with DTC-CONTROL                  |    |    |     |    |    |  |
| f [Hz]                                   | 5  | 20 | 45  | 50 | 60 |  |
| T/Tn [%]                                 | 75 | 88 | 100 | 90 | 75 |  |
| ACS550                                   |    |    |     |    |    |  |
| f [Hz]                                   | 15 | 20 | 45  | 50 | 60 |  |
| T/Tn [%]                                 | 80 | 83 | 95  | 85 | 70 |  |
| PTC 155C DIN 44081/-82                   |    |    |     |    |    |  |
| ABB IEC 60034-1                          |    |    |     |    |    |  |

Figure 14. Standard VSD plate

Abb. 14. Standard-FU-Schild

Figure 14. Plaque VSD standard

Figura 14. Placa de variador de velocidad estándar

Figura 14. Targhetta VSD standard

Şekil 14. Standart VSD plakası

|                                     |    |    |       |     |     |      |
|-------------------------------------|----|----|-------|-----|-----|------|
| ABB                                 |    |    |       |     |     |      |
| 3~Motor M3KP 315SMA 4 IMB3 / IM1001 |    |    |       |     |     |      |
| No. 3GF1000002                      |    |    |       |     |     |      |
| CONVERTER SUPPLY                    |    |    |       |     |     |      |
| FC Type ACS800 with DTC-CONTROL     |    |    |       |     |     |      |
| Switc.freq. 2 kHz                   |    |    |       |     |     |      |
| FWP 690V 50Hz                       |    |    |       |     |     |      |
| V                                   | HZ | kW | r/min | A   | Nm  | Duty |
| 690 Y                               | 50 | 95 | 1487  | 103 | 610 | S9   |
|                                     |    |    |       |     |     |      |
|                                     |    |    |       |     |     |      |
|                                     |    |    |       |     |     |      |
|                                     |    |    |       |     |     |      |
| QUADRATIC TORQUE: 0 – 1478 r/min    |    |    |       |     |     |      |
|                                     |    |    |       |     |     |      |

Figure 15. Customer specific VSD plate ACS800

Abb. 15. Kundenspezifisches FU-Schild ACS800

Figure 15. Plaque VSD propre au client ACS800

Figura 15. Placa de variador de velocidad ACS800 específica del cliente

Figura 15. Targhetta ACS800 VSD specifica del cliente

Şekil 15. Müşteriye özel VSD plakası ACS800

|                                     |      |      |       |    |     |      |
|-------------------------------------|------|------|-------|----|-----|------|
| ABB                                 |      |      |       |    |     |      |
| 3~Motor M3KP 315SMA 4 IMB3 / IM1001 |      |      |       |    |     |      |
| No. 3GF1000003                      |      |      |       |    |     |      |
| CONVERTER SUPPLY                    |      |      |       |    |     |      |
| FC Type ACS550                      |      |      |       |    |     |      |
| Switc.freq. 3 kHz                   |      |      |       |    |     |      |
| FWP 690V 50Hz                       |      |      |       |    |     |      |
| V                                   | HZ   | kW   | r/min | A  | Nm  | Duty |
| 282 Y                               | 20.4 | 37.9 | 600   | 96 | 600 | S9   |
| 649 Y                               | 47.1 | 88.2 | 1400  | 97 | 600 | S9   |
|                                     |      |      |       |    |     |      |
|                                     |      |      |       |    |     |      |
|                                     |      |      |       |    |     |      |
| QUADRATIC TORQUE: 600 – 1400 r/min  |      |      |       |    |     |      |
| PTC 150 C DIN44081/-82              |      |      |       |    |     |      |
|                                     |      |      |       |    |     |      |

Figure 16. Customer specific VSD plate ACS550 with thermistors for surface protection.

Abb. 16. Kundenspezifisches FU-Schild ACS550 mit Kaltleitern zum Oberflächenschutz.

Figure 16. Plaque VSD propre au client ACS550 avec thermistances pour la protection de surface.

Figura 16. Placa de variador de velocidad ACS550 específica del cliente con termistores para protección de superficie.

Figura 16. Targhetta ACS55 VSD specifica del cliente con termistore per protezione superficiale.

Şekil 16. Yüzey koruması için termistörleri bulunan müşteriye özel VSD plakası ACS550.



# Bizimle iletişime geçin

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Tüm hakları saklıdır

Özellikler, bildirim yapılmaksızın değişikliğe tabidir.

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3GZF500730-47 rev F ML 08-2016

Power and productivity  
for a better world™



EN

# Flexible Connections

L70 – L200 – Texcoat – LTF – R250 – R350 – R450 – PU - PKSR

**BarkerBille fans**



**Revision: 2018-11-23**

**Doc-14-01-EN Flexible connections.docx**



## Content

---

|  |           |
|--|-----------|
| <b>1. Datasheets.....</b>  | <b>3</b>  |
| L70 5.1 .....  | 3         |
| L70 5.2.....   | 3         |
| L70 (Silenced).....  | 4         |
| Texcoat300 .....   | 5         |
| L200 2.1 .....   | 5         |
| L200 2.2.....  | 6         |
| L200 4.2.....  | 6         |
| L200 4.3.....  | 7         |
| L200 (Silenced).....   | 8         |
| LTF140.....  | 9         |
| LTF260.....  | 9         |
| R250 .....   | 10        |
| R350 .....   | 12        |
| R450 .....   | 14        |
| PU .....   | 16        |
| PKSR .....   | 17        |
| <b>2 Storage, handling and mounting instructions .....</b>                     | <b>18</b> |
| <b>3 Installation of flex for flanges (square).....</b>                        | <b>19</b> |
| <b>4 Installation of flex with clamps (round) .....</b>                        | <b>20</b> |
| <b>5 Installation of guide plate and flex for flanges (square).....</b>        | <b>21</b> |
| <b>6 Installation of guide plate and flex for flanges (round) .....</b>        | <b>22</b> |
| <b>7 Installation of heavy flex for flanges (square).....</b>                  | <b>23</b> |
| <b>8 Installation of heavy flex for flanges (round) .....</b>                  | <b>24</b> |
| <b>9 Installation of guide plate and heavy flex for flanges (square).....</b>  | <b>25</b> |
| <b>10 Installation of guide plate and heavy flex for flanges (round) .....</b> | <b>26</b> |

# 1. Datasheets

## L70 5.1

### Material specification for BB-standard materials

| BB-no.: | Type of material : | Date :  | Sign.: |
|---------|--------------------|---------|--------|
| 5.1     | Outside cover      | 19/5-94 | TBC    |

**Description :** Polyester fabric coated on both sides with PVC

|                              |            |           |
|------------------------------|------------|-----------|
| Weight                       | $g/m^2$    | 750       |
| Thickness                    | $mm$       | 0.65      |
| Weave                        |            | Taft, 9/9 |
| Reinforcement                |            | -         |
| Tensile strength warp        | $N/50\ mm$ | 3000      |
| Tensile strength weft        | $N/50\ mm$ | 3000      |
| Finish                       |            | Matt grey |
| Working temperature max./min | $C^\circ$  | +70 / -20 |
| Working pressure max./min    | $KPa$      | +20/-20   |

| Resistance against : | EXCELLENT |   |   |   |   |   | POOR |  |
|----------------------|-----------|---|---|---|---|---|------|--|
|                      | 6         | 5 | 4 | 3 | 2 | 1 |      |  |
| Oils                 | X         |   |   |   |   |   |      |  |
| Solvents             |           | X |   |   |   |   |      |  |
| Dilute acids         |           |   |   | X |   |   |      |  |
| Strong acids         |           |   |   |   |   | X |      |  |
| Flames               |           |   |   |   | X |   |      |  |
| Vibrations           |           | X |   |   |   |   |      |  |
| Weathering           | X         |   |   |   |   |   |      |  |

Notes :

|                                 |
|---------------------------------|
| Flame retardent acc. to BS 3119 |
|---------------------------------|

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## L70 5.2

### Material specification for BB-standard materials

| BB-no.: | Type of material : | Date :  | Sign.: |
|---------|--------------------|---------|--------|
| 5.2     | Outside cover      | 19/5-94 | TBC    |

**Description :** Polyester fabric coated on both sides with PVC

|                              |            |                  |
|------------------------------|------------|------------------|
| Weight                       | $g/m^2$    | 1570             |
| Thickness                    | $mm$       | 1.20             |
| Weave                        |            | 12/12 Panama 2/2 |
| Reinforcement                |            | -                |
| Tensile strength warp        | $N/50\ mm$ | 4830             |
| Tensile strength weft        | $N/50\ mm$ | 4830             |
| Finish                       |            | Black / grey     |
| Working temperature max./min | $C^\circ$  | +70 / -30        |
| Working pressure max./min    | $KPa$      | +20/-20          |

| Resistance against : | EXCELLENT |   |   |   |   |   | POOR |  |
|----------------------|-----------|---|---|---|---|---|------|--|
|                      | 6         | 5 | 4 | 3 | 2 | 1 |      |  |
| Oils                 | X         |   |   |   |   |   |      |  |
| Solvents             |           | X |   |   |   |   |      |  |
| Dilute acids         |           |   |   | X |   |   |      |  |
| Strong acids         |           |   |   |   |   | X |      |  |
| Flames               |           |   |   |   | X |   |      |  |
| Vibrations           |           | X |   |   |   |   |      |  |
| Weathering           | X         |   |   |   |   |   |      |  |

Notes :

|                                 |
|---------------------------------|
| Flame retardent acc. to BS 3119 |
|---------------------------------|

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## L70 (Silenced)

### Material specification for BB-standard materials

| BB-no.: | Type of material : | Date :  | Sign.: |
|---------|--------------------|---------|--------|
| 5.2     | Outside cover      | 19/5-94 | TBC    |

**Description :** Polyester fabric coated on both sides with PVC

|                              |            |                  |
|------------------------------|------------|------------------|
| Weight                       | $g/m^2$    | 1570             |
| Thickness                    | $mm$       | 1.20             |
| Weave                        |            | 12/12 Panama 2/2 |
| Reinforcement                |            | -                |
| Tensile strength warp        | $N/50\ mm$ | 4830             |
| Tensile strength weft        | $N/50\ mm$ | 4830             |
| Finish                       |            | Black / grey     |
| Working temperature max./min | $C^\circ$  | +70 / -30        |
| Working pressure max./min    | $KPa$      | +20/-20          |

| Resistance against : | EXCELLENT |   |   |   |   |   | POOR |
|----------------------|-----------|---|---|---|---|---|------|
|                      | 6         | 5 | 4 | 3 | 2 | 1 |      |
| Oils                 | X         |   |   |   |   |   |      |
| Solvents             |           | X |   |   |   |   |      |
| Dilute acids         |           |   |   | X |   |   |      |
| Strong acids         |           |   |   |   |   | X |      |
| Flames               |           |   |   |   | X |   |      |
| Vibrations           |           | X |   |   |   |   |      |
| Weathering           | X         |   |   |   |   |   |      |

**Notes :**

Flame retardent acc. to BS 3119

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

### Material specification for BB-standard materials

| BB-no.: | Type of material : | Date :  | Sign.: |
|---------|--------------------|---------|--------|
| 10.2    | Inside protection  | 19/5-94 | TBC    |

**Description :** Glass fabric, PU- coated on one side.

|                              |            |                 |
|------------------------------|------------|-----------------|
| Weight                       | $g/m^2$    | 970             |
| Thickness                    | $mm$       | 1.30            |
| Weave                        |            | Cross twill 2/2 |
| Reinforcement                |            | -               |
| Tensile strength warp        | $N/50\ mm$ | 4250            |
| Tensile strength weft        | $N/50\ mm$ | 2500            |
| Finish                       |            | PU, one side    |
| Working temperature max./min | $C^\circ$  | +500/-60        |
| Working pressure max./min    | $KPa$      | +30/-30         |

| Resistance against : | EXCELLENT |   |   |   |   |   | POOR |
|----------------------|-----------|---|---|---|---|---|------|
|                      | 6         | 5 | 4 | 3 | 2 | 1 |      |
| Oils                 | X         |   |   |   |   |   |      |
| Solvents             | X         |   |   |   |   |   |      |
| Dilute acids         |           | X |   |   |   |   |      |
| Strong acids         |           |   |   | X |   |   |      |
| Flames               |           | X |   |   |   |   |      |
| Vibrations           |           | X |   |   |   |   |      |
| Weathering           |           |   | X |   |   |   |      |

**Notes :**

Polyurethane finish with a suspended layer of aluminium powder.

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

### Material specification for BB-standard materials

| BB-no.: | Type of material : | Date :  | Sign.: |
|---------|--------------------|---------|--------|
| 13.1    | Insulation felt    | 19/5-94 | TBC    |

**Description :** Needled glass felt

|                              |            |          |
|------------------------------|------------|----------|
| Weight                       | $g/m^2$    | 2000     |
| Thickness                    | $mm$       | 13,0     |
| Weave                        |            | -        |
| Reinforcement                |            | -        |
| Tensile strength warp        | $N/50\ mm$ | 80       |
| Tensile strength weft        | $N/50\ mm$ | 40       |
| Finish                       |            | -        |
| Working temperature max./min | $C^\circ$  | +500/-60 |
| Working pressure max./min    | $KPa$      | +30/-30  |

| Resistance against : | EXCELLENT |   |   |   |   |   | POOR |
|----------------------|-----------|---|---|---|---|---|------|
|                      | 6         | 5 | 4 | 3 | 2 | 1 |      |
| Oils                 |           | X |   |   |   |   |      |
| Solvents             |           | X |   |   |   |   |      |
| Dilute acids         |           | X |   |   |   |   |      |
| Strong acids         |           |   | X |   |   |   |      |
| Flames               | X         |   |   |   |   |   |      |
| Vibrations           | X         |   |   |   |   |   |      |
| Weathering           |           |   | X |   |   |   |      |

**Notes :**

Low thermal conductivity ( 0.038 W/m K @ 20 °C.)  
Excellent resistance against vibrations.

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## Texcoat300

### Material specification for BB-standard materials

| BB-no.:  | Type of material : | Date :  | Sign.: |
|--|--------------------|---------|--------|
| 6.4  | Outside cover      | 19/5-94 | TBC    |
| <b>Description :</b> Glass fabric coated on both sides with PTFE |                    |         |        |

|                              |                        |          |
|------------------------------|------------------------|----------|
| Weight                       | <i>g/m<sup>2</sup></i> | 645      |
| Thickness                    | <i>mm</i>              | 0.36     |
| Weave                        |                        | Plain    |
| Reinforcement                |                        | -        |
| Tensile strength warp        | <i>N/50 mm</i>         | 2902     |
| Tensile strength weft        | <i>N/50 mm</i>         | 2455     |
| Finish                       |                        | -        |
| Working temperature max./min | <i>C°</i>              | +287/-60 |
| Working pressure max./min    | <i>KPa</i>             | +30/-30  |

| Resistance against : | EXCELLENT |   |   |   |   |   | POOR |  |
|----------------------|-----------|---|---|---|---|---|------|--|
|                      | 6         | 5 | 4 | 3 | 2 | 1 |      |  |
| Oils                 | X         |   |   |   |   |   |      |  |
| Solvents             |           | X |   |   |   |   |      |  |
| Dilute acids         |           | X |   |   |   |   |      |  |
| Strong acids         |           |   | X |   |   |   |      |  |
| Flames               |           |   | X |   |   |   |      |  |
| Vibrations           | X         |   |   |   |   |   |      |  |
| Weathering           | X         |   |   |   |   |   |      |  |

Notes :

|  |
|--|
|  |
|  |
|  |

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## L200 2.1

### Material specification for BB-standard materials

| BB-no.:   | Type of material : | Date :  | Sign.: |
|---|--------------------|---------|--------|
| 2.1   | Outside cover      | 19/5-94 | TBC    |
| <b>Description :</b> Glass fabric coated on both sides with Silicone. |                    |         |        |

|                              |                        |            |
|------------------------------|------------------------|------------|
| Weight                       | <i>g/m<sup>2</sup></i> | 1112       |
| Thickness                    | <i>mm</i>              | 0.79       |
| Weave                        |                        | Plain      |
| Reinforcement                |                        | -          |
| Tensile strength warp        | <i>N/50 mm</i>         | 4465       |
| Tensile strength weft        | <i>N/50 mm</i>         | 4020       |
| Finish                       |                        | White      |
| Working temperature max./min | <i>C°</i>              | +260 / -72 |
| Working pressure max./min    | <i>KPa</i>             | +30/-30    |

| Resistance against : | EXCELLENT |   |   |   |   |   | POOR |  |
|----------------------|-----------|---|---|---|---|---|------|--|
|                      | 6         | 5 | 4 | 3 | 2 | 1 |      |  |
| Oils                 |           |   | X |   |   |   |      |  |
| Solvents             |           |   |   | X |   |   |      |  |
| Dilute acids         |           |   |   |   | X |   |      |  |
| Strong acids         |           |   |   |   |   | X |      |  |
| Flames               |           | X |   |   |   |   |      |  |
| Vibrations           | X         |   |   |   |   |   |      |  |
| Weathering           | X         |   |   |   |   |   |      |  |

Notes :

|                        |
|------------------------|
| Excellent flexibility. |
|                        |
|                        |

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## L200 2.2

### Material specification for BB-standard materials

| BB-no.: | Type of material : | Date :  | Sign.: |
|---------|--------------------|---------|--------|
| 2.2     | Outside cover      | 19/5-94 | TBC    |

**Description :** Glass fabric coated on both sides with Silicone.

|                              |            |             |
|------------------------------|------------|-------------|
| Weight                       | $g/m^2$    | 1250        |
| Thickness                    | $mm$       | 0.97        |
| Weave                        |            | 8-H satin   |
| Reinforcement                |            | -           |
| Tensile strength warp        | $N/50\ mm$ | 8485        |
| Tensile strength weft        | $N/50\ mm$ | 7145        |
| Finish                       |            | Silver grey |
| Working temperature max./min | $C^\circ$  | +260 / -72  |
| Working pressure max./min    | $KPa$      | +30/-30     |

| Resistance against : | EXCELLENT |   |   |   |   | POOR |  |
|----------------------|-----------|---|---|---|---|------|--|
|                      | 6         | 5 | 4 | 3 | 2 | 1    |  |
| Oils                 |           |   | X |   |   |      |  |
| Solvents             |           |   |   | X |   |      |  |
| Dilute acids         |           |   |   |   | X |      |  |
| Strong acids         |           |   |   |   |   | X    |  |
| Flames               | X         |   |   |   |   |      |  |
| Vibrations           | X         |   |   |   |   |      |  |
| Weathering           | X         |   |   |   |   |      |  |

#### Notes :

|  |
|--|
| Meets MIL-STD-7674 specification ( basic requirements for welding blankets ) - <b>Flame retarding</b> : flame out less 5 sec. - flame glow less 10 sec. - char length less 1 cm. |
|--|

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## L200 4.2

### Material specification for BB-standard materials

| BB-no.: | Type of material : | Date :  | Sign.: |
|---------|--------------------|---------|--------|
| 4.2     | Outside cover      | 19/5-94 | TBC    |

**Description :** Glass fabric coated with aluminium foil.

|                              |            |                 |
|------------------------------|------------|-----------------|
| Weight                       | $g/m^2$    | 450             |
| Thickness                    | $mm$       | 0.45            |
| Weave                        |            | Cross twill 1/3 |
| Reinforcement                |            | -               |
| Tensile strength warp        | $N/50\ mm$ | 4000            |
| Tensile strength weft        | $N/50\ mm$ | 2500            |
| Finish                       |            | Aluminium       |
| Working temperature max./min | $C^\circ$  | +250 / -50      |
| Working pressure max./min    | $KPa$      | +20/-20         |

| Resistance against : | EXCELLENT |   |   |   |   | POOR |  |
|----------------------|-----------|---|---|---|---|------|--|
|                      | 6         | 5 | 4 | 3 | 2 | 1    |  |
| Oils                 |           | X |   |   |   |      |  |
| Solvents             |           |   | X |   |   |      |  |
| Dilute acids         |           |   |   | X |   |      |  |
| Strong acids         |           |   |   |   |   | X    |  |
| Flames               |           |   | X |   |   |      |  |
| Vibrations           |           | X |   |   |   |      |  |
| Weathering           | X         |   |   |   |   |      |  |

#### Notes :

|   |
|---|
| Aluminium powder is applied in a heat process.            |
| High capacity for reflecting radiated heat, max. 1000° C. |

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## L200 4.3

### Material specification for BB-standard materials

|   |                    |         |        |
|---|--------------------|---------|--------|
| BB-no.:   | Type of material : | Date :  | Sign.: |
| 4.3   | Outside cover      | 19/5-94 | TBC    |
| Description : Glass fabric coated with aluminium and polyester foil |                    |         |        |

|                              |             |                |
|------------------------------|-------------|----------------|
| Weight                       | $g/m^2$     | 650            |
| Thickness                    | $mm$        | 0.70           |
| Weave                        |             | Satin 1/7      |
| Reinforcement                |             | -              |
| Tensile strength warp        | $N/50\ mm$  | 7050           |
| Tensile strength weft        | $N/50\ mm$  | 6600           |
| Finish                       |             | Aluminium/grey |
| Working temperature max./min | $^{\circ}C$ | +170 / -50     |
| Working pressure max./min    | $KPa$       | +20/-20        |

| Resistance against : | EXCELLENT |   |   |   |   |   | POOR |  |
|----------------------|-----------|---|---|---|---|---|------|--|
|                      | 6         | 5 | 4 | 3 | 2 | 1 |      |  |
| Oils                 | X         |   |   |   |   |   |      |  |
| Solvents             |           | X |   |   |   |   |      |  |
| Dilute acids         |           |   |   | X |   |   |      |  |
| Strong acids         |           |   |   |   |   | X |      |  |
| Flames               |           |   |   | X |   |   |      |  |
| Vibrations           |           | X |   |   |   |   |      |  |
| Weathering           | X         |   |   |   |   |   |      |  |

#### Notes :

|  |
|--|
| Polyester foil with an aluminium vapour coating applied on one side, other side is coated with polyurethane. |
|  |

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## L200 (Silenced)

### Material specification for BB-standard materials

| BB-no.: | Type of material : | Date :  | Sign.: |
|---------|--------------------|---------|--------|
| 2.2     | Outside cover      | 19/5-94 | TBC    |

**Description :** Glass fabric coated on both sides with Silicone.

|                              |                  |             |
|------------------------------|------------------|-------------|
| Weight                       | g/m <sup>2</sup> | 1250        |
| Thickness                    | mm               | 0.97        |
| Weave                        |                  | 8-H satin   |
| Reinforcement                |                  | -           |
| Tensile strength warp        | N/50 mm          | 8485        |
| Tensile strength weft        | N/50 mm          | 7145        |
| Finish                       |                  | Silver grey |
| Working temperature max./min | C°               | +260 / -72  |
| Working pressure max./min    | KPa              | +30/-30     |

| Resistance against : | EXCELLENT |   |   |   |   |   | POOR |
|----------------------|-----------|---|---|---|---|---|------|
|                      | 6         | 5 | 4 | 3 | 2 | 1 |      |
| Oils                 |           |   | X |   |   |   |      |
| Solvents             |           |   |   | X |   |   |      |
| Dilute acids         |           |   |   |   | X |   |      |
| Strong acids         |           |   |   |   |   | X |      |
| Flames               | X         |   |   |   |   |   |      |
| Vibrations           | X         |   |   |   |   |   |      |
| Weathering           | X         |   |   |   |   |   |      |

#### Notes :

|  |
|--|
| Meets MIL-STD-7674 specification ( basic requirements for welding blankets ) - <b>Flame retarding</b> : flame out less 5 sec. - flame glow less 10 sec. - char length less 1 cm. |
|--|

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

### Material specification for BB-standard materials

| BB-no.: | Type of material : | Date :  | Sign.: |
|---------|--------------------|---------|--------|
| 10.2    | Inside protection  | 19/5-94 | TBC    |

**Description :** Glass fabric, PU- coated on one side.

|                              |                  |                 |
|------------------------------|------------------|-----------------|
| Weight                       | g/m <sup>2</sup> | 970             |
| Thickness                    | mm               | 1.30            |
| Weave                        |                  | Cross twill 2/2 |
| Reinforcement                |                  | -               |
| Tensile strength warp        | N/50 mm          | 4250            |
| Tensile strength weft        | N/50 mm          | 2500            |
| Finish                       |                  | PU, one side    |
| Working temperature max./min | C°               | +500/-60        |
| Working pressure max./min    | KPa              | +30/-30         |

| Resistance against : | EXCELLENT |   |   |   |   |   | POOR |
|----------------------|-----------|---|---|---|---|---|------|
|                      | 6         | 5 | 4 | 3 | 2 | 1 |      |
| Oils                 | X         |   |   |   |   |   |      |
| Solvents             | X         |   |   |   |   |   |      |
| Dilute acids         |           | X |   |   |   |   |      |
| Strong acids         |           |   |   | X |   |   |      |
| Flames               |           | X |   |   |   |   |      |
| Vibrations           |           | X |   |   |   |   |      |
| Weathering           |           |   | X |   |   |   |      |

#### Notes :

|   |
|---|
| Polyurethane finish with a suspended layer of aluminium powder. |
|---|

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

### Material specification for BB-standard materials

| BB-no.: | Type of material : | Date :  | Sign.: |
|---------|--------------------|---------|--------|
| 13.1    | Insulation felt    | 19/5-94 | TBC    |

**Description :** Needled glass felt

|                              |                  |          |
|------------------------------|------------------|----------|
| Weight                       | g/m <sup>2</sup> | 2000     |
| Thickness                    | mm               | 13,0     |
| Weave                        |                  | -        |
| Reinforcement                |                  | -        |
| Tensile strength warp        | N/50 mm          | 80       |
| Tensile strength weft        | N/50 mm          | 40       |
| Finish                       |                  | -        |
| Working temperature max./min | C°               | +500/-60 |
| Working pressure max./min    | KPa              | +30/-30  |

| Resistance against : | EXCELLENT |   |   |   |   |   | POOR |
|----------------------|-----------|---|---|---|---|---|------|
|                      | 6         | 5 | 4 | 3 | 2 | 1 |      |
| Oils                 |           | X |   |   |   |   |      |
| Solvents             |           | X |   |   |   |   |      |
| Dilute acids         |           | X |   |   |   |   |      |
| Strong acids         |           |   | X |   |   |   |      |
| Flames               | X         |   |   |   |   |   |      |
| Vibrations           | X         |   |   |   |   |   |      |
| Weathering           |           |   | X |   |   |   |      |

#### Notes :

|  |
|--|
| Low thermal conductivity ( 0.038 W/m K @ 20 °C.) |
| Excellent resistance against vibrations.         |

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## LTF140

### Material specification for BB-standard materials

| BB-no.: | Type of material : | Date :  | Sign.: |
|---------|--------------------|---------|--------|
| 3.4     | Outside cover      | 19/5-94 | TBC    |

**Description :** Rubber plate in 4 mm EPDM with reinforcement.

|                              |                  |                      |
|------------------------------|------------------|----------------------|
| Weight                       | g/m <sup>2</sup> | 4600                 |
| Thickness                    | mm               | 4.00                 |
| Weave                        |                  | -                    |
| Reinforcement                |                  | 2 plies glass fabric |
| Tensile strength warp        | N/50 mm          | 4450                 |
| Tensile strength weft        | N/50 mm          | 4450                 |
| Finish                       |                  | Black                |
| Working temperature max./min | C°               | +140 / -50           |
| Working pressure max./min    | KPa              | +30/-30              |

| Resistance against : | EXCELLENT |   |   |   |   |   | POOR |
|----------------------|-----------|---|---|---|---|---|------|
|                      | 6         | 5 | 4 | 3 | 2 | 1 |      |
| Oils                 |           |   | X |   |   |   |      |
| Solvents             |           |   | X |   |   |   |      |
| Dilute acids         |           |   | X |   |   |   |      |
| Strong acids         |           |   |   |   | X |   |      |
| Flames               |           |   |   |   | X |   |      |
| Vibrations           | X         |   |   |   |   |   |      |
| Weathering           | X         |   |   |   |   |   |      |

#### Notes :

|                            |
|----------------------------|
| Hardness : 50 ± 5 Shore A. |
|----------------------------|

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## LTF260

### Material specification for BB-standard materials

| BB-no.: | Type of material :          | Date :  | Sign.: |
|---------|-----------------------------|---------|--------|
| 6.6     | Outside cover/chem. barrier | 19/5-99 | TBC    |

**Description :** Glass fabric coated and laminated with PTFE

|                              |                  |                    |
|------------------------------|------------------|--------------------|
| Weight                       | g/m <sup>2</sup> | 1526               |
| Thickness                    | mm               | 0.94               |
| Weave                        |                  | Plain              |
| Reinforcement                |                  | -                  |
| Tensile strength warp        | N/50 mm          | 6256               |
| Tensile strength weft        | N/50 mm          | 6256               |
| Finish                       |                  | Laminated one side |
| Working temperature max./min | C°               | +315/-60           |
| Working pressure max./min    | KPa              | +30/-30            |

| Resistance against : | EXCELLENT |   |   |   |   |   | POOR |
|----------------------|-----------|---|---|---|---|---|------|
|                      | 6         | 5 | 4 | 3 | 2 | 1 |      |
| Oils                 | X         |   |   |   |   |   |      |
| Solvents             | X         |   |   |   |   |   |      |
| Dilute acids         | X         |   |   |   |   |   |      |
| Strong acids         | X         |   |   |   |   |   |      |
| Flames               |           |   | X |   |   |   |      |
| Vibrations           | X         |   |   |   |   |   |      |
| Weathering           | X         |   |   |   |   |   |      |

#### Notes :

|   |
|---|
| Glass fabric coated on both sides with PTFE and laminated on one side with a 0.23 mm thick PTFE-film. |
| (7-7)   |

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

### Material specification for BB-standard materials

| BB-no.: | Type of material : | Date :  | Sign.: |
|---------|--------------------|---------|--------|
| 10.2    | Inside protection  | 19/5-94 | TBC    |

**Description :** Glass fabric, PU- coated on one side.

|                              |                  |                 |
|------------------------------|------------------|-----------------|
| Weight                       | g/m <sup>2</sup> | 970             |
| Thickness                    | mm               | 1.30            |
| Weave                        |                  | Cross twill 2/2 |
| Reinforcement                |                  | -               |
| Tensile strength warp        | N/50 mm          | 4250            |
| Tensile strength weft        | N/50 mm          | 2500            |
| Finish                       |                  | PU, one side    |
| Working temperature max./min | C°               | +500/-60        |
| Working pressure max./min    | KPa              | +30/-30         |

| Resistance against : | EXCELLENT |   |   |   |   |   | POOR |
|----------------------|-----------|---|---|---|---|---|------|
|                      | 6         | 5 | 4 | 3 | 2 | 1 |      |
| Oils                 | X         |   |   |   |   |   |      |
| Solvents             | X         |   |   |   |   |   |      |
| Dilute acids         |           | X |   |   |   |   |      |
| Strong acids         |           |   |   | X |   |   |      |
| Flames               |           | X |   |   |   |   |      |
| Vibrations           |           | X |   |   |   |   |      |
| Weathering           |           |   | X |   |   |   |      |

#### Notes :

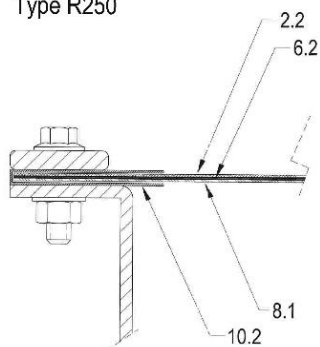
|   |
|---|
| Polyurethane finish with a suspended layer of aluminium powder. |
|---|

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.



## R250

Type R250



### Material specification for BB-standard materials

| BB-no.: | Type of material : | Date :  | Sign.: |
|---------|--------------------|---------|--------|
| 2.2     | Outside cover      | 19/5-94 | TBC    |

**Description :** Glass fabric coated on both sides with Silicone.

|                              |                  |             |
|------------------------------|------------------|-------------|
| Weight                       | g/m <sup>2</sup> | 1250        |
| Thickness                    | mm               | 0.97        |
| Weave                        |                  | 8-H satin   |
| Reinforcement                |                  | -           |
| Tensile strength warp        | N/50 mm          | 8485        |
| Tensile strength weft        | N/50 mm          | 7145        |
| Finish                       |                  | Silver grey |
| Working temperature max./min | C°               | +260 / -72  |
| Working pressure max./min    | KPa              | +30/-30     |

| Resistance against : | EXCELLENT | 5 | 4 | 3 | 2 | POOR |
|----------------------|-----------|---|---|---|---|------|
| Oils                 |           |   | X |   |   |      |
| Solvents             |           |   |   | X |   |      |
| Dilute acids         |           |   |   |   | X |      |
| Strong acids         |           |   |   |   |   | X    |
| Flames               | X         |   |   |   |   |      |
| Vibrations           | X         |   |   |   |   |      |
| Weathering           | X         |   |   |   |   |      |

#### Notes :

|  |
|--|
| Meets MIL-STD-7674 specification ( basic requirements for welding blankets ) - <b>Flame retarding</b> : flame out less 5 sec. - flame glow less 10 sec. - char length less 1 cm. |
|--|

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

### Material specification for BB-standard materials

| BB-no.: | Type of material : | Date :  | Sign.: |
|---------|--------------------|---------|--------|
| 6.2     | Chemical barrier   | 19/5-99 | TBC    |

**Description :** PTFE - foil

|                              |                  |           |
|------------------------------|------------------|-----------|
| Weight                       | g/m <sup>2</sup> | 535       |
| Thickness                    | mm               | 0.25      |
| Weave                        |                  | -         |
| Reinforcement                |                  | -         |
| Tensile strength warp        | N/50 mm          | 375       |
| Tensile strength weft        | N/50 mm          | 375       |
| Finish                       |                  | -         |
| Working temperature max./min | C°               | +260/-120 |
| Working pressure max./min    | KPa              | +20/-20   |

| Resistance against : | EXCELLENT | 5 | 4 | 3 | 2 | POOR |
|----------------------|-----------|---|---|---|---|------|
| Oils                 | X         |   |   |   |   |      |
| Solvents             | X         |   |   |   |   |      |
| Dilute acids         | X         |   |   |   |   |      |
| Strong acids         | X         |   |   |   |   |      |
| Flames               |           |   |   |   | X |      |
| Vibrations           | X         |   |   |   |   |      |
| Weathering           | X         |   |   |   |   |      |

#### Notes :

|  |
|--|
|  |
|  |
|  |

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## Material specification for BB-standard materials

| BB-no.:   | Type of material : | Date :  | Sign.: |
|---|--------------------|---------|--------|
| 8.1   | Inside protection  | 19/5-94 | TBC    |
| <b>Description :</b> Glass fabric, Reinforced with SS-wire. |                    |         |        |

|                              |                  |                |
|------------------------------|------------------|----------------|
| Weight                       | g/m <sup>2</sup> | 1190           |
| Thickness                    | mm               | 1.60           |
| Weave                        |                  | Leinwand dobb. |
| Reinforcement                |                  | AISI 316       |
| Tensile strength warp        | N/50 mm          | 3000           |
| Tensile strength weft        | N/50 mm          | 2500           |
| Finish                       |                  | Natural        |
| Working temperature max./min | C°               | +650/-60       |
| Working pressure max./min    | KPa              | +30/-30        |

| Resistance against : | EXCELLENT |   |   |   |   |   | POOR |
|----------------------|-----------|---|---|---|---|---|------|
|                      | 6         | 5 | 4 | 3 | 2 | 1 |      |
| Oils                 | X         |   |   |   |   |   |      |
| Solvents             | X         |   |   |   |   |   |      |
| Dilute acids         |           | X |   |   |   |   |      |
| Strong acids         |           |   | X |   |   |   |      |
| Flames               | X         |   |   |   |   |   |      |
| Vibrations           | X         |   |   |   |   |   |      |
| Weathering           |           |   | X |   |   |   |      |

### Notes :

|   |
|---|
| Reinforced by a AISI 316 thread in each yarn,<br>which gives a high tensile strength. |
|---|

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## Material specification for BB-standard materials

| BB-no.:  | Type of material : | Date :  | Sign.: |
|--|--------------------|---------|--------|
| 10.2   | Inside protection  | 19/5-94 | TBC    |
| <b>Description :</b> Glass fabric, PU- coated on one side. |                    |         |        |

|                              |                  |                 |
|------------------------------|------------------|-----------------|
| Weight                       | g/m <sup>2</sup> | 970             |
| Thickness                    | mm               | 1.30            |
| Weave                        |                  | Cross twill 2/2 |
| Reinforcement                |                  | -               |
| Tensile strength warp        | N/50 mm          | 4250            |
| Tensile strength weft        | N/50 mm          | 2500            |
| Finish                       |                  | PU, one side    |
| Working temperature max./min | C°               | +500/-60        |
| Working pressure max./min    | KPa              | +30/-30         |

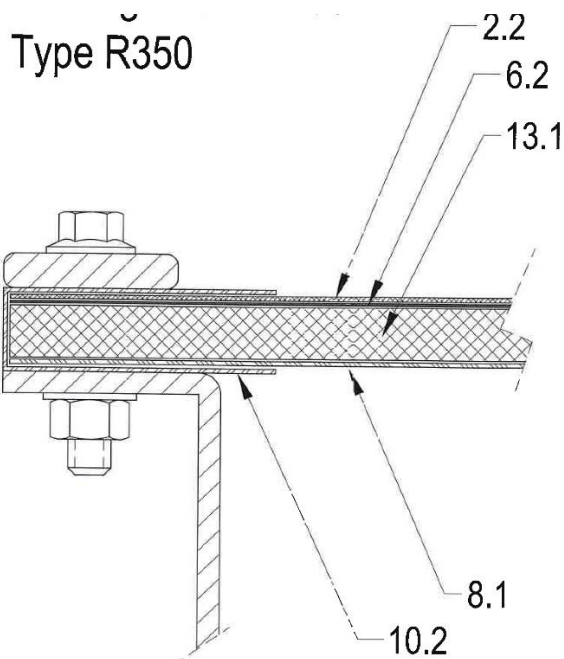
| Resistance against : | EXCELLENT |   |   |   |   |   | POOR |
|----------------------|-----------|---|---|---|---|---|------|
|                      | 6         | 5 | 4 | 3 | 2 | 1 |      |
| Oils                 | X         |   |   |   |   |   |      |
| Solvents             | X         |   |   |   |   |   |      |
| Dilute acids         |           | X |   |   |   |   |      |
| Strong acids         |           |   |   | X |   |   |      |
| Flames               |           | X |   |   |   |   |      |
| Vibrations           |           | X |   |   |   |   |      |
| Weathering           |           |   | X |   |   |   |      |

### Notes :

|  |
|--|
| Polyurethane finish with a suspended layer<br>of aluminium powder. |
|--|

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## R350



### Material specification for BB-standard materials

| BB-no.: | Type of material : | Date :  | Sign.: |
|---------|--------------------|---------|--------|
| 2.2     | Outside cover      | 19/5-94 | TBC    |

Description : Glass fabric coated on both sides with Silicone.

|                              |                  |             |
|------------------------------|------------------|-------------|
| Weight                       | g/m <sup>2</sup> | 1250        |
| Thickness                    | mm               | 0.97        |
| Weave                        |                  | 8-H satin   |
| Reinforcement                |                  | -           |
| Tensile strength warp        | N/50 mm          | 8485        |
| Tensile strength weft        | N/50 mm          | 7145        |
| Finish                       |                  | Silver grey |
| Working temperature max./min | C°               | +260 / -72  |
| Working pressure max./min    | KPa              | +30/-30     |

| Resistance against : | EXCELLENT | 6 | 5 | 4 | 3 | 2 | POOR | 1 |
|----------------------|-----------|---|---|---|---|---|------|---|
| Oils                 |           |   |   | X |   |   |      |   |
| Solvents             |           |   |   |   | X |   |      |   |
| Dilute acids         |           |   |   |   |   | X |      |   |
| Strong acids         |           |   |   |   |   |   | X    |   |
| Flames               | X         |   |   |   |   |   |      |   |
| Vibrations           | X         |   |   |   |   |   |      |   |
| Weathering           | X         |   |   |   |   |   |      |   |

#### Notes :

Meets MIL-STD-7674 specification ( basic requirements for welding blankets ) - **Flame retarding** : flame out less 5 sec. - flame glow less 10 sec. - char length less 1 cm.

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

### Material specification for BB-standard materials

| BB-no.: | Type of material : | Date :  | Sign.: |
|---------|--------------------|---------|--------|
| 6.2     | Chemical barrier   | 19/5-99 | TBC    |

Description : PTFE - foil

|                              |                  |           |
|------------------------------|------------------|-----------|
| Weight                       | g/m <sup>2</sup> | 535       |
| Thickness                    | mm               | 0.25      |
| Weave                        |                  | -         |
| Reinforcement                |                  | -         |
| Tensile strength warp        | N/50 mm          | 375       |
| Tensile strength weft        | N/50 mm          | 375       |
| Finish                       |                  | -         |
| Working temperature max./min | C°               | +260/-120 |
| Working pressure max./min    | KPa              | +20/-20   |

| Resistance against : | EXCELLENT | 6 | 5 | 4 | 3 | 2 | POOR | 1 |
|----------------------|-----------|---|---|---|---|---|------|---|
| Oils                 | X         |   |   |   |   |   |      |   |
| Solvents             | X         |   |   |   |   |   |      |   |
| Dilute acids         | X         |   |   |   |   |   |      |   |
| Strong acids         | X         |   |   |   |   |   |      |   |
| Flames               |           |   |   |   |   | X |      |   |
| Vibrations           | X         |   |   |   |   |   |      |   |
| Weathering           | X         |   |   |   |   |   |      |   |

#### Notes :

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## Material specification for BB-standard materials

| BB-no.:   | Type of material : | Date :  | Sign.: |
|---|--------------------|---------|--------|
| 8.1   | Inside protection  | 19/5-94 | TBC    |
| <b>Description :</b> Glass fabric, Reinforced with SS-wire. |                    |         |        |

|                              |                  |          |
|------------------------------|------------------|----------|
| Weight                       | g/m <sup>2</sup> | 1190     |
| Thickness                    | mm               | 1.60     |
| Weave                        | Leinwand dobb.   |          |
| Reinforcement                | AISI 316         |          |
| Tensile strength warp        | N/50 mm          | 3000     |
| Tensile strength weft        | N/50 mm          | 2500     |
| Finish                       | Natural          |          |
| Working temperature max./min | C°               | +650/-60 |
| Working pressure max./min    | KPa              | +30/-30  |

| Resistance against : | EXCELLENT |   |   |   |   | POOR |  |
|----------------------|-----------|---|---|---|---|------|--|
|                      | 6         | 5 | 4 | 3 | 2 | 1    |  |
| Oils                 | X         |   |   |   |   |      |  |
| Solvents             | X         |   |   |   |   |      |  |
| Dilute acids         |           | X |   |   |   |      |  |
| Strong acids         |           |   | X |   |   |      |  |
| Flames               | X         |   |   |   |   |      |  |
| Vibrations           | X         |   |   |   |   |      |  |
| Weathering           |           |   | X |   |   |      |  |

### Notes :

|   |
|---|
| Reinforced by a AISI 316 thread in each yarn,<br>which gives a high tensile strength. |
|---|

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## Material specification for BB-standard materials

| BB-no.:  | Type of material : | Date :  | Sign.: |
|--|--------------------|---------|--------|
| 10.2   | Inside protection  | 19/5-94 | TBC    |
| <b>Description :</b> Glass fabric, PU- coated on one side. |                    |         |        |

|                              |                  |          |
|------------------------------|------------------|----------|
| Weight                       | g/m <sup>2</sup> | 970      |
| Thickness                    | mm               | 1.30     |
| Weave                        | Cross twill 2/2  |          |
| Reinforcement                | -                |          |
| Tensile strength warp        | N/50 mm          | 4250     |
| Tensile strength weft        | N/50 mm          | 2500     |
| Finish                       | PU, one side     |          |
| Working temperature max./min | C°               | +500/-60 |
| Working pressure max./min    | KPa              | +30/-30  |

| Resistance against : | EXCELLENT |   |   |   |   | POOR |  |
|----------------------|-----------|---|---|---|---|------|--|
|                      | 6         | 5 | 4 | 3 | 2 | 1    |  |
| Oils                 | X         |   |   |   |   |      |  |
| Solvents             | X         |   |   |   |   |      |  |
| Dilute acids         |           | X |   |   |   |      |  |
| Strong acids         |           |   |   | X |   |      |  |
| Flames               |           | X |   |   |   |      |  |
| Vibrations           |           | X |   |   |   |      |  |
| Weathering           |           |   | X |   |   |      |  |

### Notes :

|  |
|--|
| Polyurethane finish with a suspended layer<br>of aluminium powder. |
|--|

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## Material specification for BB-standard material

| BB-no.:                                 | Type of material : | Date :  | Sign.: |
|---|--------------------|---------|--------|
| 13.1                                    | Insulation felt    | 19/5-94 | TBC    |
| <b>Description :</b> Needled glass felt |                    |         |        |

|                              |                  |          |
|------------------------------|------------------|----------|
| Weight                       | g/m <sup>2</sup> | 2000     |
| Thickness                    | mm               | 13,0     |
| Weave                        | -                |          |
| Reinforcement                | -                |          |
| Tensile strength warp        | N/50 mm          | 80       |
| Tensile strength weft        | N/50 mm          | 40       |
| Finish                       | -                |          |
| Working temperature max./min | C°               | +500/-60 |
| Working pressure max./min    | KPa              | +30/-30  |

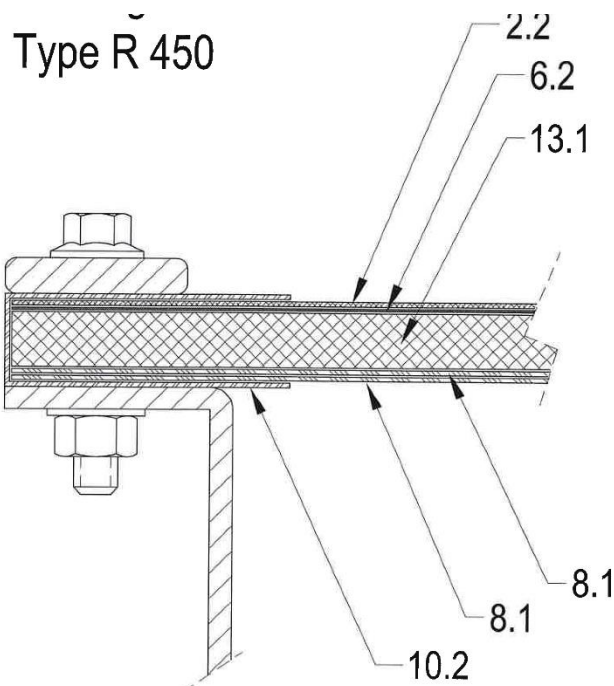
| Resistance against : | EXCELLENT |   |   |   |   | POOR |  |
|----------------------|-----------|---|---|---|---|------|--|
|                      | 6         | 5 | 4 | 3 | 2 | 1    |  |
| Oils                 |           | X |   |   |   |      |  |
| Solvents             |           | X |   |   |   |      |  |
| Dilute acids         |           | X |   |   |   |      |  |
| Strong acids         |           |   | X |   |   |      |  |
| Flames               | X         |   |   |   |   |      |  |
| Vibrations           | X         |   |   |   |   |      |  |
| Weathering           |           |   | X |   |   |      |  |

### Notes :

|  |
|--|
| Low thermal conductivity ( 0.038 W/m K @ 20 °C.)<br>Excellent resistance against vibrations. |
|--|

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## R450



### Material specification for BB-standard materials

| BB-no.: | Type of material : | Date :  | Sign.: |
|---------|--------------------|---------|--------|
| 2.2     | Outside cover      | 19/5-94 | TBC    |

**Description :** Glass fabric coated on both sides with Silicone.

|                              |                  |             |
|------------------------------|------------------|-------------|
| Weight                       | g/m <sup>2</sup> | 1250        |
| Thickness                    | mm               | 0.97        |
| Weave                        |                  | 8-H satin   |
| Reinforcement                |                  | -           |
| Tensile strength warp        | N/50 mm          | 8485        |
| Tensile strength weft        | N/50 mm          | 7145        |
| Finish                       |                  | Silver grey |
| Working temperature max./min | C°               | +260 / -72  |
| Working pressure max./min    | KPa              | +30/-30     |

| Resistance against : | EXCELLENT |   |   |   |   | POOR |
|----------------------|-----------|---|---|---|---|------|
|                      | 6         | 5 | 4 | 3 | 2 | 1    |
| Oils                 |           |   | X |   |   |      |
| Solvents             |           |   |   | X |   |      |
| Dilute acids         |           |   |   |   | X |      |
| Strong acids         |           |   |   |   |   | X    |
| Flames               | X         |   |   |   |   |      |
| Vibrations           | X         |   |   |   |   |      |
| Weathering           | X         |   |   |   |   |      |

#### Notes :

|  |
|--|
| Meets MIL-STD-7674 specification ( basic requirements for welding blankets ) - <b>Flame retarding</b> : flame out less 5 sec. - flame glow less 10 sec. - char length less 1 cm. |
|--|

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

### Material specification for BB-standard materials

| BB-no.: | Type of material : | Date :  | Sign.: |
|---------|--------------------|---------|--------|
| 6.2     | Chemical barrier   | 19/5-99 | TBC    |

**Description :** PTFE - foil

|                              |                  |           |
|------------------------------|------------------|-----------|
| Weight                       | g/m <sup>2</sup> | 535       |
| Thickness                    | mm               | 0.25      |
| Weave                        |                  | -         |
| Reinforcement                |                  | -         |
| Tensile strength warp        | N/50 mm          | 375       |
| Tensile strength weft        | N/50 mm          | 375       |
| Finish                       |                  | -         |
| Working temperature max./min | C°               | +260/-120 |
| Working pressure max./min    | KPa              | +20/-20   |

| Resistance against : | EXCELLENT |   |   |   |   | POOR |
|----------------------|-----------|---|---|---|---|------|
|                      | 6         | 5 | 4 | 3 | 2 | 1    |
| Oils                 | X         |   |   |   |   |      |
| Solvents             | X         |   |   |   |   |      |
| Dilute acids         | X         |   |   |   |   |      |
| Strong acids         | X         |   |   |   |   |      |
| Flames               |           |   |   |   | X |      |
| Vibrations           | X         |   |   |   |   |      |
| Weathering           | X         |   |   |   |   |      |

#### Notes :

|  |
|--|
|  |
|  |
|  |

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## Material specification for BB-standard materials

| BB-no.:   | Type of material : | Date :  | Sign.: |
|---|--------------------|---------|--------|
| 8.1   | Inside protection  | 19/5-94 | TBC    |
| <b>Description :</b> Glass fabric, Reinforced with SS-wire. |                    |         |        |

|                              |                  |                |
|------------------------------|------------------|----------------|
| Weight                       | g/m <sup>2</sup> | 1190           |
| Thickness                    | mm               | 1.60           |
| Weave                        |                  | Leinwand dobb. |
| Reinforcement                |                  | AISI 316       |
| Tensile strength warp        | N/50 mm          | 3000           |
| Tensile strength weft        | N/50 mm          | 2500           |
| Finish                       |                  | Natural        |
| Working temperature max./min | C°               | +650/-60       |
| Working pressure max./min    | KPa              | +30/-30        |

| Resistance against : | EXCELLENT | 5 | 4 | 3 | 2 | POOR |
|----------------------|-----------|---|---|---|---|------|
| Oils                 | X         |   |   |   |   |      |
| Solvents             | X         |   |   |   |   |      |
| Dilute acids         |           | X |   |   |   |      |
| Strong acids         |           |   | X |   |   |      |
| Flames               | X         |   |   |   |   |      |
| Vibrations           | X         |   |   |   |   |      |
| Weathering           |           |   | X |   |   |      |

### Notes :

|   |
|---|
| Reinforced by a AISI 316 thread in each yarn,<br>which gives a high tensile strength. |
|---|

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## Material specification for BB-standard materials

| BB-no.:  | Type of material : | Date :  | Sign.: |
|--|--------------------|---------|--------|
| 10.2   | Inside protection  | 19/5-94 | TBC    |
| <b>Description :</b> Glass fabric, PU- coated on one side. |                    |         |        |

|                              |                  |                 |
|------------------------------|------------------|-----------------|
| Weight                       | g/m <sup>2</sup> | 970             |
| Thickness                    | mm               | 1.30            |
| Weave                        |                  | Cross twill 2/2 |
| Reinforcement                |                  | -               |
| Tensile strength warp        | N/50 mm          | 4250            |
| Tensile strength weft        | N/50 mm          | 2500            |
| Finish                       |                  | PU, one side    |
| Working temperature max./min | C°               | +500/-60        |
| Working pressure max./min    | KPa              | +30/-30         |

| Resistance against : | EXCELLENT | 5 | 4 | 3 | 2 | POOR |
|----------------------|-----------|---|---|---|---|------|
| Oils                 | X         |   |   |   |   |      |
| Solvents             | X         |   |   |   |   |      |
| Dilute acids         |           | X |   |   |   |      |
| Strong acids         |           |   |   | X |   |      |
| Flames               |           | X |   |   |   |      |
| Vibrations           |           | X |   |   |   |      |
| Weathering           |           |   | X |   |   |      |

### Notes :

|  |
|--|
| Polyurethane finish with a suspended layer<br>of aluminium powder. |
|--|

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.

## Material specification for BB-standard material

| BB-no.:                                 | Type of material : | Date :  | Sign.: |
|---|--------------------|---------|--------|
| 13.1                                    | Insulation felt    | 19/5-94 | TBC    |
| <b>Description :</b> Needled glass felt |                    |         |        |

|                              |                  |          |
|------------------------------|------------------|----------|
| Weight                       | g/m <sup>2</sup> | 2000     |
| Thickness                    | mm               | 13,0     |
| Weave                        |                  | -        |
| Reinforcement                |                  | -        |
| Tensile strength warp        | N/50 mm          | 80       |
| Tensile strength weft        | N/50 mm          | 40       |
| Finish                       |                  | -        |
| Working temperature max./min | C°               | +500/-60 |
| Working pressure max./min    | KPa              | +30/-30  |

| Resistance against : | EXCELLENT | 5 | 4 | 3 | 2 | POOR |
|----------------------|-----------|---|---|---|---|------|
| Oils                 |           | X |   |   |   |      |
| Solvents             |           | X |   |   |   |      |
| Dilute acids         |           | X |   |   |   |      |
| Strong acids         |           |   | X |   |   |      |
| Flames               | X         |   |   |   |   |      |
| Vibrations           | X         |   |   |   |   |      |
| Weathering           |           |   | X |   |   |      |

### Notes :

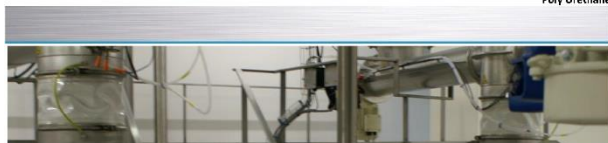
|  |
|--|
| Low thermal conductivity ( 0.038 W/m K @ 20 °C.)<br>Excellent resistance against vibrations. |
|--|

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed.



### Material Specifications

### Poly Urethane



### General Properties

[illegible]

**Abrasive**  
Abrasive and wear-resistant ensure a long life.

**Detectable**  
Detection or  
magnetical  
separation.

**FDA/ECC**  
Compliance with  
FDA and ECC  
food safety  
regulations

**Atex**  
ATEX: Explosion safety.



### Material Specifications

### Poly Urethane



## Food Contact Safety

| Name:   | PJ-UF1   | PJ-UF15  | PJ-UF3   | PJ-UF03  | PJPU     |
|---|----------|----------|----------|----------|----------|
| • FDA 21 CFR of the United States of America: | -1/5,125 | -1/5,125 | -1/5,125 | -1/5,125 | -1/5,125 |
|   | -177,168 | -177,168 | -177,168 | -177,168 | -177,168 |
|   | 333,360  | 333,360  | 333,360  | 333,360  | 333,360  |



Name : PU-UF1  
European Union Food Contact Safety regulations :

|  |   |  |
|--|---|--|
|  | <p>regulation on plastic materials and is often intended to come into contact with food (EU L 242/2012) of 14-04-2012</p> <p>up to and including amendment (EU 1186/2013) of 15-11-2012</p> | <p>(EU 1182/2012)</p> <p>(R) 13/2/2011</p> |
|  | <p>regulation (EU 2006/2012) of 29-03-2012</p> <p>up to and including amendment (EU 1186/2013) of 15-11-2012</p>  |  |
|  | <p>up to and including regulation (EU 108/2013) of 15-02-2013 on food contact</p>   |  |
|  | <p>regulation (EU 2013/2012) of 09-08-2012 on the amendment of regulation (EU 108/2013) of 15-02-2013 on food contact</p>   |  |
|  | <p>(EU 108/2013) up to and including amendment (EU 1186/2013) of 15-11-2012</p>   |  |



**Other Regulations :**

|               |   |         |         |         |
|---------------|---|---------|---------|---------|
| Netherlands   | Commodity Act, Packaging, and Food Labels Regulation of the Netherlands of 20-11-1975 and its amendments up to and including VOB/VEN/348661 of 14-07-2011 |         |         |         |
| International | ISO 63  | ISO 63  | ISO 63  | ISO 63  |
|               | ISO 63C   | ISO 63C | ISO 63C | ISO 63C |
|               | EN 63   | EN 63   | EN 63   | EN 63   |

#### Method of confirm

| Certificate or Declaration:                     | Full Certificate | Good Contact Compliance Declaration | Full Certificate | Good Contact Compliance Declaration | Full Certificate |
|---|------------------|-------------------------------------|------------------|-------------------------------------|------------------|
| Migration testing reports available on request: | YES              | NO                                  | YES              | NO                                  | YES              |
| Testing Institute (independently):              | TNO Triskelion   |                                     | TNO Triskelion   |                                     | TNO Triskelion   |
| Testing reports available upon request:         | YES              |                                     | YES              |                                     | YES              |

### Production Method

**Welding methods:** Hot Air / Hot Contact pressure / High Frequency Pressure  
No Gases, Additives or Chemicals are used.

### Material Specifications

### Poly Urethane



## Explosion Safety

| Items   | P14-0P1                     | P14-0P1S   | P14-0P2                               | P14-0P2S   | P14P1      |
|---|-----------------------------|------------|---------------------------------------|------------|------------|
| Explosion Pressure resistance:                          | 1.5 Bar<br>max 300mm length | not tested | 3.5 Bar<br>max 300mm length           | not tested | not tested |
| Propagating Discharge safety:                           | not possible up to 20W      | not tested | not possible up to 20W<br>(in tested) | not tested | not tested |
| Ignition value of the powder which is safe to use with: | 2 mJ and higher             | not tested | 3 mJ and higher                       | not tested | not tested |
| Maximum length flexible connector (see performance)     | 1000mm                      | not tested | 1000mm                                | not tested | not tested |
| Diameter / Cross-section:                               | no minimum                  | not tested | no minimum                            | not tested | not tested |

Testing Institute: **Wilhelm Jost Institute**

Testing reports available upon request

request: YES

\_\_\_\_\_



### Material Datasheet


**PKSR - Polyester Knitted fabric Silicone Rubber**



#### Product Description

PESE is a 2mm thickness silicone sheet, with a limited Polyester fabric inner ply. The Polyester Ply provides for extra tensile strength by restricting the stretch capability of the Silicone sheeting. By restricting the amount of stretch the material allows less expansion under pressurised application. Also the limited stretch capability provides a better tear resistance.

### General Properties

|   |   |
|---|---|
| <b>Name:</b> PKSR   |  |
| <b>Material:</b> 50 cone up to polyester knitted ply  |   |
| <b>Colour:</b> 1 standard white   |   |
| <b>Thickness:</b> 2.0mm (avg. 0.8mm tolerance)  |   |
| <b>Temperature Resistance:</b> -65 °C to +40 °C<br>+140 °C (+200 °C)  |   |
| <b>Weight Polyester Knitted Ply:</b> 145 g/m <sup>2</sup>   |   |
| <b>Weight Silicone Coating:</b> 1100 g/m <sup>2</sup>   |   |
| <b>Total Weight/Material:</b> 2540 g/m <sup>2</sup>   |   |
| <b>Hardness:</b> 60 Shore A   |   |
| <b>Chemical Resistance:</b> good to oil and acid resistance   |   |
| <b>Maximum Stretch Capacity:</b> 200%   |   |
| <b>Per resistance to:</b><br>coffee oil<br>high concentration for a substance at 150 °C for 24 hrs (above 200 °C) |   |



**Fond Contact Caregivers**

[illegible]

#### Production Method

**Flexibles Sleeves and Connectors:** To convert a Silicone sheet to a flexible connector, all parts are glued or stitched together.

**Glue:** 802632 RTV\_Silicone Glue E-83 RTV-1, specifications available upon request

**Gaskets:** gaskets are cut from a sheet using a Stainless Steel Knife or Hardened Steel cutting tool

### Material Data sheet

**PKSR - Polyester Knitted fabric Silicone Rubber**



## End Content Safety Declaration of Compliance

Flieckex B.V. hereby declares that the above titled product meets the requirement for repetitive contact with foodstuffs in accordance with:

FD-21, CFR of the United States of America



1.0%–2.61%

European Union Food Contact Safety regulations.



EC 2935/2004  
2004/177/CE  
2023/2006

European Union Food Contact Safety regulations

BFR BFR XV Empfehlung and colour bleed test according to BFR Empfehlung part B 11  
WRAS (Water Regulations Advisory Service) for use with potable water at temperatures up to 85°C (185°F)  
+ Listing number 080308

### Production Method

**Flexible Sleeves and Connectors:** To convert a Silicone sheet to a flexible connector, all parts are glued or stitched together.

Name: Werner van Luon  
Position: Manager  
Signature:

Werner

Location: Kuatsheuw  
Date: 5-12-2006  
Order Nr.:  
Article Nr.:



## 2 Storage, handling and mounting instructions

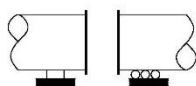
Storage, handling and mounting instructions of flexible connection must follow instruction from supplier below.

For information on the type of flexible connection – see the fan Technical Specification.



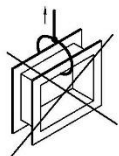
### STORAGE

BB-Expansion Bellows should be stored in clean dry conditions and must be protected against mechanical damage. Do not unpack the bellows until ready for installation. Protective covers should be left on as long as possible – transport supports ought not to be removed until the bellows are in position in the ductwork.



### HANDLING

Bellows should only be fitted after all work on the ducting and flanges has been completed and anchors and supports have been established. This is to avoid any accidental damage due to welding splatter or sharp objects, and to ensure that the bellows are not over stressed.



BB-Bellows are manufactured from highly flexible materials. Maximum service life depends on careful and correct handling. Sharp corners and folds must be avoided, care must be taken when lifting bellows and we recommend the use of a supporting plate, or an internal frame. Preferably the bellows should be assembled with backing flanges and internal sleeves before lifting.

### DUCTING FLANGES / TOLERANCES

Check that ducting flanges are manufactured according to the drawings and that the boltholes are placed symmetrically in each flange. Torsion must be avoided.



Ensure that the installation length "L" is in accordance with the tolerances.

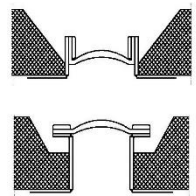


**Any deviations must be checked with Bording Bellows or their agent.**

The bellows must be installed with the identification label on the outside.

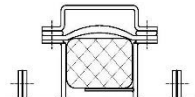
### INTERNAL SLEEVE

Internal sleeves must be installed if the gas velocity exceeds 7 metres per sec. or if the medium contains abrasive particles. Ensure that the sleeve is correctly aligned in relation to the flow and that there is sufficient distance between the bellows/ducting flanges and the sleeve for the movements specified, including installation tolerances.



### INSULATION

The bellows may only be covered with insulation in the low and medium temperature ranges and only after consultation with BB. For temperatures higher than 200°C insulation must not cover the bellows. It is important to ensure a good air circulation around the bellows to allow convection from the bellows and clamping area.



### BOLTED UNIT

The unit is placed between the ducting flanges with the flange gasket. The bolts are fastened and the transport straps can then be removed. Transport straps should be removed as late as possible in order to avoid welding stresses, or other stresses caused during installation of the ductwork.



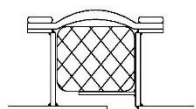
### PROFILE I

BB-Bellows may be supplied with or without clamps. With single layer bellows, the clamps might be sewn in the clamping area, and thus form an integrated part of the bellows. Generally clamps are only recommended for use with bellows at temperatures lower than 450°C and for sizes smaller than 1000 mm diameter.



### PROFILE II, III AND VI

Only recommended for temperatures up to 450°C. Backing flanges and inner sleeve can be supplied with the bellows where required.



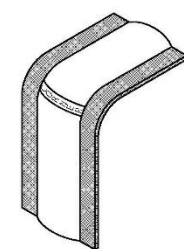
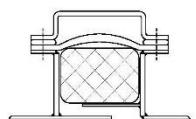
### PROFILE IV, V AND VII

These styles are often used in conjunction with an internal insulation bolster in order to improve the sound attenuation of the joint and as a protection against accumulation of particles. Backing flanges can be supplied with the bellows where required.

### ASSEMBLIES

#### WELDING UNIT

BB-Expansion bellows and flanges can be supplied as a complete unit with transport straps allowing delivery of the assembled unit. Transport straps should be removed as late as possible in order to avoid welding stresses, or other stresses caused during installation of the ductwork.



### OPEN ENDED CONSTRUCTION

The open bellows is wrapped around the ducting and fastened temporarily to the ducting flanges with clips or clamps. Ensure that the identification label is facing outwards. For rectangular styles IV and V, corners will be marked on the bellows.

For horizontal ducting the join should be made on the top of the duct.

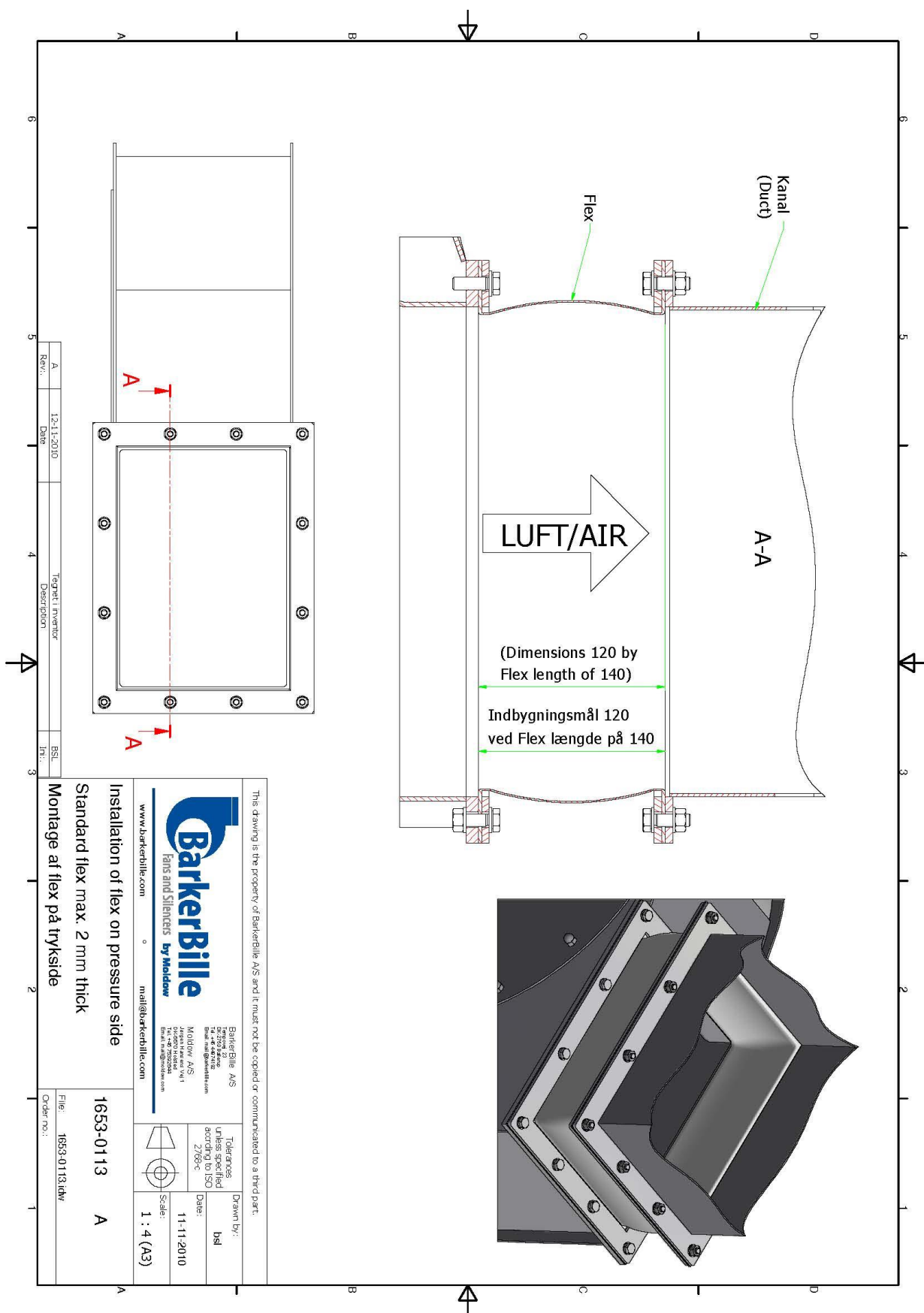
The bolts are installed in sequence from the middle of the side opposite the join working to the left and the right of this position. All the bolts are installed except for approximately 300 mm on either side of the join. No bolts should be tightened before the join has been made and all the bolts are inserted.

The bellows are joined using the instructions given on BB-Form A 22.1 – A 22.8, which will be supplied with each open construction bellows. Each ply has to be joined in turn, starting at the inside. When the joining is complete loose flange sections should be installed in the jointing area and any remaining boltholes should be punched or drilled. Once all the bolts are inserted tightening should commence again from the side opposite the join.

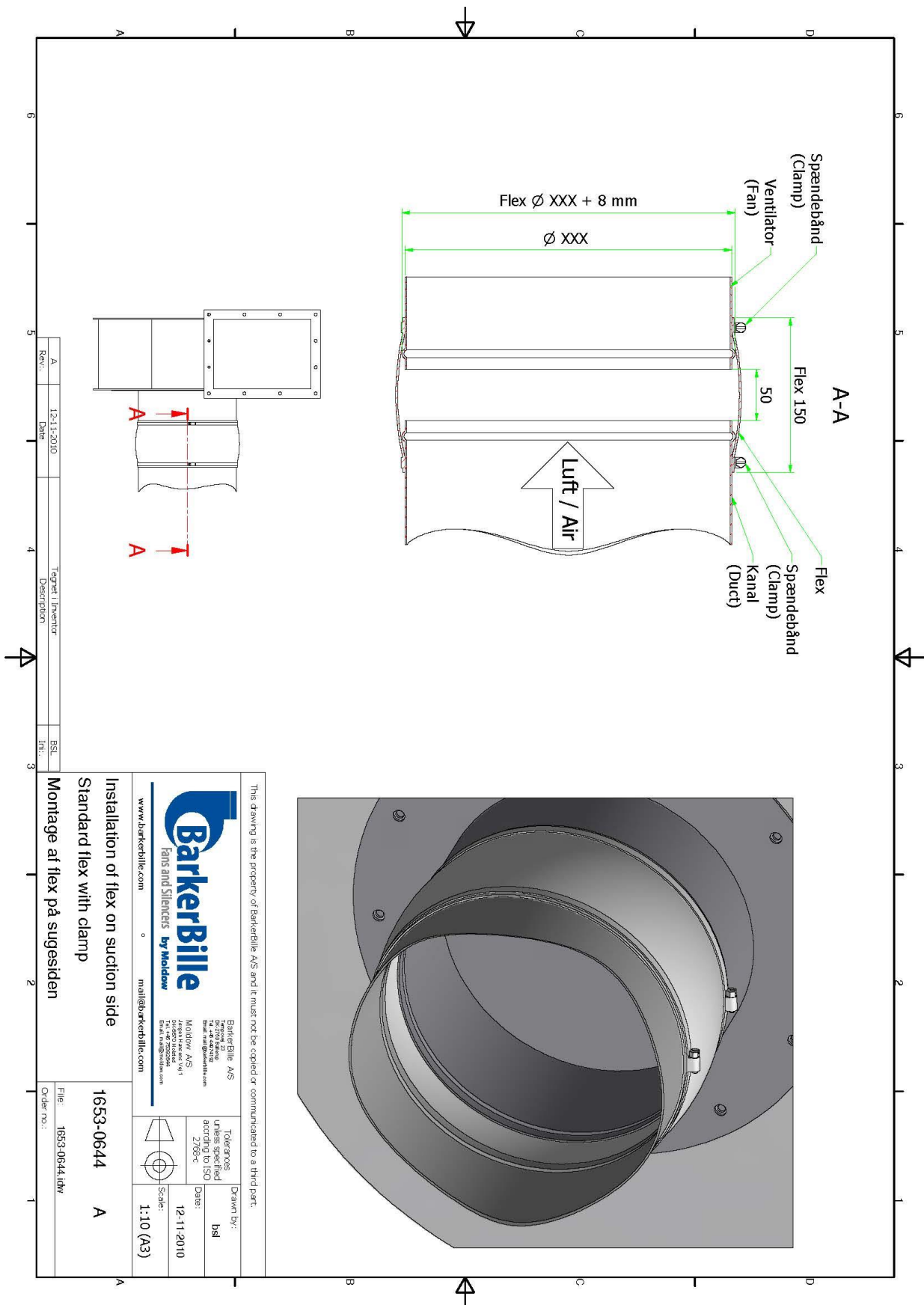
### N.B.

The optimum working life and reliability of the bellows depends very much on careful and correct installation. In any case of doubt Bording Bellows or their agent should be consulted. Our trained staff can assist with installation or instruction/supervision of installation personnel.

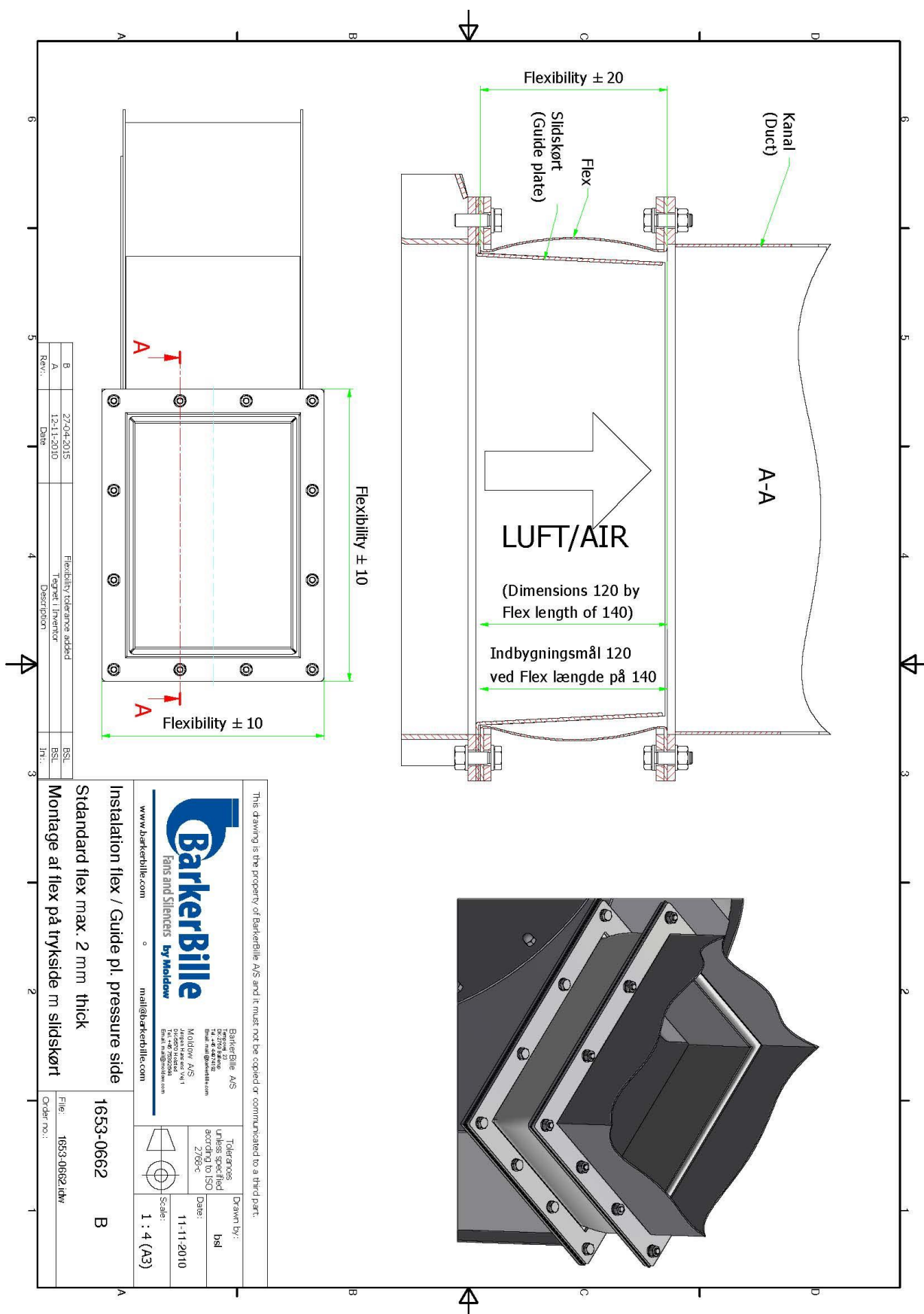
### 3 Installation of flex for flanges (square)



## 4 Installation of flex with clamps (round)

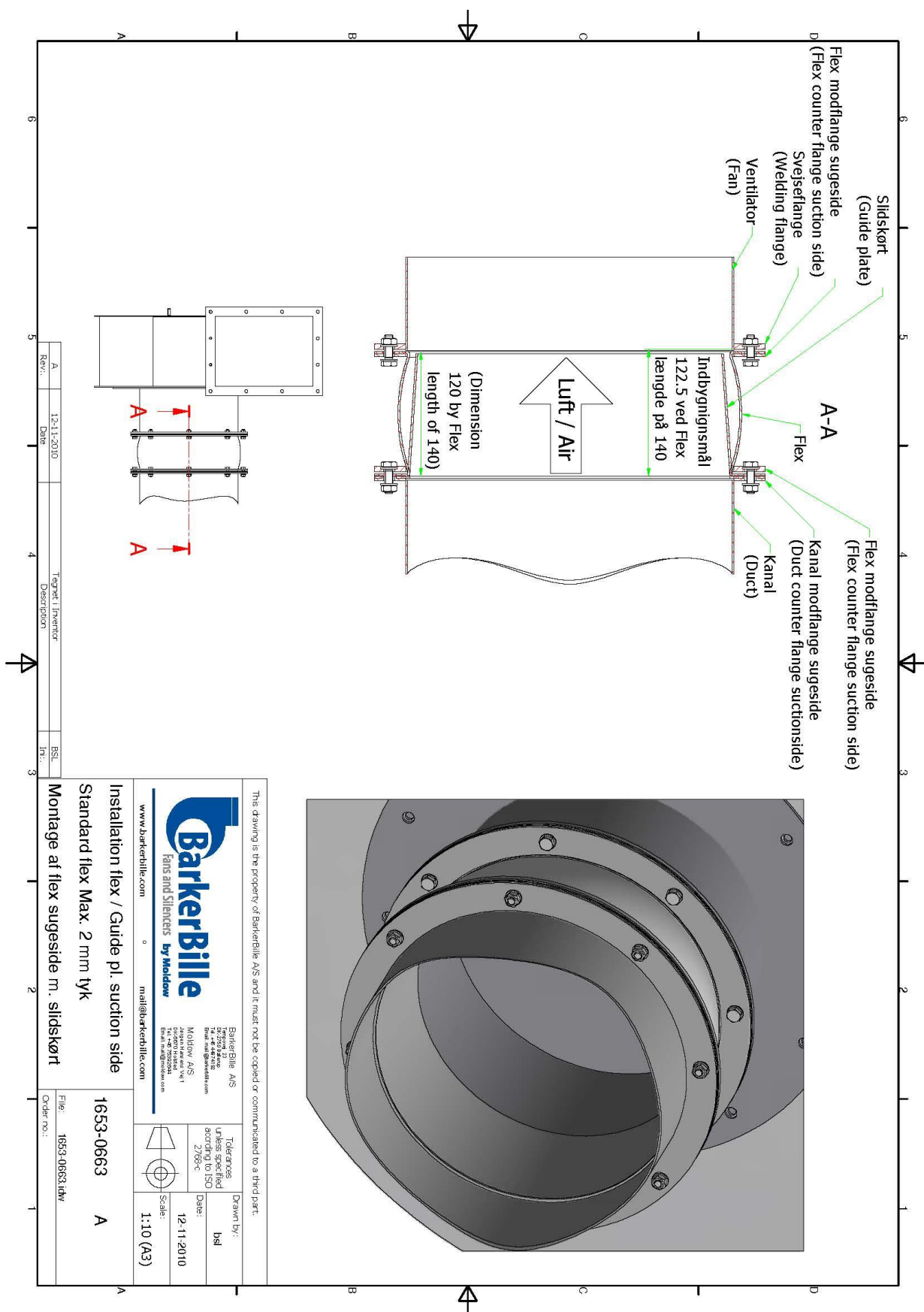


## 5 Installation of guide plate and flex for flanges (square)

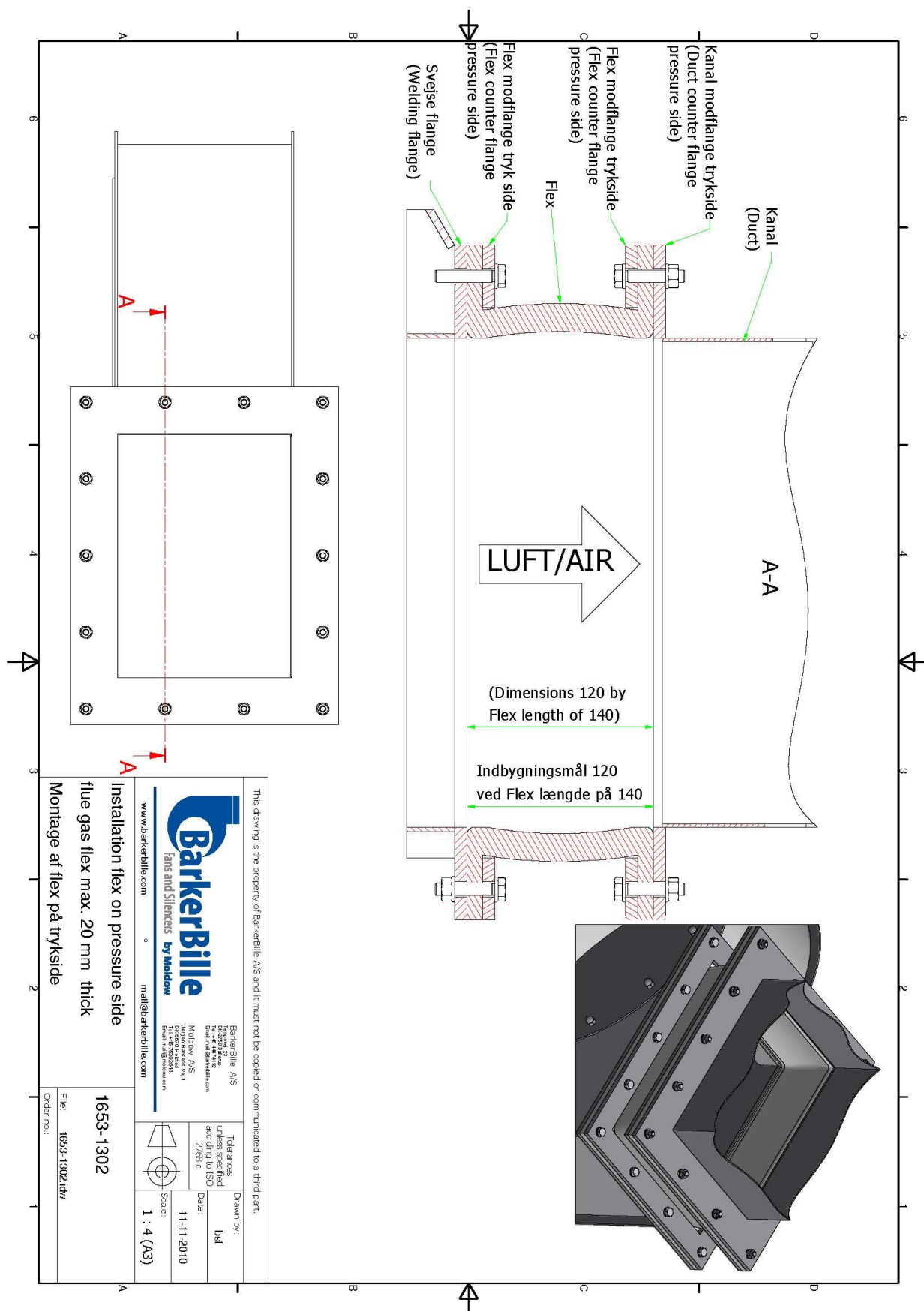




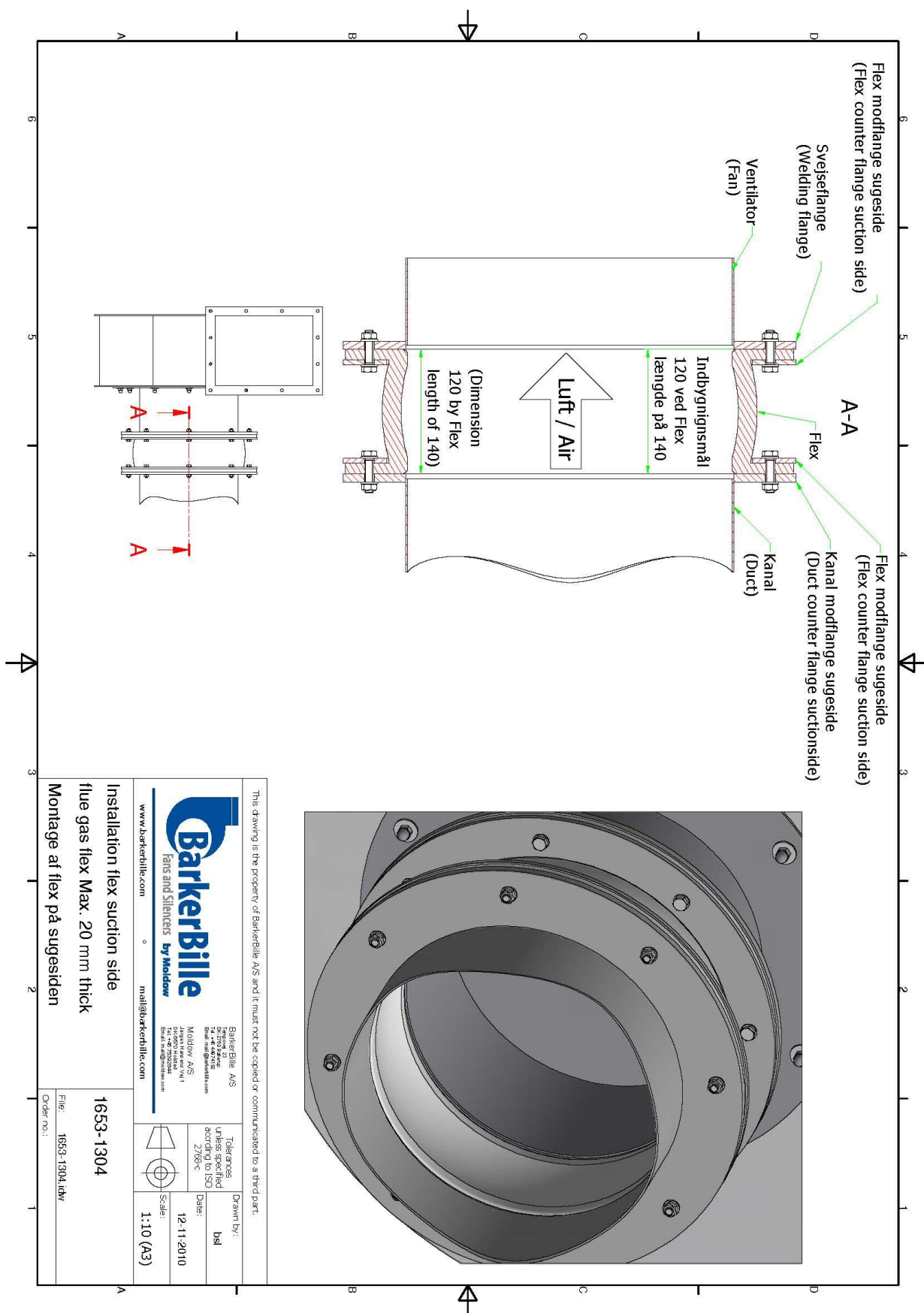
## 6 Installation of guide plate and flex for flanges (round)



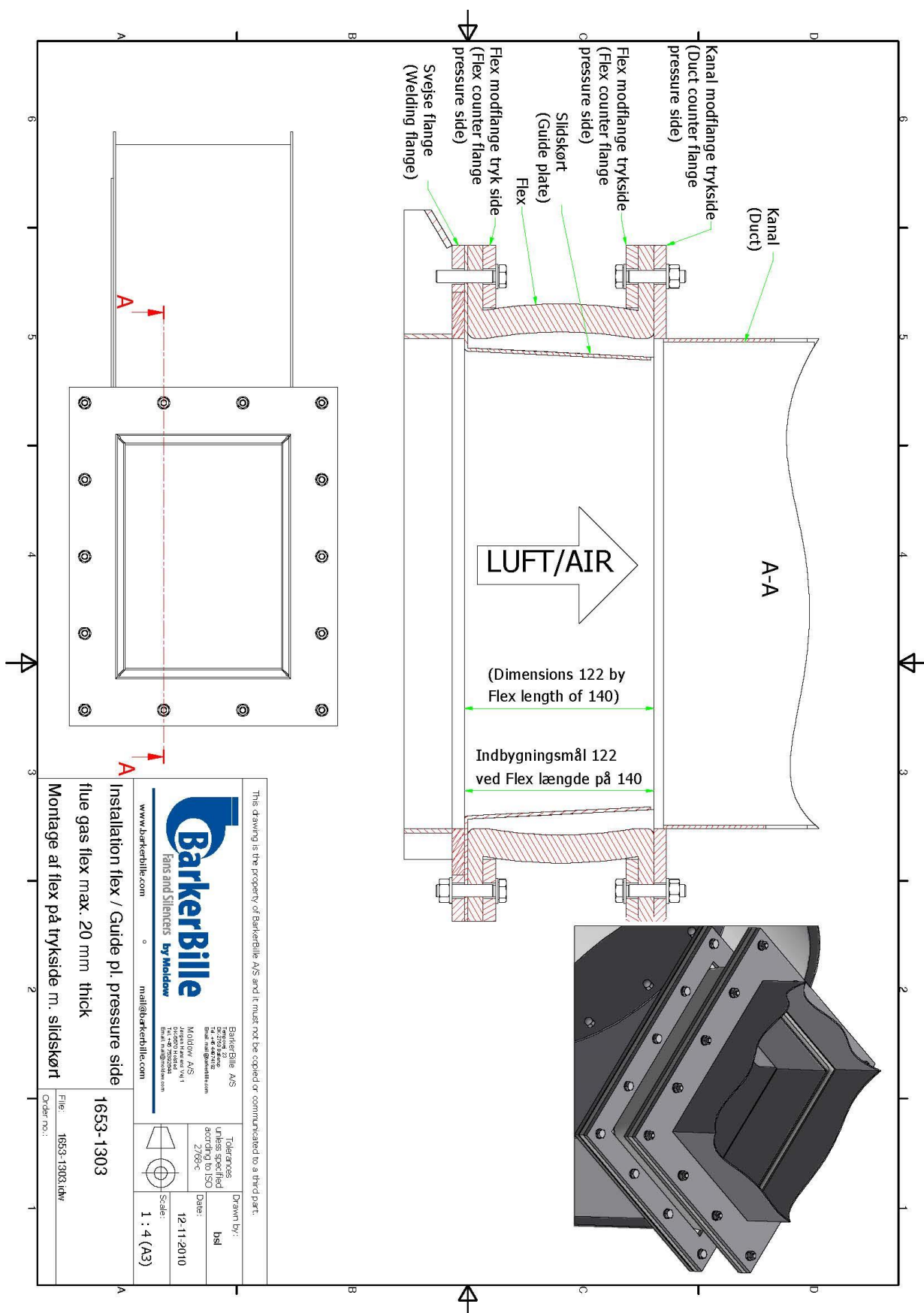
## 7 Installation of heavy flex for flanges (square)



## 8 Installation of heavy flex for flanges (round)

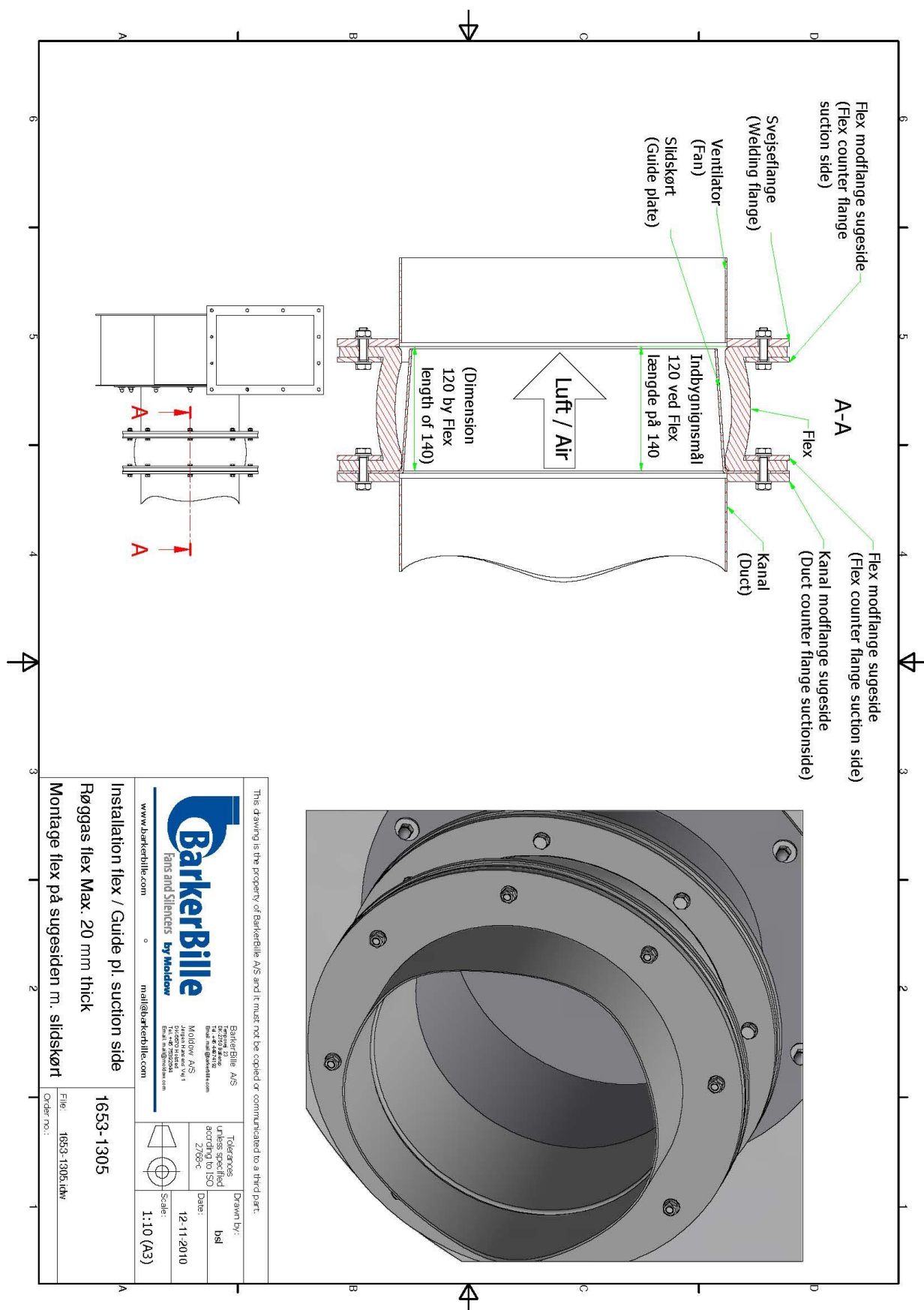


## 9 Installation of guide plate and heavy flex for flanges (square)





## 10 Installation of guide plate and heavy flex for flanges (round)



EN

# Vibration Dampers

AD, RAD, Type C, BRB, Marine Mounts, Sandwich 100-700, AMC Spring

**BarkerBille fans**



**Revision: 2018-09-27**

**Doc-16-01-EN Vibration Dampers.docx**

## Index

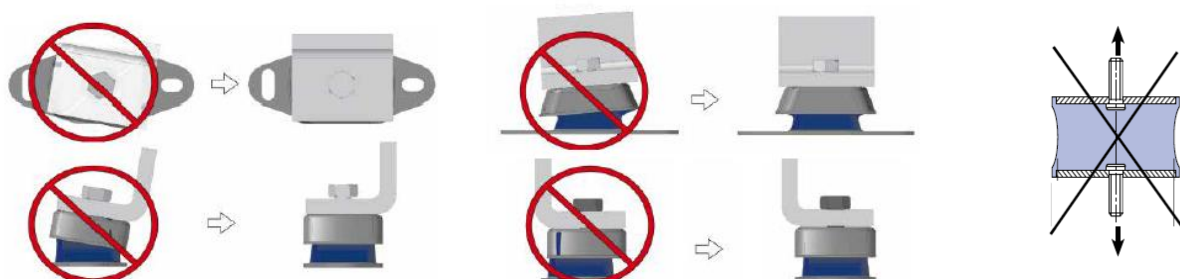
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|   |           |
|---|-----------|
| <b>1. Installation Principles for vibration dampers .....</b> | <b>3</b>  |
| <b>2. AD, RAD .....</b>                                       | <b>4</b>  |
| <b>3. Type C .....</b>  | <b>6</b>  |
| <b>4. BRB .....</b>   | <b>7</b>  |
| <b>5. Marine Mounts .....</b>                                 | <b>9</b>  |
| <b>6. Vikas Sandwich 100-700 .....</b>                        | <b>11</b> |
| <b>7 AMC Spring 2-6 .....</b>                                 | <b>13</b> |

## 1. Installation Principles for vibration dampers

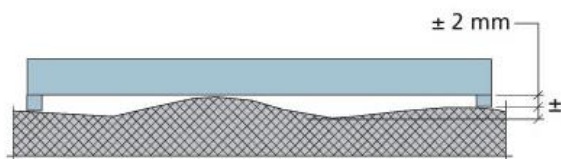
The vibration dampers should be installed between two parallel and perfectly flat surfaces.

vibration dampers operating tilted or twisted do not work properly. This may be due to incorrect alignment, tolerances in the building of the chassis or over-tightened torque during the installation of the vibration dampers.

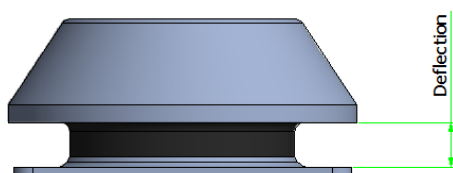


Before installing, make sure that the support surfaces are sufficiently rigid flat and totally parallel.

Recommendation to the floor support surfaces flatness tolerances, measured over the fan frame's length and width



All dampers on the Fan should be approximately equally deflected  $\pm 1$  mm.



The main fixing screw should be tightened according to the torques recommended in the following chart:

|                      | M8 | M10 | M12 | M16 | M20 | M24 |
|----------------------|----|-----|-----|-----|-----|-----|
| Tightening torque Nm | 16 | 32  | 55  | 125 | 190 | 285 |

## 2. AD, RAD

www.iac-acoustics.com

### Cylindrical Rubber Mounts

AD, RAD

#### Product Description

Cylindrical vibration mount manufactured from natural rubber vulcanised to 2 galvanised steel plates with a central thread.

Type AD is made in 3 different rubber densities, where the colour of the rubber determines the hardness.

- ★ White 45 Sh.
- ★ Red 55 Sh.
- ★ Black 65 Sh.

The AD range is also available in neoprene rubber if the mount is going to be in contact with oil / fuel.

#### Application

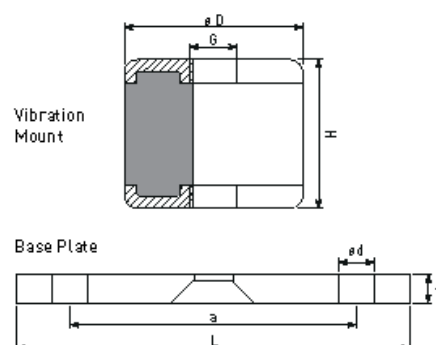
This vibration mount is used to dampen noise and vibrations from stationary machinery such as ventilators, pumps, electric motors, converters and compressors with frequencies above 1200rpm. It is constructed to be used in compression, but can handle minor shear forces.

#### Accessories

Galvanised steel base plates are available for fastening on to floors.

**[ ALSO AVAILABLE IN STAINLESS STEEL ]**

When ordering, please use designations RADXXXX for stainless version.



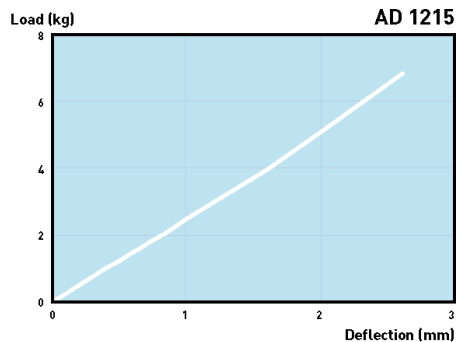
| Type    | Weight of mount [g] | Hardness [Rubber Colour] | Max. Load [kg] | Static Deflection [mm] | Dimensions [mm]<br>Vibration Mount |    |     | Dimensions [mm]<br>Base Plate |       |   |     |     |
|---------|---------------------|--------------------------|----------------|------------------------|------------------------------------|----|-----|-------------------------------|-------|---|-----|-----|
|         |                     |                          |                |                        | D                                  | H  | G   | L                             | Width | T | ad  | a   |
| AD1215  | 5                   | White                    | 7              | 2.6                    | 12                                 | 15 | M3  | -                             | -     | - | -   | -   |
| AD2015  | 15                  | White                    | 15             | 1.5                    | 20                                 | 15 | M6  | 60                            | 20    | 4 | 7.5 | 40  |
|         |                     | Red                      | 20             | 1.3                    |                                    |    |     |                               |       |   |     |     |
|         |                     | Black                    | 25             | 1.2                    |                                    |    |     |                               |       |   |     |     |
| AD3025  | 50                  | White                    | 35             | 2.7                    | 30                                 | 25 | M8  | 90                            | 30    | 6 | 10  | 60  |
|         |                     | Red                      | 45             | 2.5                    |                                    |    |     |                               |       |   |     |     |
|         |                     | Black                    | 55             | 2.0                    |                                    |    |     |                               |       |   |     |     |
| AD4030  | 90                  | White                    | 65             | 3.5                    | 40                                 | 30 | M8  | 100                           | 40    | 6 | 10  | 70  |
|         |                     | Red                      | 80             | 2.8                    |                                    |    |     |                               |       |   |     |     |
|         |                     | Black                    | 100            | 2.0                    |                                    |    |     |                               |       |   |     |     |
| AD5035  | 170                 | White                    | 100            | 4.0                    | 50                                 | 35 | M10 | 110                           | 50    | 8 | 10  | 80  |
|         |                     | Red                      | 115            | 3.0                    |                                    |    |     |                               |       |   |     |     |
|         |                     | Black                    | 135            | 2.0                    |                                    |    |     |                               |       |   |     |     |
| AD7535  | 370                 | White                    | 225            | 2.8                    | 75                                 | 35 | M12 | 150                           | 75    | 8 | 13  | 115 |
|         |                     | Red                      | 300            | 2.7                    |                                    |    |     |                               |       |   |     |     |
|         |                     | Black                    | 400            | 2.2                    |                                    |    |     |                               |       |   |     |     |
| AD10050 | 800                 | White                    | 300            | 4.2                    | 100                                | 50 | M12 | 175                           | 100   | 8 | 13  | 145 |
|         |                     | Red                      | 400            | 4.0                    |                                    |    |     |                               |       |   |     |     |
|         |                     | Black                    | 600            | 2.2                    |                                    |    |     |                               |       |   |     |     |

Errors and Omissions Excepted (EEOE).

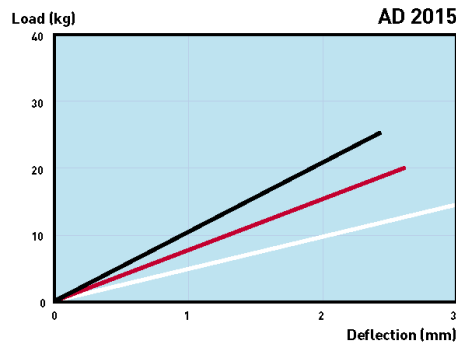
## Deflection, Static Load

AD, RAD

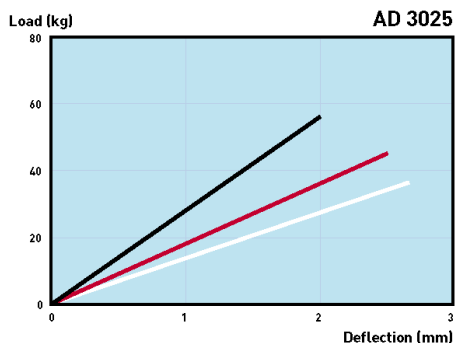
AD 1215



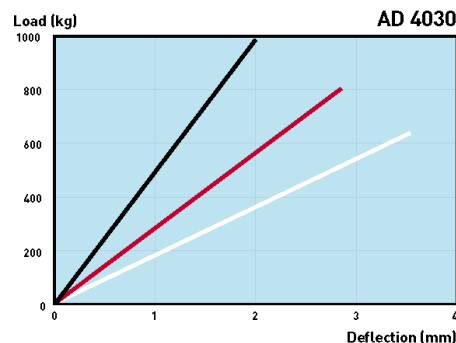
AD 2015



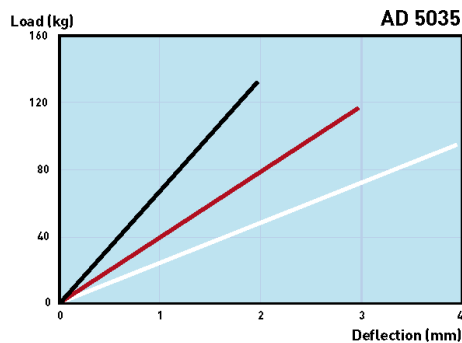
AD 3025



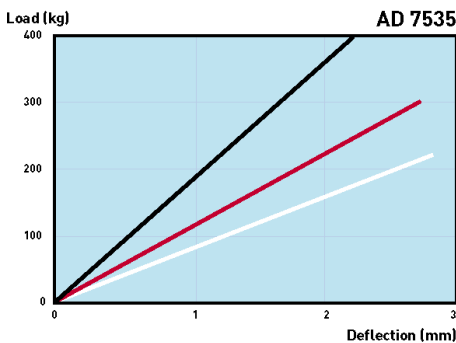
AD 4030



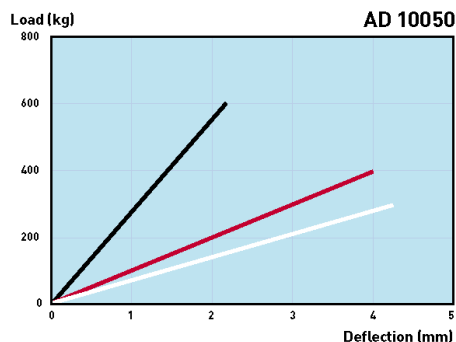
AD 5035



AD 7535



AD 10050



Errors and Omissions Excepted [E&OE].

## 3. Type C



# AMC MECANOCAUCHO® BOBBINS TYPE C

### OPERATION AND INSTALLATION

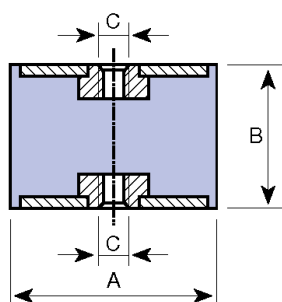
Their elasticity is much greater in all the directions parallel to the armatures than in the perpendicular direction. The rubber works based on compression or shear depending on the direction it is placed in at installation time. This direction is made according to the use and the objective.

It is therefore installed with nuts or screws depending on the model chosen, with one part attached to the fixed chassis and the other to the machine to be suspended.

### APPLICATIONS

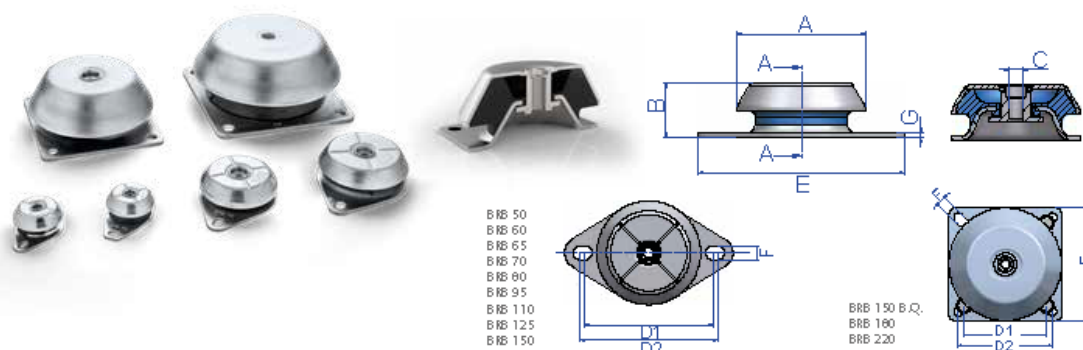
The AMC MECANOCAUCHO® bobbins are particularly suitable for installation on small motor-pumps, motor-ventilators, driers, sieves, compactors, washing machines, electrical motors, on-board control panels, measuring apparatuses, control cabinets, microphones, fluorescent tubes, etc.

TYPE C



| Type                   | Code   | A (mm) | B (mm) | C (mm) | Weight (kg) | COMPRESSION LOAD<br>Max. dan | COMPRESSION DE-<br>FLECT. mm | SHEAR LOAD Max. dan | SHEAR DEFLECT. mm |
|------------------------|--------|--------|--------|--------|-------------|------------------------------|------------------------------|---------------------|-------------------|
| BOBBINS TYPE C 12-30   | 122003 | 12,5   | 20     | M-5    | 0,007       | 8                            | 3,5                          | 1,5                 | 4                 |
|                        | 122013 | 16     | 20     | M-5    | 0,01        | 15                           | 4                            | 2,5                 | 4                 |
|                        | 122014 | 16     | 25     | M-5    | 0,012       | 15                           | 5                            | 2                   | 5                 |
|                        | 122023 | 20     | 20     | M-6    | 0,017       | 30                           | 5                            | 5                   | 3,5               |
|                        | 122024 | 20     | 25     | M-6    | 0,018       | 30                           | 5,5                          | 4,5                 | 4,5               |
|                        | 122025 | 20     | 30     | M-6    | 0,019       | 25                           | 7                            | 4,5                 | 4,5               |
|                        | 122173 | 25,5   | 20     | M-6    | 0,03        | 55                           | 4,5                          | 8                   | 3,5               |
|                        | 122174 | 25,5   | 25     | M-6    | 0,035       | 50                           | 6                            | 8                   | 4,5               |
|                        | 122175 | 25,5   | 30     | M-6    | 0,036       | 50                           | 8                            | 8                   | 6                 |
|                        | 122032 | 25,5   | 19     | M-8    | 0,031       | 55                           | 4,5                          | 8                   | 3,5               |
|                        | 122033 | 25,5   | 22     | M-8    | 0,038       | 50                           | 5,5                          | 8                   | 4                 |
|                        | 122034 | 25,5   | 25     | M-8    | 0,037       | 50                           | 6                            | 8                   | 4,5               |
|                        | 122035 | 25,5   | 30     | M-8    | 0,038       | 50                           | 8                            | 8                   | 6                 |
|                        | 122036 | 25,5   | 40     | M-8    | 0,044       | 50                           | 10                           | 10                  | 6                 |
|                        | 122042 | 30     | 22     | M-8    | 0,045       | 80                           | 5                            | 11                  | 4                 |
| BOBBINS TYPE C 40-60   | 122186 | 30     | 25     | M-8    | 0,048       | 75                           | 6,5                          | 11                  | 5                 |
|                        | 122043 | 30     | 30     | M-8    | 0,052       | 70                           | 8                            | 11                  | 6                 |
|                        | 122044 | 30     | 40     | M-8    | 0,061       | 60                           | 9                            | 11                  | 7,5               |
|                        | 122194 | 40     | 25     | M-8    | 0,089       | 150                          | 6                            | 20                  | 3,5               |
|                        | 122195 | 40     | 28     | M-8    | 0,097       | 150                          | 6                            | 20                  | 5,5               |
|                        | 122196 | 40     | 30     | M-8    | 0,097       | 150                          | 6                            | 30                  | 5,5               |
|                        | 122197 | 40     | 35     | M-8    | 0,099       | 120                          | 8                            | 20                  | 6,5               |
|                        | 122198 | 40     | 40     | M-8    | 0,106       | 120                          | 10                           | 20                  | 7,5               |
|                        | 122199 | 40     | 45     | M-8    | 0,111       | 120                          | 11                           | 20                  | 9                 |
|                        | 122052 | 40     | 28     | M-10   | 0,094       | 150                          | 6                            | 20                  | 5,5               |
|                        | 122192 | 40     | 30     | M-10   | 0,099       | 150                          | 6                            | 30                  | 5,5               |
|                        | 122053 | 40     | 35     | M-10   | 0,102       | 120                          | 8                            | 20                  | 6,5               |
|                        | 122054 | 40     | 40     | M-10   | 0,109       | 120                          | 10                           | 20                  | 7,5               |
|                        | 122055 | 40     | 45     | M-10   | 0,114       | 120                          | 11                           | 20                  | 9                 |
|                        | 122061 | 50     | 25     | M-10   | 0,117       | 300                          | 6                            | 25                  | 4,5               |
|                        | 122202 | 50     | 30     | M-10   | 0,134       | 275                          | 7                            | 25                  | 6,5               |
|                        | 122062 | 50     | 35     | M-10   | 0,146       | 250                          | 8                            | 25                  | 7                 |
|                        | 122203 | 50     | 40     | M-10   | 0,161       | 210                          | 10                           | 25                  | 8                 |
|                        | 122063 | 50     | 45     | M-10   | 0,171       | 190                          | 11                           | 25                  | 9                 |
|                        | 122204 | 50     | 50     | M-10   | 0,185       | 170                          | 11                           | 25                  | 10,5              |
|                        | 122064 | 50     | 60     | M-10   | 0,199       | 150                          | 11                           | 25                  | 12                |
|                        | 122071 | 60     | 25     | M-10   | 0,194       | 400                          | 6                            | 30                  | 4,5               |
|                        | 122072 | 60     | 36     | M-10   | 0,234       | 300                          | 9                            | 30                  | 7                 |
|                        | 122073 | 60     | 45     | M-10   | 0,255       | 250                          | 11                           | 30                  | 9                 |
|                        | 122074 | 60     | 60     | M-10   | 0,304       | 200                          | 12                           | 30                  | 10                |
| BOBBINS TYPE C 70-95   | 122081 | 70     | 35     | M-10   | 0,307       | 450                          | 8                            | 35                  | 6,5               |
|                        | 122082 | 70     | 50     | M-10   | 0,376       | 350                          | 11                           | 35                  | 11                |
|                        | 122083 | 70     | 60     | M-10   | 0,41        | 300                          | 12                           | 35                  | 13                |
|                        | 122084 | 70     | 70     | M-10   | 0,469       | 300                          | 14                           | 35                  | 15                |
|                        | 122092 | 75     | 40     | M-12   | 0,351       | 500                          | 9                            | 37                  | 7                 |
|                        | 122093 | 75     | 45     | M-12   | 0,395       | 500                          | 10                           | 37                  | 9                 |
|                        | 122094 | 75     | 55     | M-12   | 0,436       | 450                          | 11                           | 37                  | 11                |
|                        | 122101 | 80     | 30     | M-14   | 0,391       | 950                          | 7                            | 40                  | 5                 |
|                        | 122102 | 80     | 40     | M-14   | 0,449       | 600                          | 9                            | 40                  | 7                 |
|                        | 122103 | 80     | 50     | M-14   | 0,492       | 550                          | 10                           | 40                  | 8                 |
|                        | 122104 | 80     | 55     | M-14   | 0,516       | 550                          | 11                           | 40                  | 9                 |
|                        | 122105 | 80     | 70     | M-14   | 0,602       | 500                          | 13                           | 40                  | 15                |
|                        | 122106 | 80     | 75     | M-14   | 0,63        | 450                          | 14                           | 40                  | 16                |
|                        | 122111 | 95     | 40     | M-16   | 0,714       | 1.200                        | 8                            | 60                  | 7                 |
|                        | 122112 | 95     | 55     | M-16   | 0,851       | 1.000                        | 11                           | 60                  | 8                 |
| BOBBINS TYPE C 105-150 | 122113 | 95     | 60     | M-16   | 0,88        | 800                          | 12                           | 60                  | 10                |
|                        | 122114 | 95     | 75     | M-16   | 1,026       | 700                          | 13                           | 60                  | 14                |
|                        | 122122 | 105    | 50     | M-16   | 0,714       | 1.200                        | 9                            | 80                  | 9                 |
|                        | 122123 | 105    | 75     | M-16   | 1,158       | 1.000                        | 13                           | 80                  | 14                |
|                        | 122124 | 105    | 100    | M-16   | 1,405       | 800                          | 16                           | 80                  | 16                |
|                        | 122131 | 120    | 50     | M-16   | 1,108       | 1.500                        | 9                            | 100                 | 9                 |
|                        | 122132 | 120    | 75     | M-16   | 1,366       | 1.200                        | 13                           | 100                 | 14                |
|                        | 122133 | 120    | 100    | M-16   | 1,702       | 1.000                        | 16                           | 100                 | 16                |
|                        | 122142 | 130    | 50     | M-16   | 2,125       | 1.600                        | 9                            | 120                 | 9                 |
|                        | 122143 | 130    | 75     | M-16   | 1,962       | 1.450                        | 13                           | 120                 | 14                |
|                        | 122144 | 130    | 100    | M-16   | 2,356       | 1.200                        | 16                           | 120                 | 16                |
|                        | 122151 | 150    | 50     | M-20   | 2,024       | 1.800                        | 9                            | 140                 | 9                 |
|                        | 122152 | 150    | 75     | M-20   | 2,558       | 1.650                        | 13                           | 140                 | 14                |
|                        | 122153 | 150    | 100    | M-20   | 2,996       | 1.400                        | 16                           | 140                 | 16                |

## 4. BRB



### BRB

#### DESCRIPTION

The BRB type AMC MECANOCAUCHO® mounts are antivibration elements which work the rubber in shear and compression. Their tall height section produce large deflections, low natural frequencies, and excellent vibration isolation results. This range of mounts is suitable for applications where high vibration isolation in the 85-95% range is a priority.

#### TECHNICAL CHARACTERISTICS

- The top metal hood protects the rubber from the Ozone, UV rays, diesel or oils which damage the rubber.
- The metal parts have a suitable anticorrosive treatment for outdoor applications. RoHS compliant.
- They have an interlocking metal component that provides a fail-safe protection for mobile applications. This device limits the ascending vertical movement when the mounting is submitted to shocks at traction.
- The mounts are clearly identified, as the base-plates are engraved with the type and hardness, which makes it possible to easily recognise the part even after several years of use.
- The hood has a cross stamped on the top, which enhances its rigidity on mobile applications and also improves the evacuation of oils or liquids that precipitate onto it.

#### APPLICATIONS

This mount is suitable for the isolation of mobile rotating machines which are exposed to axial and radial shocks, dripping oil, diesel or exposure to the weather. It is particularly interesting for applications where a high level of vibration isolation is required.

DNV Marine Type approval



S.B. = Square Base

| Type         | A (mm) | B (mm) | C (mm) | D1 (Min) | D2 (Max) | E (mm) | F (mm) | G (mm) | Weight (kg) | Code   | Load (kg) | Shore |
|--------------|--------|--------|--------|----------|----------|--------|--------|--------|-------------|--------|-----------|-------|
| BRB 50       | 50     | 25     | M-8    | 61       | 70       | 85     | 6,5    | 2      | 117         | 135451 | 20        | 40 Sh |
|              |        |        |        |          |          |        |        |        |             | 135453 | 40        | 50 Sh |
|              |        |        |        |          |          |        |        |        |             | 135455 | 60        | 60 Sh |
|              |        |        |        |          |          |        |        |        |             | 135457 | 80        | 70 Sh |
| BRB 60       | 64     | 35     | M-10   | 76,5     | 90,5     | 110    | 9      | 2,5    | 225         | 135101 | 30        | 40 Sh |
|              |        |        |        |          |          |        |        |        |             | 135405 | 45        | 50 Sh |
|              |        |        |        |          |          |        |        |        |             | 135103 | 65        | 60 Sh |
|              |        |        |        |          |          |        |        |        |             | 135104 | 75        | 70 Sh |
| BRB 65 M10   | 64     | 35     | M-10   | 76,5     | 90,5     | 110    | 9      | 2,5    | 248         | 135421 | 50        | 40 Sh |
|              |        |        |        |          |          |        |        |        |             | 135422 | 75        | 50 Sh |
|              |        |        |        |          |          |        |        |        |             | 135423 | 120       | 60 Sh |
|              |        |        |        |          |          |        |        |        |             | 135424 | 140       | 70 Sh |
| BRB 65 M12   | 64     | 35     | M-12   | 76,5     | 90,5     | 110    | 9      | 2,5    | 248         | 135431 | 50        | 40 Sh |
|              |        |        |        |          |          |        |        |        |             | 135432 | 75        | 50 Sh |
|              |        |        |        |          |          |        |        |        |             | 135433 | 120       | 60 Sh |
|              |        |        |        |          |          |        |        |        |             | 135434 | 140       | 70 Sh |
| BRB 70       | 64     | 35     | M-12   | 100      | 100      | 120    | 11     | 3      | 253         | 135251 | 50        | 40 Sh |
|              |        |        |        |          |          |        |        |        |             | 135252 | 75        | 50 Sh |
|              |        |        |        |          |          |        |        |        |             | 135253 | 120       | 60 Sh |
|              |        |        |        |          |          |        |        |        |             | 135254 | 140       | 70 Sh |
| BRB 80 M10   | 83     | 35     | M-10   | 108      | 112      | 135    | 11     | 3      | 398         | 135231 | 80        | 40 Sh |
|              |        |        |        |          |          |        |        |        |             | 135232 | 130       | 50 Sh |
|              |        |        |        |          |          |        |        |        |             | 135233 | 175       | 60 Sh |
|              |        |        |        |          |          |        |        |        |             | 135234 | 235       | 70 Sh |
| BRB 80 M12   | 83     | 35     | M-12   | 108      | 112      | 135    | 11     | 3      | 398         | 135275 | 80        | 40 Sh |
|              |        |        |        |          |          |        |        |        |             | 135276 | 130       | 50 Sh |
|              |        |        |        |          |          |        |        |        |             | 135277 | 175       | 60 Sh |
|              |        |        |        |          |          |        |        |        |             | 135278 | 235       | 70 Sh |
| BRB 95 M10   | 92     | 39     | M-10   | 122      | 126,5    | 150    | 10     | 3      | 657         | 135771 | 150       | 40 Sh |
|              |        |        |        |          |          |        |        |        |             | 135772 | 260       | 50 Sh |
|              |        |        |        |          |          |        |        |        |             | 135773 | 330       | 60 Sh |
|              |        |        |        |          |          |        |        |        |             | 135774 | 390       | 70 Sh |
| BRB 95 M12   | 92     | 39     | M-12   | 122      | 126,5    | 150    | 10     | 3      | 657         | 135761 | 150       | 40 Sh |
|              |        |        |        |          |          |        |        |        |             | 135762 | 260       | 50 Sh |
|              |        |        |        |          |          |        |        |        |             | 135763 | 330       | 60 Sh |
|              |        |        |        |          |          |        |        |        |             | 135764 | 390       | 70 Sh |
| BRB 110 M12  | 106    | 41     | M-12   | 137      | 148      | 175    | 13     | 3      | 857         | 135241 | 200       | 40 Sh |
|              |        |        |        |          |          |        |        |        |             | 135242 | 305       | 50 Sh |
|              |        |        |        |          |          |        |        |        |             | 135243 | 420       | 60 Sh |
|              |        |        |        |          |          |        |        |        |             | 135244 | 450       | 70 Sh |
| BRB 110 M16  | 106    | 41     | M-16   | 137      | 148      | 175    | 13     | 3      | 857         | 135331 | 200       | 40 Sh |
|              |        |        |        |          |          |        |        |        |             | 135332 | 305       | 50 Sh |
|              |        |        |        |          |          |        |        |        |             | 135333 | 420       | 60 Sh |
|              |        |        |        |          |          |        |        |        |             | 135334 | 450       | 70 Sh |
| BRB 125      | 123    | 48     | M-16   | 154      | 162      | 190    | 14     | 4      | 1170        | 135618 | 350       | 40 Sh |
|              |        |        |        |          |          |        |        |        |             | 135620 | 500       | 50 Sh |
|              |        |        |        |          |          |        |        |        |             | 135622 | 700       | 60 Sh |
|              |        |        |        |          |          |        |        |        |             | 135624 | 900       | 70 Sh |
| BRB 150 S.B. | 156    | 53,5   | M-16   | 125      | 132      | 164    | 14,5   | 4      | 2030        | 135205 | 450       | 40 Sh |
|              |        |        |        |          |          |        |        |        |             | 135206 | 570       | 50 Sh |
|              |        |        |        |          |          |        |        |        |             | 135207 | 800       | 60 Sh |
|              |        |        |        |          |          |        |        |        |             | 135208 | 1000      | 70 Sh |
| BRB 150      | 156    | 53,5   | M-16   | 176      | 188      | 218    | 14,5   | 4      | 1840        | 135161 | 450       | 40 Sh |
|              |        |        |        |          |          |        |        |        |             | 135162 | 570       | 50 Sh |
|              |        |        |        |          |          |        |        |        |             | 135163 | 800       | 60 Sh |
|              |        |        |        |          |          |        |        |        |             | 135164 | 1000      | 70 Sh |
| BRB 180      | 186    | 84     | M-20   | 146      | 150      | 181    | 14     | 5      | 3800        | 135391 | 875       | 40 Sh |
|              |        |        |        |          |          |        |        |        |             | 135392 | 1200      | 50 Sh |
|              |        |        |        |          |          |        |        |        |             | 135393 | 1700      | 60 Sh |
|              |        |        |        |          |          |        |        |        |             | 135394 | 2400      | 70 Sh |
| BRB 220      | 230    | 105    | M-24   | 180      | 180      | 220    | 19     | 6      | 6716        | 135201 | 1600      | 40 Sh |
|              |        |        |        |          |          |        |        |        |             | 135202 | 2400      | 50 Sh |
|              |        |        |        |          |          |        |        |        |             | 135203 | 3400      | 60 Sh |





## 5. Marine Mounts



### MARINE MOUNTS

#### DESCRIPTION

The Marine-type AMC MECANOCAUCHO® mounts are ideal for mobile applications thanks to their rugged architecture.

Their special design offers different stiffnesses on the three axes, they are antivibration mounts with great vertical elasticity, great longitudinal stiffness and optimal lateral stiffness to offer extra isolation on this axis.

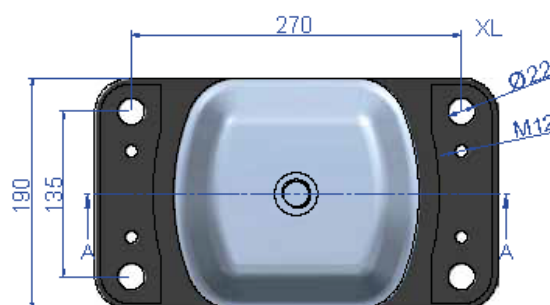
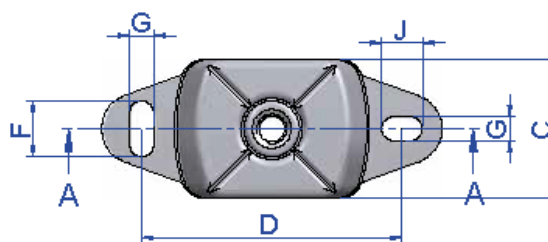
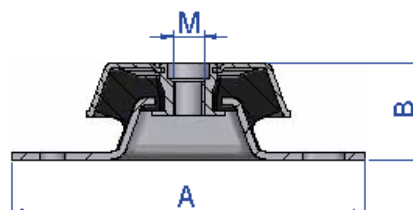
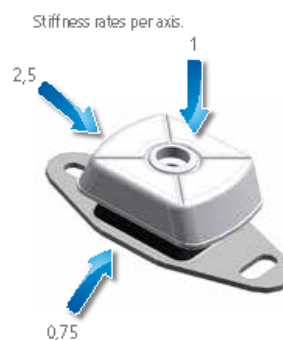
#### TECHNICAL CHARACTERISTICS

- The top part of the hood has a cross-shaped stamp, which improves its stiffness in mobile applications and also improves the evacuation of oils or liquid which splash onto it.
- The metal parts have an anticorrosive treatment which is suitable for outdoor applications. RoHS compliant.
- The mounts are clearly identified, as the bases are engraved with the type and hardness.
- They have an interlocking metal component that provides a fail-safe protection for mobile applications. This device limits the ascending vertical movement when the mounting is submitted to shocks at traction.
- The top part protects the elastomer inside from possible dripping oil, diesel, ozone and ultraviolet emissions that may cause major damage to the rubber.
- The different stiffnesses for each axis make it possible to offer major flexibility in the direction perpendicular to the crankshaft/shaft of the motor. This provides more effective isolation from vibrations of all types of engines.
- For marine engine applications, contact the AMC-MECANOCAUCHO® technical department.

#### APPLICATIONS

In mobile rotating machines that need a major isolation capacity from vibrations and noises, such as:

- Pumps
- Marine-Land units
- Mobile electrical panels
- Industrial vehicles
- Compressors
- Ventilators
- Marine Propellers



Drawing Marine XL

DNV Marine Type approval

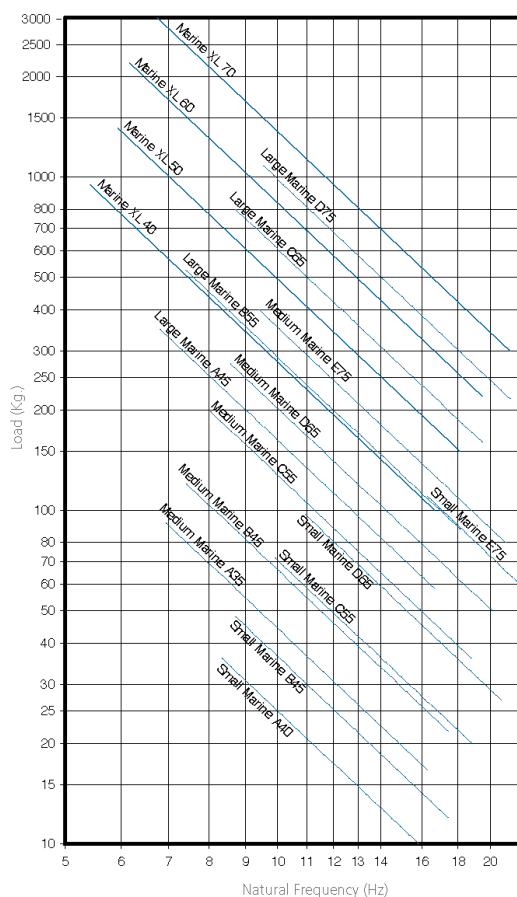


## ANTI-VIBRATION MOUNTS

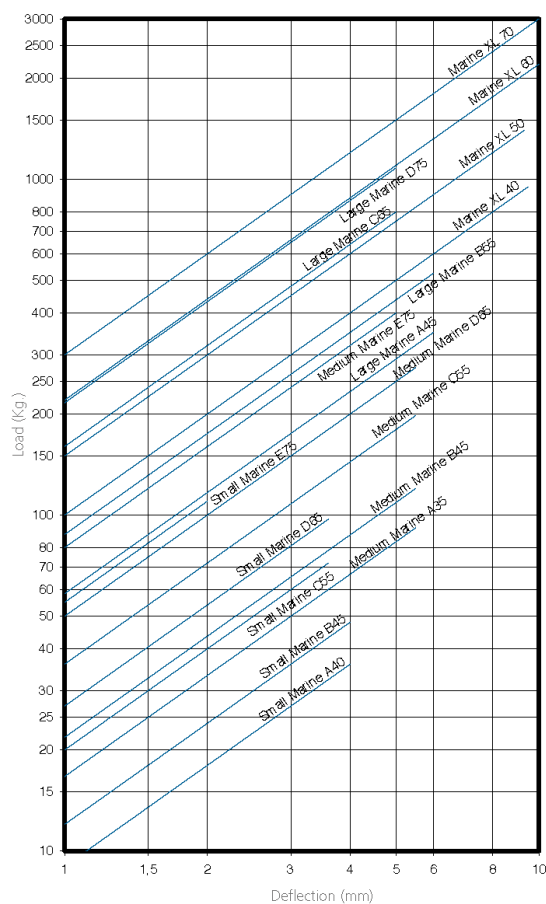
### MARINE TYPE MOUNT

| Type   | A (mm) | B (mm) | C (mm) | D (mm) | F (mm) | G (mm) | H (mm) | J (mm) | M    | Weight (gr.) | Code   | Load (kg) | Shore |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|------|--------------|--------|-----------|-------|
| SMALL  | 120    | 40     | 60     | 100    | 14     | 11     | 14     | 11     | M-12 | 397          | 136001 | 35        | 40 Sh |
|        |        |        |        |        |        |        |        |        |      |              | 136002 | 45        | 45 Sh |
|        |        |        |        |        |        |        |        |        |      |              | 136003 | 70        | 55 Sh |
|        |        |        |        |        |        |        |        |        |      |              | 136004 | 95        | 65 Sh |
|        |        |        |        |        |        |        |        |        |      |              | 136005 | 110       | 75 Sh |
| MEDIUM | 184    | 50     | 75     | 140    | 30     | 13     | 13     | 22     | M-16 | 857          | 136021 | 95        | 35 Sh |
|        |        |        |        |        |        |        |        |        |      |              | 136022 | 120       | 45 Sh |
|        |        |        |        |        |        |        |        |        |      |              | 136023 | 220       | 55 Sh |
|        |        |        |        |        |        |        |        |        |      |              | 136024 | 280       | 65 Sh |
|        |        |        |        |        |        |        |        |        |      |              | 136025 | 400       | 75 Sh |
| LARGE  | 228    | 68     | 112    | 182    | 34     | 18     | 18     | 26     | M-20 | 2250         | 136041 | 350       | 45 Sh |
|        |        |        |        |        |        |        |        |        |      |              | 136042 | 525       | 55 Sh |
|        |        |        |        |        |        |        |        |        |      |              | 136043 | 800       | 65 Sh |
|        |        |        |        |        |        |        |        |        |      |              | 136044 | 1080      | 75 Sh |
| XL     | 330    | 112    | 190    | 270    | -      | -      | -      | -      | M-24 | 9600         | 136061 | 950       | 40 Sh |
|        |        |        |        |        |        |        |        |        |      |              | 136062 | 1400      | 50 Sh |
|        |        |        |        |        |        |        |        |        |      |              | 136063 | 2200      | 60 Sh |
|        |        |        |        |        |        |        |        |        |      |              | 136064 | 3000      | 70 Sh |

NATURAL FREQUENCY  
AMC MECANOCACHO® DYNAMIC MARINE MOUNT



LOAD DEFLECTION GRAPH  
AMC MECANOCACHO® MARINE TYPE MOUNT



\* In order to adapt its products to the state of the art, AMC S.A. reserves the right to modify the conception and manufacture of the materials presented in this catalogue without prior notice.

## 6. Vikas Sandwich 100-700

www.iac-acoustics.com

### Sandwich Mounts

### VIKAS 100-700

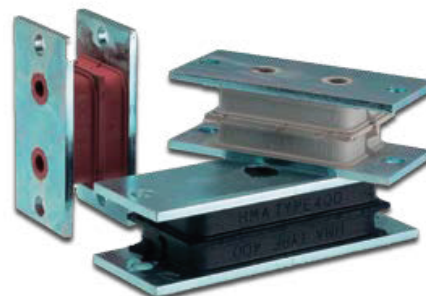
#### Product Description

The Sandwich mount is made of 3 steel plates that are zinc plated and vulcanised to layers of natural rubber. The vibration mount is made in 3 different hardnesses where the colour of the rubber indicates its hardness.

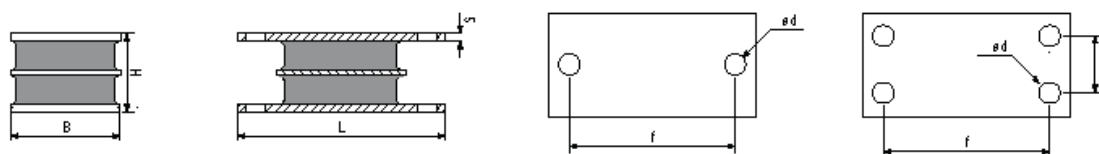
#### Application

The Sandwich vibration mount is used for reducing noise and vibration from large stationary machinery such as fans, pumps and diesel engines.

The mount is designed to be used in compression but can also be used in shear. When loaded in shear, refer to the following table for reduced maximum loadings.



[ ALSO AVAILABLE IN STAINLESS STEEL ]



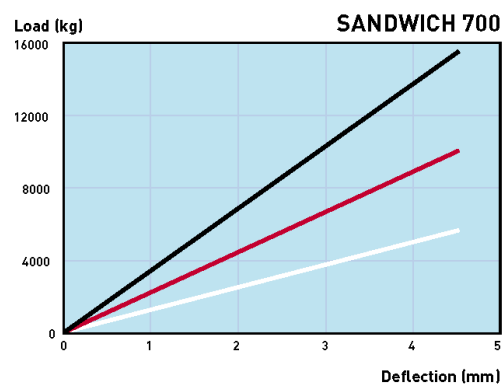
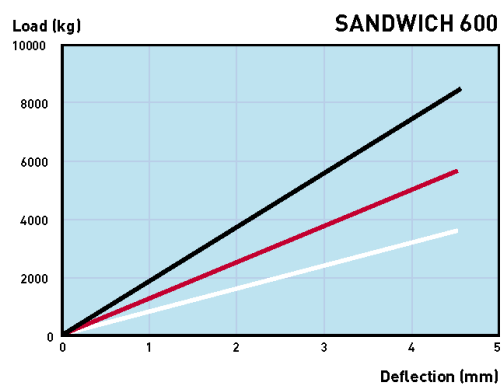
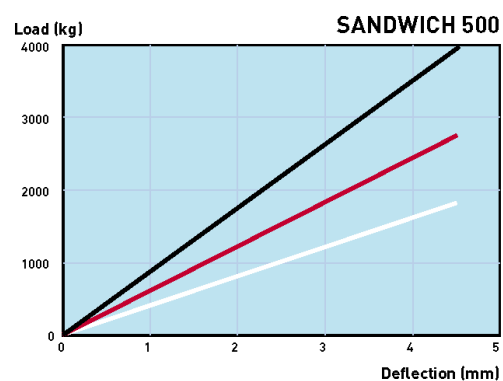
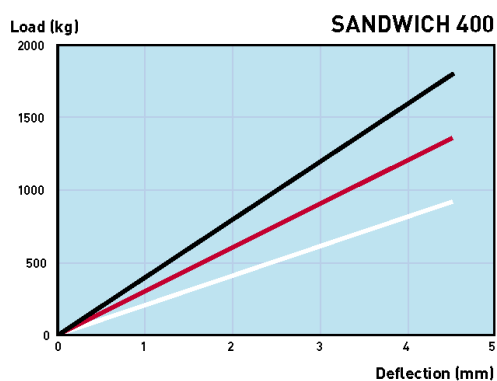
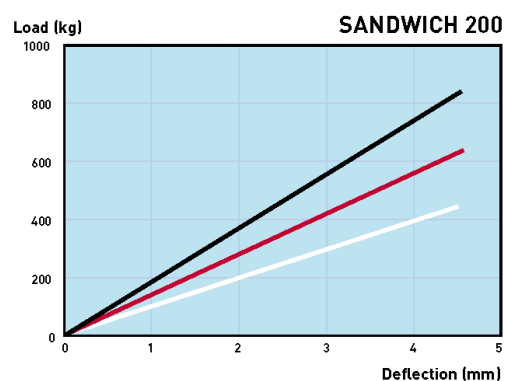
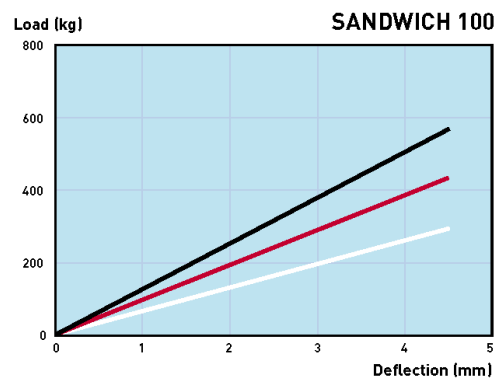
| Type | Hardness<br>[Rubber<br>Colour] | Load                 |                              | Shear                |                               | Stiffness<br>Scale* | Dimensions [mm] |     |     |    |     |    |
|------|--------------------------------|----------------------|------------------------------|----------------------|-------------------------------|---------------------|-----------------|-----|-----|----|-----|----|
|      |                                | Max.<br>Load<br>[kg] | Static<br>Deflection<br>[mm] | Max.<br>Load<br>[kg] | Spring<br>Constant<br>[kg/mm] |                     | H               | B   | L   | a  | f   | ød |
| 100  | White                          | 300                  |                              | 65                   | 3.9                           | 1.31                |                 |     |     |    |     |    |
|      | Red                            | 440                  | 4.5                          | 110                  | 6.4                           | 1.32                | 43              | 57  | 108 | -  | 89  | 11 |
|      | Black                          | 570                  |                              | 155                  | 9.6                           | 1.53                |                 |     |     |    |     |    |
| 200  | White                          | 440                  |                              | 85                   | 5.5                           | 1.31                |                 |     |     |    |     |    |
|      | Red                            | 620                  | 4.5                          | 140                  | 8.5                           | 1.32                | 43              | 57  | 127 | -  | 108 | 11 |
|      | Black                          | 830                  |                              | 200                  | 12.7                          | 1.53                |                 |     |     |    |     |    |
| 400  | White                          | 850                  |                              | 150                  | 9                             | 1.31                |                 |     |     |    |     |    |
|      | Red                            | 1300                 | 4.5                          | 235                  | 14                            | 1.32                | 43              | 57  | 168 | -  | 146 | 11 |
|      | Black                          | 1800                 |                              | 345                  | 21                            | 1.53                |                 |     |     |    |     |    |
| 500  | White                          | 1800                 |                              | 225                  | 13                            | 1.31                |                 |     |     |    |     |    |
|      | Red                            | 2700                 | 4.5                          | 375                  | 23                            | 1.32                | 43              | 83  | 216 | 51 | 178 | 11 |
|      | Black                          | 4000                 |                              | 540                  | 35                            | 1.53                |                 |     |     |    |     |    |
| 600  | White                          | 3700                 |                              | 420                  | 24                            | 1.31                |                 |     |     |    |     |    |
|      | Red                            | 5800                 | 4.5                          | 680                  | 40                            | 1.32                | 43              | 108 | 251 | 51 | 210 | 13 |
|      | Black                          | 8600                 |                              | 935                  | 54                            | 1.53                |                 |     |     |    |     |    |
| 700  | White                          | 6400                 |                              | 505                  | 30                            | 1.31                |                 |     |     |    |     |    |
|      | Red                            | 10000                | 4.5                          | 855                  | 52                            | 1.32                | 43              | 108 | 302 | 51 | 260 | 14 |
|      | Black                          | 15000                |                              | 1180                 | 71                            | 1.53                |                 |     |     |    |     |    |

\* Stiffness scale is the relation between the dynamic and static stiffness.

Errors and Omissions Excepted (EEOE).

## Deflection, Static Load

VIKAS 100-700



Errors and Omissions Excepted [E&OE].

## 7 AMC Spring 2-6



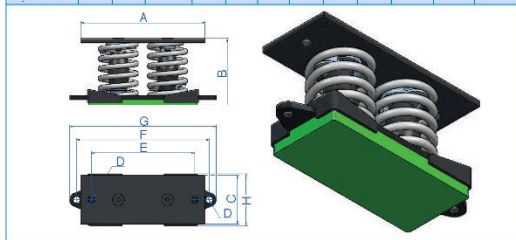
### 2 AMC

The 2 AMC spring mount is necessary in all machinery, which, by virtue of its design, has reciprocating or rotating parts, creates vibration to some degree through the imbalance of the moving parts. This vibration produced by a machine leads to different problems, such as a reduction in

the machine's useful life through part wear, plus the transmission of this vibration to other non-insulated adjacent structures, giving rise to problems of noise and vibration transmission. It is therefore important to install a spring mount to machinery.

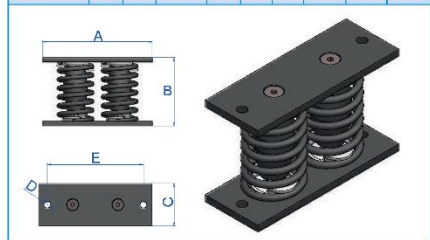
#### Vibrabsorber + **sylomer**®

| Type                  | A (mm.) | B (mm.) | Spring color | C (mm.) | D (mm.) | E (mm.) | F (mm.) | G (mm.) | H (mm.) | Max. load (kg.) | Code  | Weight (kg.) |
|-----------------------|---------|---------|--------------|---------|---------|---------|---------|---------|---------|-----------------|-------|--------------|
| 2 AMC 300 + Sylomer®  | 200     | 136     | BLUE         | 75      | 12      | 170     | 220     | 244     | 81      | 300             | 20471 | 3,1          |
| 2 AMC 400 + Sylomer®  | 200     | 136     | WHITE        | 75      | 12      | 170     | 220     | 244     | 81      | 400             | 20472 | 3,172        |
| 2 AMC 500 + Sylomer®  | 200     | 136     | BLACK        | 75      | 12      | 170     | 220     | 244     | 81      | 500             | 20473 | 3,348        |
| 2 AMC 700 + Sylomer®  | 200     | 136     | CREAM        | 75      | 12      | 170     | 220     | 244     | 81      | 700             | 20474 | 3,7          |
| 2 AMC 1000 + Sylomer® | 250     | 136     | LIGHT GREY   | 100     | 14      | 210     | 270     | 298     | 106     | 1000            | 20475 | 5,9          |
| 2 AMC 1500 + Sylomer® | 250     | 136     | GREEN        | 100     | 14      | 210     | 270     | 298     | 106     | 1500            | 20476 | 6,844        |

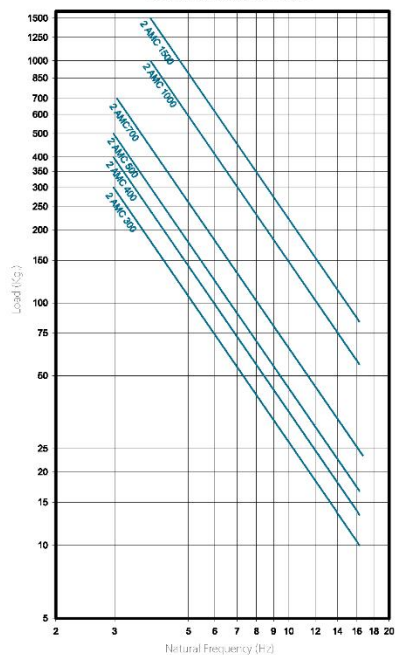


#### Vibrabsorber

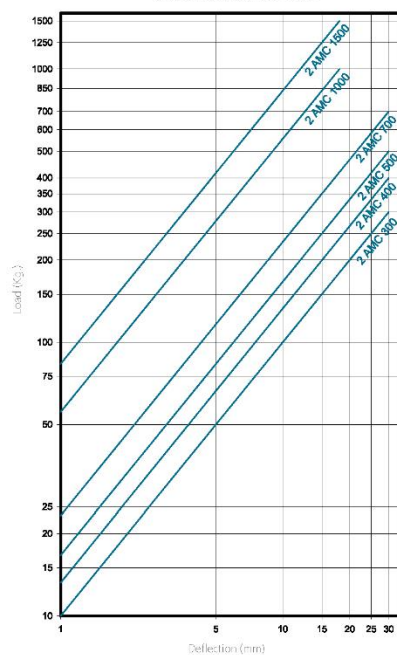
| Type        | A (mm.) | B (mm.) | Spring color | C (mm.) | D (mm.) | E (mm.) | Max. load (kg.) | Code  | Weight (kg.) |
|-------------|---------|---------|--------------|---------|---------|---------|-----------------|-------|--------------|
| 2 AMC 300   | 200     | 124     | BLUE         | 75      | 12      | 170     | 300             | 20401 | 3,1          |
| 2 AMC 400   | 200     | 124     | WHITE        | 75      | 12      | 170     | 400             | 20411 | 3,172        |
| 2 AMC 500   | 200     | 124     | BLACK        | 75      | 12      | 170     | 500             | 20421 | 3,348        |
| 2 AMC 700   | 200     | 124     | CREAM        | 75      | 12      | 170     | 700             | 20431 | 3,7          |
| 2 AMC 1.000 | 250     | 124     | LIGHT GREY   | 100     | 14      | 210     | 1000            | 20441 | 5,9          |
| 2 AMC 1.500 | 250     | 124     | GREEN        | 100     | 14      | 210     | 1500            | 20451 | 6,844        |



DYNAMIC NATURAL FREQUENCY RANGE  
AMC-MECANOCAUCHO® 2 AMC



LOAD VS DEFLECTION DIAGRAM  
AMC-MECANOCAUCHO® 2 AMC





## VIBRABSORBER + sylomer®

GENERAL CATALOGUE

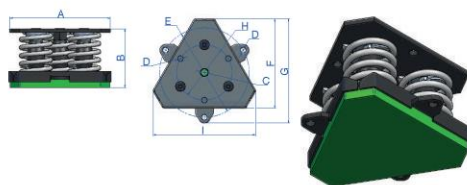
### 3 AMC

The 3 AMC spring mount is necessary in all machinery, which, by virtue of its design, has reciprocating or rotating parts, creates vibration to some degree through the imbalance of the moving parts. This vibration produced by a machine leads to different problems, such as a reduction in

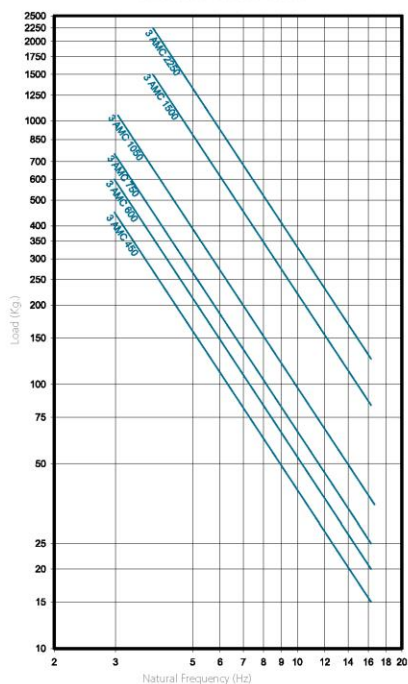
the machine's useful life through part wear, plus the transmission of this vibration to other non-insulated adjacent structures, giving rise to problems of noise and vibration transmission. It is therefore important to install a spring mount to machinery.

#### Vibrabsorber + sylomer®

| Type                 | A (mm) | B (mm) | Spring color | C (mm) | D (mm) | E (mm) | F (mm) | G (mm) | H (mm) | I (mm) | Max Load (kg) | Code  | Weight (kg) |
|----------------------|--------|--------|--------------|--------|--------|--------|--------|--------|--------|--------|---------------|-------|-------------|
| 3 AMC 450 +Sylomer®  | 196,3  | 136    | BLUE         | M-16   | 12     | 180    | 176    | 207,7  | 110    | 201,4  | 450           | 20571 | 4,6         |
| 3 AMC 600 +Sylomer®  | 196,3  | 136    | WHITE        | M-16   | 12     | 180    | 176    | 207,7  | 110    | 201,4  | 600           | 20572 | 4,714       |
| 3 AMC 750 +Sylomer®  | 196,3  | 136    | BLACK        | M-16   | 12     | 180    | 176    | 207,7  | 110    | 201,4  | 750           | 20573 | 4,978       |
| 3 AMC 1050 +Sylomer® | 196,3  | 136    | CREAM        | M-16   | 12     | 180    | 176    | 207,7  | 110    | 201,4  | 1050          | 20574 | 5,524       |
| 3 AMC 1500 +Sylomer® | 246    | 136    | LIGHT GREY   | M-20   | 14     | 220    | 219    | 255,7  | 136    | 251    | 1500          | 20575 | 8,564       |
| 3 AMC 2250 +Sylomer® | 246    | 136    | GREEN        | M-20   | 14     | 220    | 219    | 255,7  | 136    | 251    | 2250          | 20576 | 9,964       |

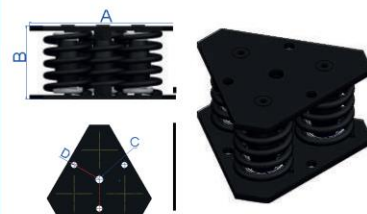


DYNAMIC NATURAL FREQUENCY RANGE  
AMC-MECANOCALUCHO® 3 AMC

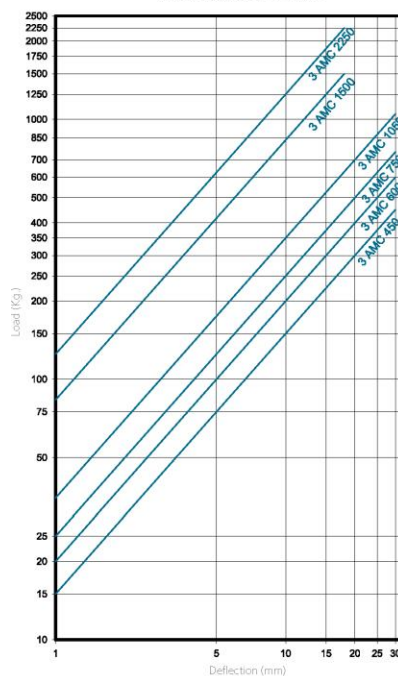


#### Vibrabsorber

| Type       | A (mm) | B (mm) | Spring color | C (mm) | D (mm) | Max Load (kg) | Code  | Weight (kg) |
|------------|--------|--------|--------------|--------|--------|---------------|-------|-------------|
| 3 AMC 450  | 196,3  | 124    | BLUE         | M-16   | 12     | 450           | 20501 | 4,6         |
| 3 AMC 600  | 196,3  | 124    | WHITE        | M-16   | 12     | 600           | 20511 | 4,714       |
| 3 AMC 750  | 196,3  | 124    | BLACK        | M-16   | 12     | 750           | 20521 | 4,978       |
| 3 AMC 1050 | 196,3  | 124    | CREAM        | M-16   | 12     | 1050          | 20531 | 5,524       |
| 3 AMC 1500 | 242    | 124    | LIGHT GREY   | M-20   | 14     | 1500          | 20541 | 8,564       |
| 3 AMC 2250 | 242    | 124    | GREEN        | M-20   | 14     | 2250          | 20551 | 9,964       |



LOAD VS DEFLECTION DIAGRAM  
AMC-MECANOCALUCHO® 3 AMC





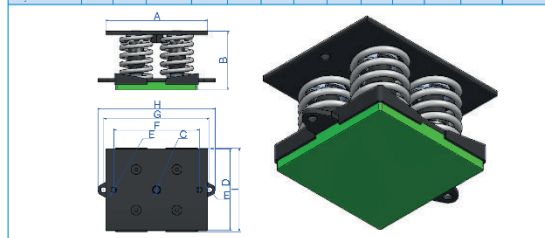
## 4 AMC

The 4 AMC spring mount is necessary in all machinery, which, by virtue of its design, has reciprocating or rotating parts, creates vibration to some degree through the imbalance of the moving parts. This vibration produced by a machine leads to different problems, such as a reduction in

the machine's useful life through part wear, plus the transmission of this vibration to other non-insulated adjacent structures, giving rise to problems of noise and vibration transmission. It is therefore important to install a spring mount to machinery.

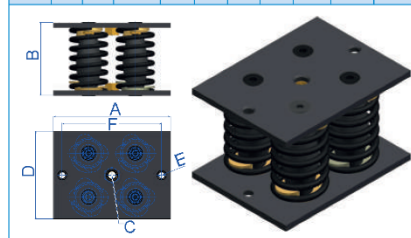
### Vibrabsorber + **sylomer**<sup>®</sup>

| Type                                 | A<br>(mm) | B<br>(mm) | Spring<br>color | C<br>(mm) | D<br>(mm) | E<br>(mm) | F<br>(mm) | G<br>(mm) | H<br>(mm) | I<br>(mm) | Max<br>Load<br>(kg.) | Code  | Weight<br>(kg.) |
|--------------------------------------|-----------|-----------|-----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------------------|-------|-----------------|
| 4 AMC 600<br>+ Sylomer <sup>®</sup>  | 200       | 136       | BLUE            | M-16      | 150       | 12        | 170       | 190       | 214       | 156       | 600                  | 20671 | 6,412           |
| 4 AMC 800<br>+ Sylomer <sup>®</sup>  | 200       | 136       | WHITE           | M-16      | 150       | 12        | 170       | 190       | 214       | 156       | 800                  | 20672 | 6,572           |
| 4 AMC 1000<br>+ Sylomer <sup>®</sup> | 200       | 136       | BLACK           | M-16      | 150       | 12        | 170       | 190       | 214       | 156       | 1000                 | 20673 | 6,7             |
| 4 AMC 1400<br>+ Sylomer <sup>®</sup> | 200       | 136       | CREAM           | M-16      | 150       | 12        | 170       | 190       | 214       | 156       | 1400                 | 20674 | 7,636           |
| 4 AMC 2000<br>+ Sylomer <sup>®</sup> | 250       | 136       | LIGHT<br>GREY   | M-20      | 200       | 14        | 210       | 260       | 288       | 206       | 2000                 | 20675 | 12,1            |
| 4 AMC 3000<br>+ Sylomer <sup>®</sup> | 250       | 136       | GREEN           | M-20      | 200       | 14        | 210       | 260       | 288       | 206       | 3000                 | 20676 | 13,962          |

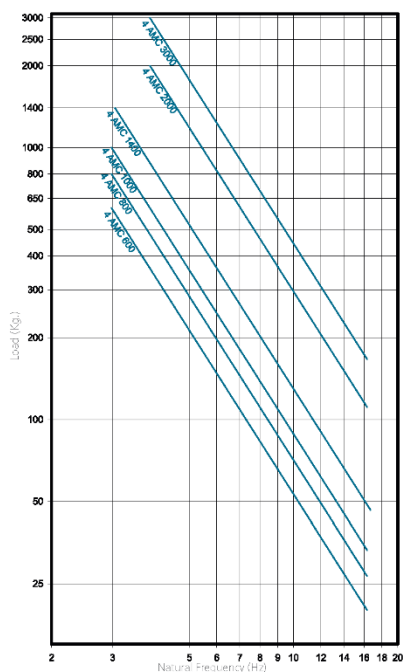


### Vibrabsorber

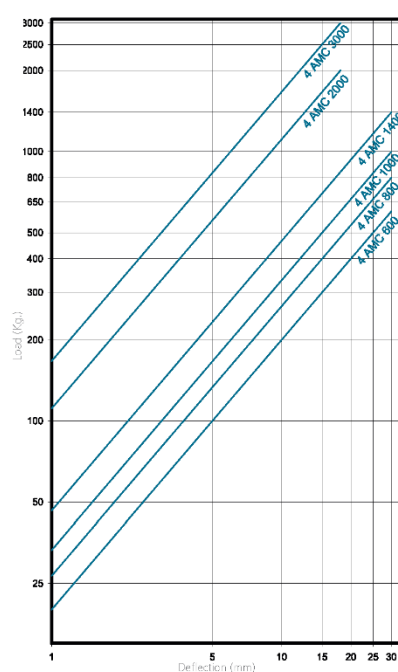
| Type       | A<br>(mm) | B<br>(mm) | Spring<br>color | C<br>(mm) | D<br>(mm) | E<br>(mm) | F<br>(mm) | Max<br>Load<br>(kg.) | Code  | Weight<br>(kg.) |
|------------|-----------|-----------|-----------------|-----------|-----------|-----------|-----------|----------------------|-------|-----------------|
| 4 AMC 600  | 200       | 124       | BLUE            | M-16      | 150       | 12        | 170       | 600                  | 20601 | 6,412           |
| 4 AMC 800  | 200       | 124       | WHITE           | M-16      | 150       | 12        | 170       | 800                  | 20611 | 6,572           |
| 4 AMC 1000 | 200       | 124       | BLACK           | M-16      | 150       | 12        | 170       | 1000                 | 20621 | 6,7             |
| 4 AMC 1400 | 200       | 124       | CREAM           | M-16      | 150       | 12        | 170       | 1400                 | 20631 | 7,636           |
| 4 AMC 2000 | 250       | 124       | LIGHT<br>GREY   | M-20      | 200       | 14        | 210       | 2000                 | 20641 | 12,1            |
| 4 AMC 3000 | 250       | 124       | GREEN           | M-20      | 200       | 14        | 210       | 3000                 | 20651 | 13,962          |



DYNAMIC NATURAL FREQUENCY RANGE  
AMC-MECANOCAUCHO<sup>®</sup> 4 AMC



LOAD VS DEFLECTION DIAGRAM  
AMC-MECANOCAUCHO<sup>®</sup> 4 AMC





## VIBRABSORBER + sylomer®

GENERAL CATALOGUE

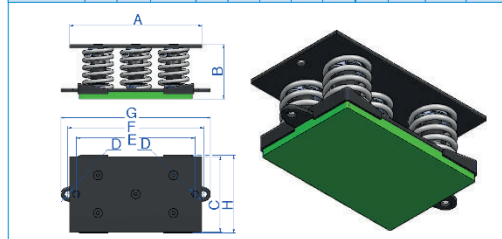
### 5 AMC

The 5 AMC spring mount is necessary in all machinery, which, by virtue of its design, has reciprocating or rotating parts, creates vibration to some degree through the imbalance of the moving parts. This vibration produced by a machine leads to different problems, such as a reduction in

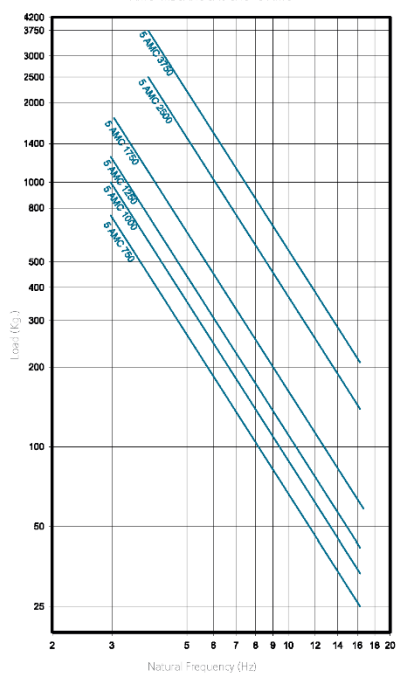
the machine's useful life through part wear, plus the transmission of this vibration to other non-insulated adjacent structures, giving rise to problems of noise and vibration transmission. It is therefore important to install a spring mount to machinery.

#### Vibrabsorber + sylomer®

| Type                    | A<br>(mm) | B<br>(mm) | Spring<br>color | C<br>(mm) | D<br>(mm) | E<br>(mm) | F<br>(mm) | G<br>(mm) | H<br>(mm) | Max.<br>Load<br>(kg) | Code  | Weight<br>(kg.) |
|-------------------------|-----------|-----------|-----------------|-----------|-----------|-----------|-----------|-----------|-----------|----------------------|-------|-----------------|
| 5 AMC 750<br>+Sylomer®  | 280       | 136       | BLUE            | 150       | 16        | 251       | 290       | 322       | 156       | 750                  | 20771 | 8,502           |
| 5 AMC 1000<br>+Sylomer® | 280       | 136       | WHITE           | 150       | 16        | 251       | 290       | 322       | 156       | 1000                 | 20772 | 8,692           |
| 5 AMC 1250<br>+Sylomer® | 280       | 136       | BLACK           | 150       | 16        | 251       | 290       | 322       | 156       | 1250                 | 20773 | 9,162           |
| 5 AMC 1750<br>+Sylomer® | 280       | 136       | CREAM           | 150       | 16        | 251       | 290       | 322       | 156       | 1750                 | 20774 | 10,037          |
| 5 AMC 2500<br>+Sylomer® | 350       | 136       | LIGHT<br>GREY   | 200       | 18        | 315       | 360       | 396       | 206       | 2500                 | 20775 | 15,716          |
| 5 AMC 3750<br>+Sylomer® | 350       | 136       | GREEN           | 200       | 18        | 315       | 360       | 396       | 206       | 3750                 | 20776 | 18,056          |

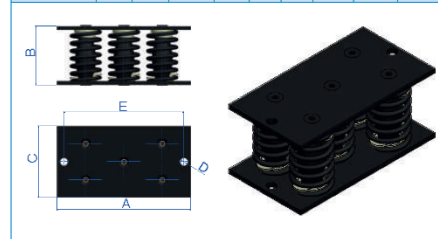


DYNAMIC NATURAL FREQUENCY RANGE  
AMC-MECANOCAUCHOP® 5 AMC

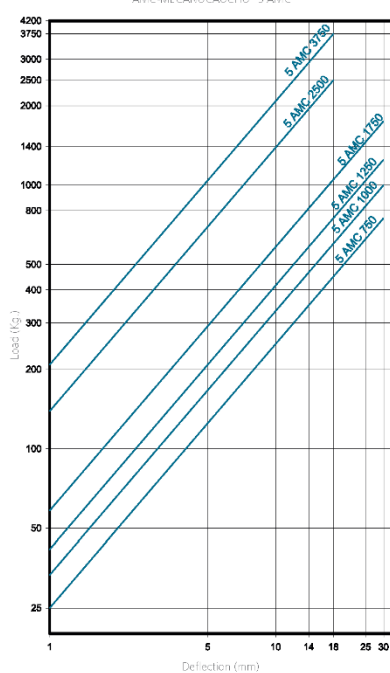


#### Vibrabsorber

| Type        | A<br>(mm) | B<br>(mm) | Spring<br>color | C<br>(mm) | D<br>(mm) | E<br>(mm) | Max.<br>Load<br>(kg.) | Code  | Weight<br>(kg.) |
|-------------|-----------|-----------|-----------------|-----------|-----------|-----------|-----------------------|-------|-----------------|
| 5 AMC 750   | 280       | 124       | BLUE            | 150       | 16        | 251       | 750                   | 20701 | 8,502           |
| 5 AMC 1.000 | 280       | 124       | WHITE           | 150       | 16        | 251       | 1000                  | 20711 | 8,692           |
| 5 AMC 1.250 | 280       | 124       | BLACK           | 150       | 16        | 251       | 1250                  | 20721 | 9,162           |
| 5 AMC 1.750 | 280       | 124       | CREAM           | 150       | 16        | 251       | 1750                  | 20731 | 10,037          |
| 5 AMC 2.500 | 350       | 124       | LIGHT<br>GREY   | 200       | 18        | 315       | 2500                  | 20741 | 15,716          |
| 5 AMC 3.750 | 350       | 124       | GREEN           | 200       | 18        | 315       | 3750                  | 20751 | 18,056          |



LOAD VS DEFLECTION DIAGRAM  
AMC-MECANOCAUCHOP® 5 AMC



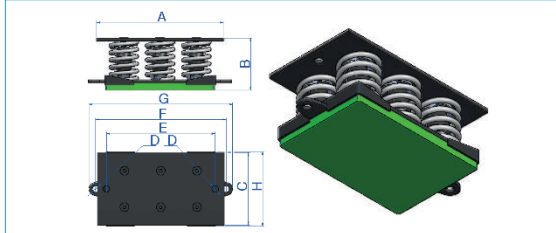
## 6 AMC

The 6 AMC spring mount is necessary in all machinery, which, by virtue of its design, has reciprocating or rotating parts, creates vibration to some degree through the imbalance of the moving parts. This vibration produced by a machine leads to different problems, such as a reduction in

the machine's useful life through part wear, plus the transmission of this vibration to other non-insulated adjacent structures, giving rise to problems of noise and vibration transmission. It is therefore important to install a spring mount to machinery.

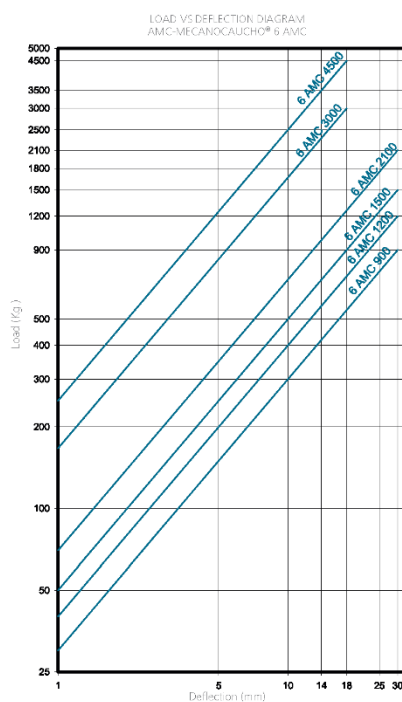
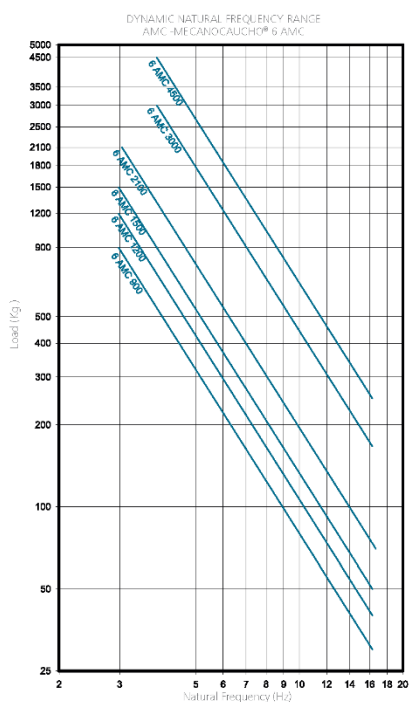
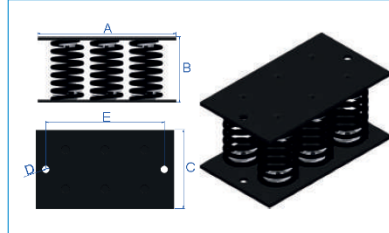
### Vibrabsorber + **sylomer®**

| Type                  | A (mm) | B (mm) | Spring color | C (mm) | D (mm) | E (mm) | F (mm) | G (mm) | H (mm) | Max Load (kg) | Code  | Weight (kg) |
|-----------------------|--------|--------|--------------|--------|--------|--------|--------|--------|--------|---------------|-------|-------------|
| 6 AMC 900 + Sylomer®  | 280    | 136    | BLUE         | 150    | 16     | 248    | 290    | 322    | 156    | 900           | 20871 | 8,928       |
| 6 AMC 1200 + Sylomer® | 280    | 136    | WHITE        | 150    | 16     | 248    | 290    | 322    | 156    | 1200          | 20872 | 9,156       |
| 6 AMC 1500 + Sylomer® | 280    | 136    | BLACK        | 150    | 16     | 248    | 290    | 322    | 156    | 1500          | 20873 | 9,684       |
| 6 AMC 2100 + Sylomer® | 280    | 136    | CREAM        | 150    | 16     | 248    | 290    | 322    | 156    | 2100          | 20874 | 10,77       |
| 6 AMC 3000 + Sylomer® | 350    | 136    | LIGHT GREY   | 200    | 18     | 300    | 360    | 396    | 206    | 3000          | 20875 | 16,848      |
| 6 AMC 4500 + Sylomer® | 350    | 136    | GREEN        | 200    | 18     | 300    | 360    | 396    | 206    | 4500          | 20876 | 19,656      |



### Vibrabsorber

| Type       | A (mm) | B (mm) | Spring color | C (mm) | D (mm) | H (mm) | Max Load (kg) | Code  | Weight (kg) |
|------------|--------|--------|--------------|--------|--------|--------|---------------|-------|-------------|
| 6 AMC 900  | 280    | 124    | BLUE         | 150    | 16     | 251    | 900           | 20801 | 8,928       |
| 6 AMC 1200 | 280    | 124    | WHITE        | 150    | 16     | 251    | 1200          | 20811 | 9,156       |
| 6 AMC 1500 | 280    | 124    | BLACK        | 150    | 16     | 251    | 1500          | 20821 | 9,684       |
| 6 AMC 2100 | 280    | 124    | CREAM        | 150    | 16     | 251    | 2100          | 20831 | 10,77       |
| 6 AMC 3000 | 350    | 124    | LIGHT GREY   | 200    | 18     | 300    | 3000          | 20841 | 16,848      |
| 6 AMC 4500 | 350    | 124    | GREEN        | 200    | 18     | 300    | 4500          | 20851 | 19,656      |



# Shaft Seal Standard Double Lip

**BarkerBille fans**



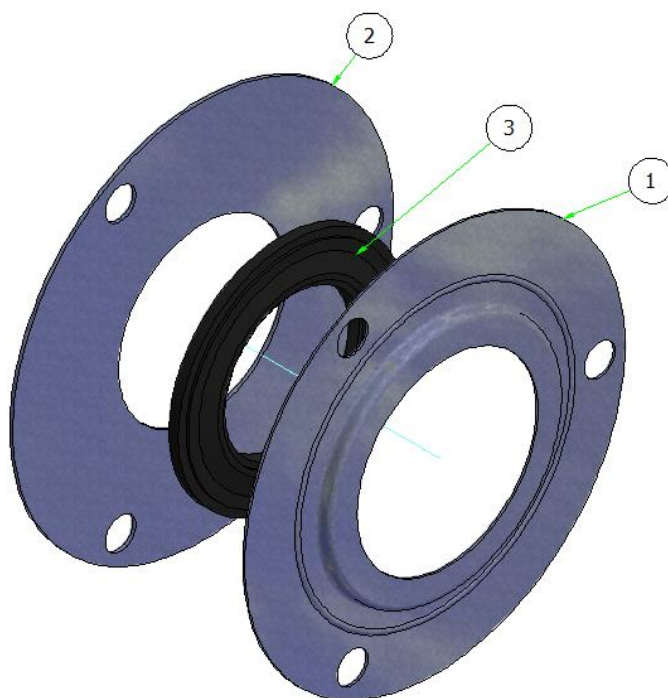
**Revision: 2018-09-27**

**Doc-17-03-EN Shaft Seal Standard Double Lip.docx**

## Standard Double Lip



The Seal is initially filled with grease from the factory.  
If changing the Lip sealing (3) new grease must be applied.



| Ref no. | Qnt. | TITLE                        |
|---------|------|------------------------------|
| 1       | 1    | Seal Housing                 |
| 2       | 1    | Back plate                   |
| 3       | 2    | SKF Lip Seals Type (TSNxxxL) |