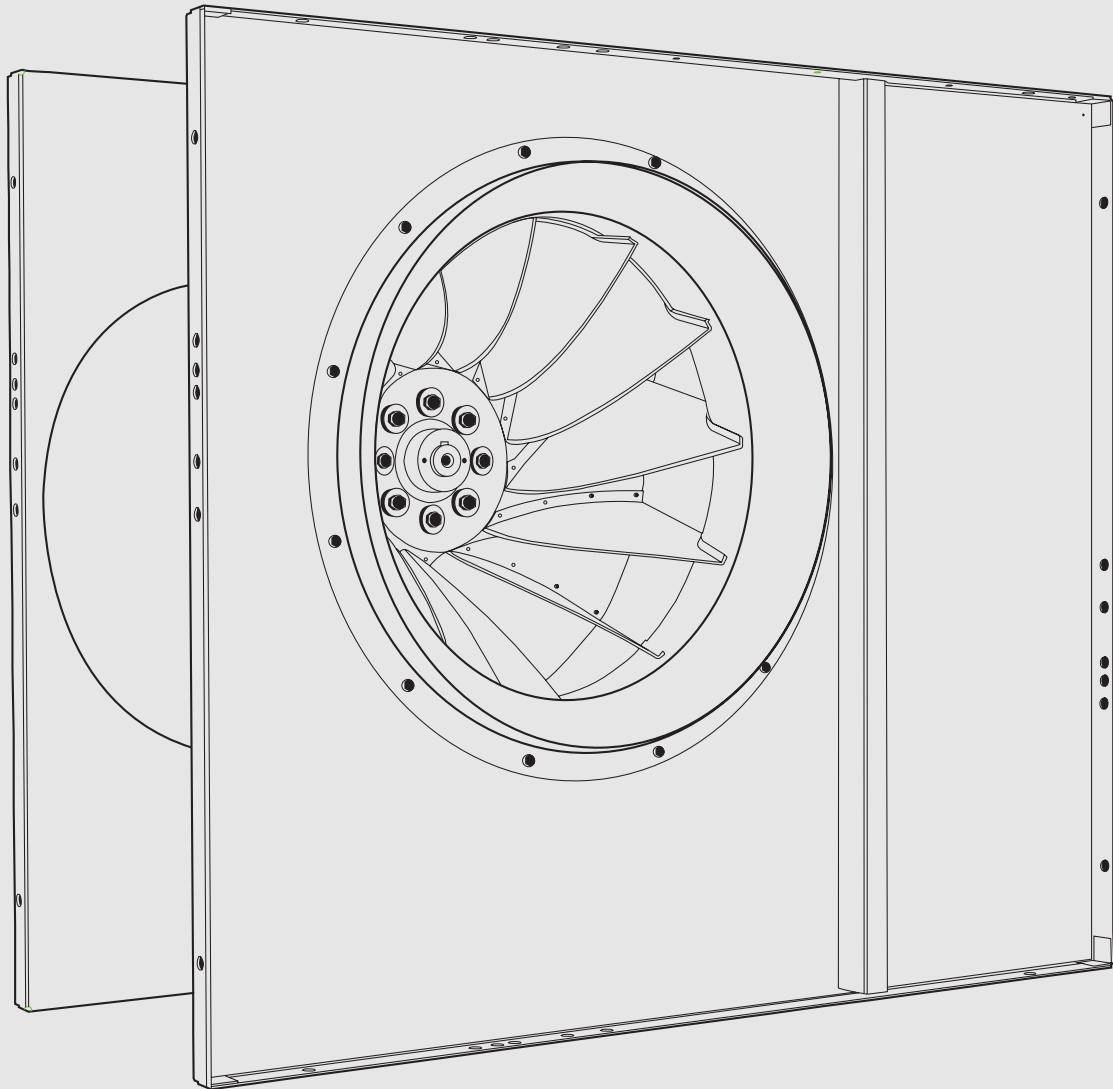


English

Building & Industry



CNA-CNB Centrifugal fans

Installation and maintenance

Centrifugal fans types CNA, CNB, CNA-M and CNB-M installation and maintenance

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1. Application

Centrifugal fans type CNA, CNB, CNA-M and CNB-M are light, compact low-pressure fans, constructed for universal installation in light industrial plants.

2. Handling

2.1 Marking

The fan is provided with a standard nameplate with Novenco's name and address. It also mentions product type, e.g. CNA 630 LG and order no.

The motor is also provided with a nameplate.

Fan type	Fan size								
	250	315	400	500	630	710	800	900	1000
CNA	42	75	93	159	216	378	444	540	677
CNB	-	-	95	168	231	402	474	575	725

Table 1. Total weights incl. motor [kg]

2.2 Weight

The total weights shown in table 1 apply to CNA, CNB, CNA-M and CNB-M, incl. the weight of the maximum motor size which can be mounted on top of the fan casing (see fig. 1).

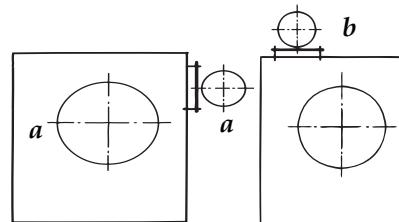


Figure 1. Placement of the motor
 a: Motor on the side (vertical motor plate).
 b: Motor on the top (horizontal motor plate)

2.3 Transport

Fan size 250 and 315 are supplied in cardboard boxes. During transit the cardboard box is placed on a pallet or the like. Size 400-1000 are supplied on pallets or bearers to allow fork-lift transport.

3. Storage

Fan size 250 and 315 cannot stand outdoor storage in the original packing. Size 400-1000 can stand outdoor storage for 1 month provided the packing is intact. If the fans are stored indoors under well-ventilated conditions with no risk of condensation the storage period is 6 months. If the storage period exceeds 3 months it is recommended to loosen any belt drive connection and turn the impeller regularly by hand. The storage location must not be exposed to vibrations likely to damage the bearings.

4. Installation

4.1 Attachment

The fan can be mounted on any of the four edges of the casing. However, it must be noted that fans provided with motor may not be mounted with larger motors than stated in table 2.

Fan size	Max. motor			
	Motor on side	Weight [kg]	Motor on top	Weight [kg]
Motor size		Motor size		Weight [kg]
250	90	20	90	20
315	112	40	112	40
400	112	40	112	40
500	132	70	132	70
630	132	70	132	70
710	132	70	160	140
800	132	70	160	140
900	132	70	180	190
1000	132	70	180	190

Table 2. Motor sizes and weight

Larger motors are mounted on slide rails next to the fan or on a common base frame.

If the motor is mounted on slide rails next to the fan, the motor shaft, fan shaft and belt pulleys must be aligned exactly in relation to each other in order to ensure that the belts run correctly in the grooves of the belt pulleys. The fan should always be mounted on a solid and level foundation to prevent deformation of the fan casing. The natural frequency of the foundation must be at least 20% higher than the highest resonating frequency of the fan.

Fan sizes up to 630 can in certain cases be mounted on the wall or suspended from the ceiling. However, it will be necessary in each individual case to make sure that the flanges of the fan casing, the mounting bolts etc. are strong enough to support the current load. If the fan is mounted on the wall, and especially if it is mounted with horizontal side plates, it will be necessary to brace the fan by plac-

ing supports under it or to suspend it in straps at a suitable distance from the wall.

To prevent vibrations spreading from the fan to the surroundings anti-vibration mountings may be inserted between fan and foundation. In cases where the motor is placed next to the fan, fan and motor must be mounted on a common base frame and the anti-vibration mountings must be mounted between base frame and foundation.

4.2 Prior to duct connection

Prior to duct connection check that all moving parts are able to move freely and wherever possible with equal distance between impeller and inlet cone throughout the circumference. Fan and adjacent ducts must also be clean and free from foreign objects and substances.

4.3 Duct connection

The spread of fan vibrations to the surroundings are avoided by inserting flexible connections between fan and ducts. The connections must be loosely extended, duct connections centred to inlet and outlet fan openings and supported to avoid overloading the flexible connections. Ducts mounted without flexible connections must be supported so that the weight does not affect the fan casing. Ducts must be designed to ensure smooth and undisturbed airflow. Avoid, for example, sharp bends before the fan inlet, as these can cause increased sound levels and reduced capacity.

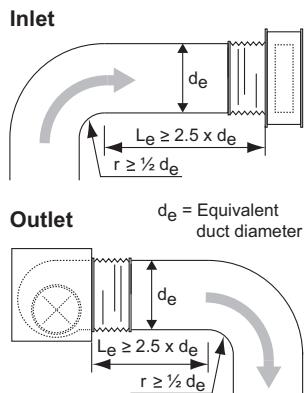


Figure 2. Example of optimal installation

Fans with free inlets or outlets must be fitted with wire guards according to current regulations to prevent contact with the impeller.

4.4 Wiring

Connection to the mains is effected by authorized personnel. The fan must be

provided with a safety switch which is switched off before working on the fan.

5. Start of operation

5.1 Prior to start of operation

Checklist prior to start of operation

- electric connections meet current regulations.
- all guards are mounted as prescribed: Inspection door, wire guard at free inlet and outlet openings and also drive guard around belt drive.
- belt tension and alignment are correct (see section 6.5).
- fans mounted on anti-vibration mountings are able to move without loading flexible and electric connections.
- direction of rotation of fan complies with the arrow-plate which is checked by short-time operation.

Motors with Y/Δ -starting

Prior to start of motor check that the relay is set to the calculated time.

5.2 Starting procedure

- Start the fan.
- Check that no abnormal mechanical noises or pulsations occur.
- Check that the vibration level is normal. This is especially important if motor and belt drive are not assembled at the factory but assembled afterwards. In those cases the effective vibration speed is measured which must not exceed 7.1 mm/s, RMS, measured on the bearing housings.

After 30 minutes of operation check that the fan operates normally and that the belt drive still has the correct tension.

Important The fan is intended for continuous operation. The following modes of operation can cause fatigue breakage in the impeller and danger of personal injury.

- Operation in stall area
- Operation with pulsating counter pressure – called pump mode
- Operation with repeated starting and stopping

If in doubt Novenco should be contacted to assess the suitability of the fan.

6. Maintenance

6.1 Protection prior to inspection and maintenance

When the fan is out of operation for reasons of inspection or repair/maintenance, the electric system must be switched off and protected so that the fan does not operate unintentionally.

6.2 Fan casing

The fan casing requires as standard no maintenance other than ordinary cleaning.

6.3 Impeller

From the factory the impeller has been carefully balanced in order to ensure vibration-free operation. Vibrations occurring during operation will normally be due to accumulations of dust or dirt on the impeller and will disappear after cleaning. Should this not be the case, expert assistance should be called in immediately as continued vibrations will shorten the life of the bearings.

6.4 Motor

The motor normally only requires cleaning and greasing of the bearings which should happen according to the motor manufacturer's instructions.

6.5 Belt drive

The belt tension should be checked at least twice a year.

Belt change and adjustment

When changing belts the motor plate and motor respectively is lowered/loosened sufficiently so that the old belts are easy to remove and the new ones are mounted on the belt pulleys.

If more belts are included, all belts must be replaced at the same time. Check that the new belts have the same tolerance (stated on the belts). The belt drive is tightened by making the distance between the motor belt pulley and fan belt pulley longer which is done either by lifting the motor plate again or by displacing the motor. When tightening the belts check both alignment and parallelism on belt pulleys (see fig. 3).

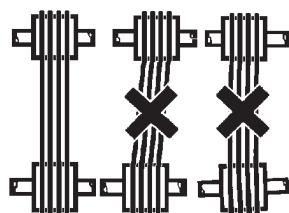


Figure 3. Belt alignment and parallelism

The correct tension of Novenco's standard belts are in table 3, defined as the ratio between the deflection of the belts depending on the pressure, the shaft distance between the belt pulleys and the diameter of the smallest pulley (see fig. 4).

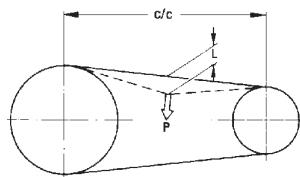


Figure 4. Belt tension

Belt profile	Diameter of smallest pulley [mm]	Normal tension, P, for each belt [N]	Belt deflection per 100 mm shaft distance [mm]
XPZ	>71 ≤ 90	25	1,95
	>90 ≤ 125		1,80
	>125		1,70
SPA	>100 ≤ 140	50	2,75
	>140 ≤ 200		2,55
	>200		2,45
SPB	>160 ≤ 224	75	2,55
	>224 ≤ 355		2,22
	>355		2,15
XPB	>160 ≤ 224	75	2,20
	>224 ≤ 355		1,85
	>355		1,75
SPC	>250 ≤ 355	125	2,55
	>355 ≤ 560		2,20
	>560		2,00

Table 3. Standard belt tension

A tension meter is recommended as exact measuring instrument, see fig.5.

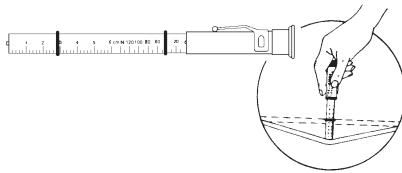


Figure 5. Tension meter

After tension of the belts the motor is fastened.

After that the fan is started as described in section 5. Start of operation.

6.6 Belt pulleys

When changing the belt pulley to another size - i. e. changed fan speed - it must be checked that the speed does not exceed the max. permissible speed which is stated on the nameplate of the fan and that the motor rating is sufficient for the changed power consumption.

The belt drive must be dimensioned having regard to the smallest permissible belt pulley diameter according to instructions from the supplier. All belt pulleys assembled at the factory are provided with a TAPER-LOCK bush.

Removal and mounting of belt pulley (fig. 6)

Do not use hammer for removal or mounting of belt pulleys as even light blows and strokes might damage the bearings resulting in noise from bearing and quick wearing.

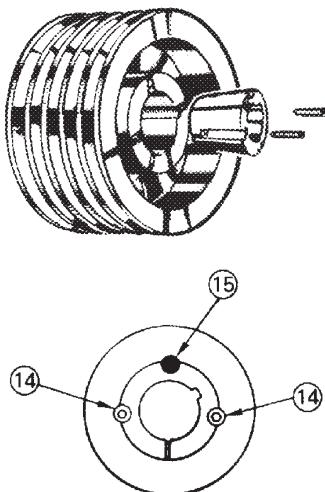


Figure 6. Belt pulley

Removal

- 1 Remove and lubricate the screws (14) slightly with oil and place one of them in the threaded hole of the bush (15).
- 2 Turn the screw so the bush is loosened from the hub of the pulley and the unit is loosened from the shaft.
- 3 Pull the belt pulley and bush off the shaft end as one unit.

Mounting

- 1 Clean the hole of the pulley and the inner and outer side of the bush for rust-preventative and check that the surfaces are totally clean.
- 2 Lubricate the screws slightly with oil and place them loosely in the threaded holes (14).
- 3 Clean the shaft and push the pulley and bush unit back onto the shaft.
- 4 Tighten the screws one after another until they are firmly tightened.
- 5 Mounting and adjustment of belts: See section 6.5 'Belt change and adjustment'.

6.7 Bearing assembly

The belt driven fans are provided with a bearing assembly. The construction of the bearing assembly varies according to fan size and type so when changing a bearing assembly follow one of the below procedures depending on size and type of fan.

After mounting of new bearings the impeller must be carefully centred in relation to the inlet cone.

CNA & CNA-M, 250-500/R and CNB & CNB-M, 400/R (See fig. 7)

The bearing assembly consists of bearing tube, ball bearings and shaft which is mounted on a conical cover in the back plate of the fan. The bearings are in dust and water-tight enclosures and cannot be re-greased. However, in special cases the bearing housings can be changed so that re-greasing can take place.

When the bearings are worn the whole bearing assembly is replaced. First remove belt guard, V-belts and fan belt pulley, then remove the conical cover with bearing assembly and impeller and at last remove impeller and bearing assembly.

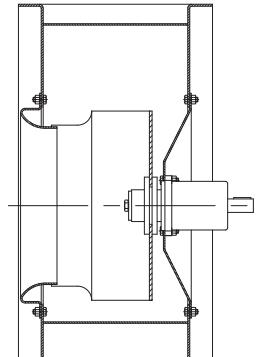


Figure 7. CNA 250-500/R and CNB 400/R

CNA & CNA-M, 630-1000/R (See fig. 8)

The bearing assembly consists of two flange single-bearings (FY) and shaft where each flange bearing is mounted on a conical cover which is mounted in the back plate of the fan. The bearings are in dust and water-tight enclosures and cannot be re-greased. In particularly exposed cases the bearing housings can be provided with a grease nipple so that re-greasing can be made.

When replacing bearings first remove belt guard, V-belts and fan belt pulley. Then remove the conical covers with bearing assembly and impeller. The impeller is withdrawn from the shaft after which the internal hexagon-headed

screws, mounted in the bearing housings, are loosened so that bearing and conical cover can be withdrawn from the shaft. Now the bearings can be removed from the conical covers. Both bearing and bearing housing are replaced.

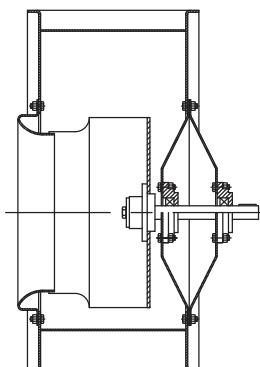


Figure 8. CNA 630-1000/R

CNB 500-1000/R & CNB-M 500-1000/R (See fig. 9)

The bearing assembly consists of bearing tube, a ball bearing, a roller bearing and shaft which is mounted between two conical covers in the back plate of the fan casing and is provided with a grease nipple. The bearing assembly must be re-greased for approx. every 2000 hours of operation with a high-quality lithium

grease, penetration class 2 (e. g. SKF Al-falub LGMT-2).

If the sealing ring at the farthest end of the bearing tube (behind belt pulley) is pushed away from the bearing during greasing, push it in place towards the bearing and remove surplus grease. When replacing the bearings first remove belt guard, V-belts and fan belt pulley. Then remove the conical covers with bearing assembly and impeller, the impeller is withdrawn from the shaft and the covers are screwed off the bearing casing. At last pull shaft and bearings out of the bearing tube from the end where the ball bearing is and remove the bearings.

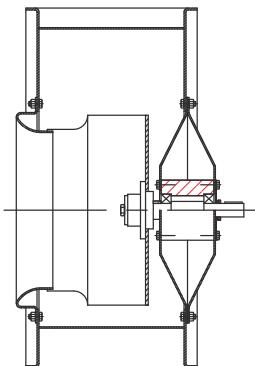


Figure 9. CNB 500-1000/R

Type / Size	Bearing assembly	Bearing house, Item no.	Bearings		Shaft		Re-greasing Amount of grease [g]
			Bearing type-1	Bearing type-2	Drawing no.	Bearing diameter [mm]	
CNA 250	Flg.double bearing	388812-0	6305-RS1	6305-RS1	489663-0	25	11
CNA 315	Flg.double bearing	388812-0	6305-RS1	6305-RS1	489663-0	25	11
CNA 400	Flg.double bearing	388812-0	6305-RS1	6305-RS1	489663-0	25	11
CNA 500	Flg.double bearing	388811-0	6306-RS1	6306-RS1	388810-0	30	14
CNA 630	FY 35 TF	FY 507 M	YAR 207 2F	<----	451390-0	35	-
CNA 710	FY 35 TF	FY 507 M	YAR 207 2F	<----	423164-0	35	-
CNA 800	FY 40 TF	FY 508 M	YAR 208 2F	<----	423165-0	40	-
CNA 900	FY 40 TF	FY 508 M	YAR 208 2F	<----	423166-0	40	-
CNA 1000	FY 55 TF	FY 511 M	YAR 211 2F	<----	423167-0	55	-
CNB 400	Flg.double bearing	388811-0	6306-RS1	6306-RS1	388810-0	30	14
CNB 500	Flange bearing	326872-0	6308-RS1	NU-308	326878-0	40	20
CNB 630	Flange bearing	326871-0	6310-RS1	NU-310	326877-0	50	30
CNB 710	Flange bearing	341042-0	6311-RS1	NU-311	326876-0	55	35
CNB 800	Flange bearing	341044-0	6311-RS1	NU-311	326875-0	55	35
CNB 900	Flange bearing	341046-0	6312-RS1	NU-312	326874-0	60	40
CNB 1000	Flange bearing	341048-0	6312-RS1	NU-312	326873-0	60	40

Table 4. Bearing types and grease amount

6.8 Dismounting of motor for CNA & CNA-M and CNB/D & CNB/D-M

When changing the motor to a motor with another number of poles it must be checked that the speed of the motor does not exceed the max. permissible speed which is stated on the nameplate of the fan. Also check that the motor rating is sufficient for the changed power consumption. In case of motor with frequency converter check also speed and power consumption as when changing the motor. When mounting the motor the impeller must be carefully centred in relation to the inlet cone.

CNA & CNA-M, 250-400/D and CNB & CNB-M, 400/D (See fig. 10)

The motor is mounted on a conical cover which is mounted direct in the back plate of the fan casing. The motor must be a standard motor with B-14 flange with threaded holes). If so, the fan casing is intended for universal mounting which is in the positions 0, 90, 180, and 270.

Dismount the motor by removing the conical cover with motor. After that withdraw the impeller from the motor shaft and remove the motor from the conical cover.

6.9 Fault localization

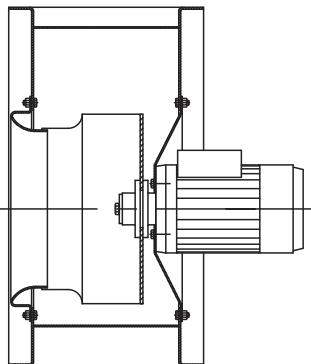


Figure 10. CNA 250-400/D and CNB 400/D

CNA & CNA-M, 500, -630/D and CNB & CNB-M, 500, -630/D (See fig. 11)
The motor is mounted on a motor bracket which is mounted on a conical cover in the back plate of the fan casing.
Dismount the motor by removing both bracket and conical cover from the fan casing. After that withdraw the impeller from the motor shaft and remove the cover, then remove the motor from the motor bracket.

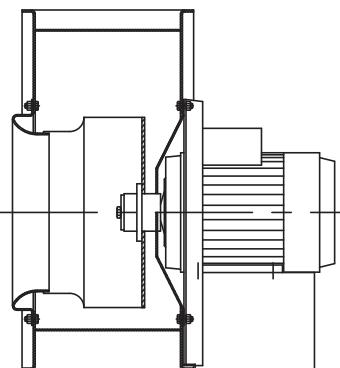


Figure 11. CNA 500 & 630/D & CNB 500 & 630/D

Deficiency in performance

- Blocked air supply on fan inlet side
- Damper closed
- Duct choked
- Installation conditions resulting in poor air flow to impeller
- Impeller has wrong direction of rotation
- Motor defective
- Motor cut out

Noise/vibrations

- Bearings in motor or bearing assembly defective
- Impeller out of balance
- Impeller worn/damaged
- Loose screws/components
- Impeller has wrong direction of rotation

7. Sound

The sound generation of the fan depends on installation and operating conditions which means that no general data of the sound generation can be given. Reference is made to our catalogues or PC programs for calculation of the specific sound generation.

8. Attestation of conformity

EU - Attestation of Conformity

Novenco Building & Industry A/S
Industrivej 22
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Denmark

Hereby declares that centrifugal fans type CNA, CNB, CNA-M and CNB-M meet the requirements of the directives below, on condition that the products are installed in accordance with the instructions included in the supply. Altering the products causes this declaration no longer to apply.

Applied directives

- Machinery 2006/42/EU
- ECO design 2009/125/EU
- ECO energy labelling 2010/30/EU
- EMC 2014/30/EU
- LVD 2014/35/EU

Applied standards and regulations

EU 327/2011:

Fans driven by motors with electric power between 125 W and 500 kW

EN ISO 12100:2011

Safety of machinery

- General principles for design
- Risk assessment and risk reduction

EN ISO 13857:

Safety of machinery - Safety distances

EN 60204-1:

Safety of machinery - Electrical equipment of machines Part 1: General Requirements

EN 61000-6-2:

EMC - Part 6-2: Generic standards - Immunity for industrial environments

EN 61000-6-3:

EMC - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments

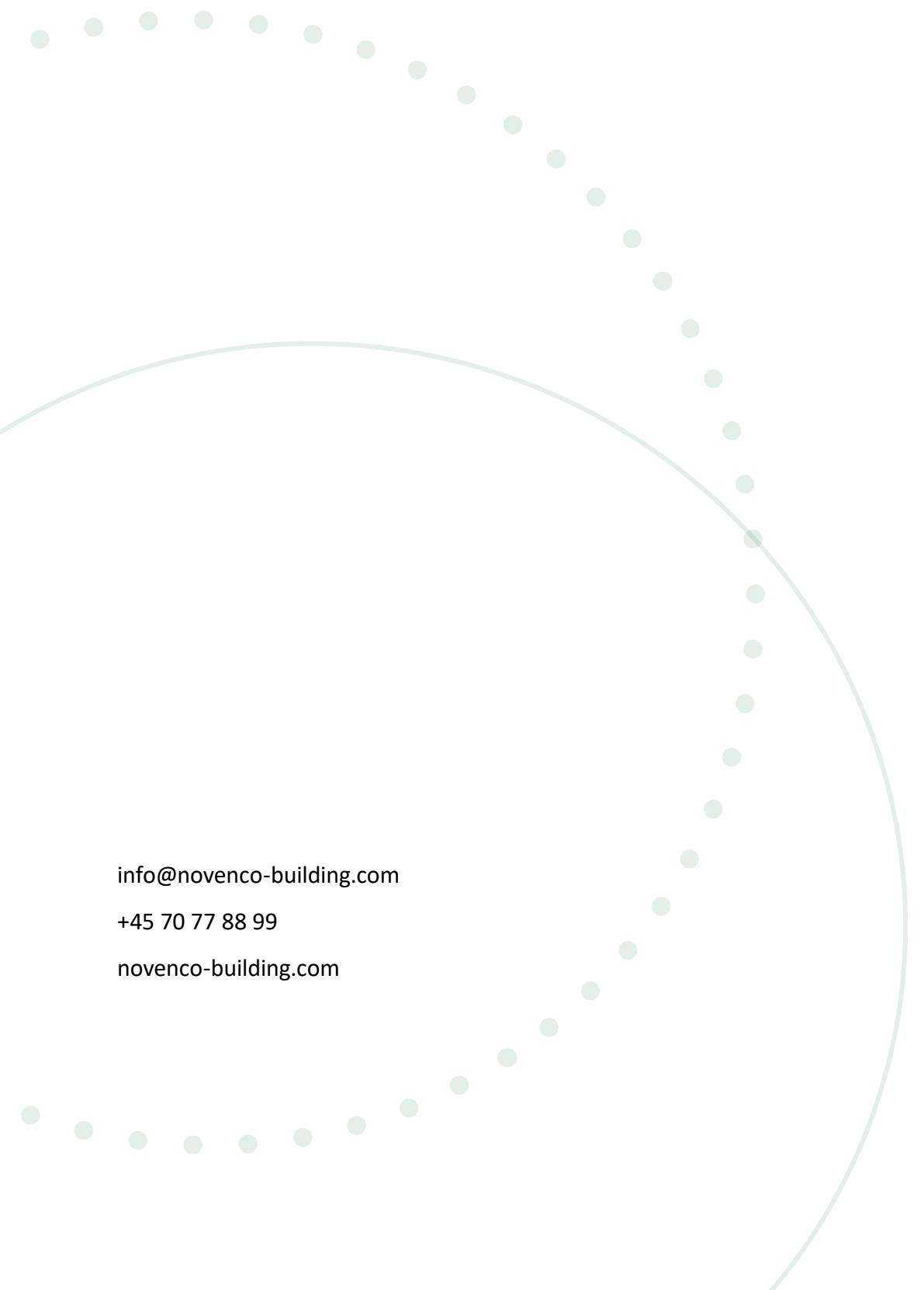
EN 61800-3, class C2:

Adjustable speed electrical power drive systems, EMC requirements and specific test methods

Naestved, 01.02.2018



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