# Air Cooler Fan Motor Protection

The purpose of this standard specification is to highlight the need to allow for higher air cooler fan motor currents when operating at low air temperatures.

## 1.0 Introduction

Motor manufacturers' motor power ratings are normally specified at Standard Temperature and Pressure (STP) conditions. When operating on low temperature air, the fan will take more power and pull more amps. In most cases the motor itself will be able to handle the higher absorbed power, however the overload must be selected to cater for the higher current.

## 2.0 Motor Current Overload Settings

Table 1 is an extract from Coolers & Condensers Bulletin CA110. The table gives the recommended overload settings for a range of cooler fans for "general and chill store" coolers, however the overload settings shown should be suitable for coolers operating on cold store duties as well.

The table gives the recommended overload settings as 24% to 27% higher than the motor full load current (FLC). As a general rule, we should allow 25% over the FLC and our electrical specifications and instructions to our panel builders should reflect this.

| Date | Issue | Originator |
|---|---|---|
| 09.12.96 | DRAFT | ADM/DJH |

| Model | FAN AND MOTOR DETAIL | | | | | | | | | | NOISE LEVEL dB(A) @ 3m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. Fans | Ext. W.WG. | IMPELLER TYPE | IMPELLER DIA. | IMPELLER RPM | OUTPUT K.W. | MOTOR CURRENT (AMPS) RUN | F.L.C. | START | O/L | |
| 5.7 | 1 | – | Propeller | 460 | 1440 | 0.30 | 1.0 | 1.0 | 3.0 | 1.3 | 69 |
| | | – | Aerofoil | 500 | 1440 | 0.37 | 1.2 | 1.3 | 4.6 | 1.6 | 69 |
| | | 0.5 | Aerofoil | 400 | 2900 | 1.1 | 2.6 | 2.6 | 14.3 | 3.3 | 76 |
| 10.12 | 1 | – | Propeller | 460 | 1440 | 0.30 | 1.0 | 1.0 | 3.0 | 1.3 | 72 |
| | | – | Aerofoil | 500 | 1440 | 0.37 | 1.2 | 1.3 | 4.6 | 1.6 | 72 |
| | | 0.5 | Aerofoil | 400 | 2900 | 1.1 | 2.6 | 2.6 | 14.3 | 3.3 | 79 |
| 15.20 | 2 | – | Propeller | 630 | 960 | 0.45 | 1.4 | 1.4 | 4.2 | 1.8 | 69 |
| | | – | Aerofoil | 630 | 940 | 0.75 | 2.5 | 2.5 | 7.5 | 3.2 | 68 |
| | | 0.5 | Aerofoil | 630 | 1440 | 1.2 | 3.3 | 3.3 | 12.0 | 4.2 | 74 |
| 24.27 | 2 | – | Axial | 760 | 920 | 1.1 | 3.3 | 3.3 | 13.2 | 4.2 | 73 |
| | | – | Aerofoil | 630 | 1440 | 1.3 | 3.3 | 3.3 | 12.0 | 4.2 | 77 |
| | | 0.5 | Aerofoil | 630 | 1440 | 1.9 | 4.8 | 5.4 | 28.5 | 6.7 | 75 |
| 30 | 2 | – | Axial | 760 | 920 | 1.1 | 3.3 | 3.3 | 13.2 | 4.2 | 73 |
| | | – | Aerofoil | 760 | 940 | 0.75 | 2.5 | 2.5 | 7.5 | 3.1 | 72 |
| | | 0.5 | Aerofoil | 760 | 1440 | 1.7 | 4.0 | 5.7 | 30.0 | 7.1 | 80 |
| 36 | 3 | – | Axial | 760 | 920 | 1.1 | 3.3 | 3.3 | 13.2 | 4.2 | 75 |
| | | – | Aerofoil | 630 | 1440 | 1.3 | 3.3 | 3.3 | 12.0 | 4.2 | 79 |
| | | 0.5 | Aerofoil | 630 | 1440 | 1.9 | 4.8 | 5.4 | 28.5 | 6.7 | 77 |
| 42 | 3 | – | Axial | 760 | 920 | 1.1 | 3.3 | 3.3 | 13.2 | 4.2 | 75 |
| | | – | Aerofoil | 760 | 940 | 0.75 | 2.5 | 2.5 | 7.5 | 3.1 | 74 |
| | | 0.5 | Aerofoil | 760 | 1440 | 2.3 | 5.2 | 5.7 | 30.0 | 7.1 | 84 |
| 48.55.60.65.72 | 3 | – | Axial | 800 | 920 | 1.4 | 3.8 | 4.0 | 16.0 | 5.0 | 79 |
| | | – | Aerofoil | 760 | 940 | 1.4 | 4.0 | 4.0 | 15.0 | 5.0 | 78 |
| | | 0.5 | Aerofoil | 760 | 1440 | 2.5 | 5.7 | 5.7 | 30.0 | 7.1 | 84 |
| 80.84.90 | 4 | – | Axial | 800 | 920 | 1.4 | 3.8 | 4.0 | 16.0 | 5.0 | 81 |
| | | – | Aerofoil | 760 | 940 | 1.4 | 4.0 | 4.0 | 15.0 | 5.0 | 80 |
| | | 0.5 | Aerofoil | 760 | 1440 | 2.5 | 5.7 | 5.7 | 30.0 | 7.1 | 86 |
| 95 | 5 | – | Axial | 800 | 920 | 1.4 | 3.8 | 4.0 | 16.0 | 5.0 | 82 |
| | | – | Aerofoil | 760 | 940 | 1.4 | 4.0 | 4.0 | 15.0 | 5.0 | 81 |
| | | 0.5 | Aerofoil | 760 | 1440 | 2.5 | 5.7 | 5.7 | 30.0 | 7.1 | 87 |
| 105 | 6 | – | Axial | 800 | 920 | 1.4 | 3.8 | 4.0 | 16.0 | 5.0 | 83 |
| | | – | Aerofoil | 760 | 940 | 1.4 | 4.0 | 4.0 | 15.0 | 5.0 | 82 |
| | | 0.5 | Aerofoil | 760 | 1440 | 2.5 | 5.7 | 5.7 | 30.0 | 7.1 | 88 |

**FAN HEATERS.** We recommend these for aerofoil or AXIAL fans at low temperatures, particularly with electric defrost. Where defrost is called for fan heaters will be supplied, except in the case of propeller fans where we consider they are not essential.

**IMPELLER TYPES.** For explanation of each see notes.

**OUTPUT K.W.** The power delivered (and absorbed) at the impeller.

**RUN CURRENT.** Motor current with selected impeller. (Clean coil and air at S.T.P.).

**F.L.C.** Motor current as marked on motor rating plate. Where F.L.C. exceeds run, motor has additional margin, where run and F.L.C. coincide the impeller and motor duty are matched.

**START CURRENT** given for S.T.P.

**O/L** (Rec. overload) settings quoted are for general and chill room use. It may be found necessary to increase these for low temp. operations to prevent 'nuisance tripping'.
N.B. Though the current increases with lower ambients the motor safety margin increases.

## IMPELLER NOTES

**PROPELLER** Relatively small diameter. On draw-through airflow the air discharge tends towards a semi-tangential spread particularly with high coil pressures.

**DUCT/PROP** A short length of trunking reduces spread and improves airflow (see table on P.5)

**AXIAL** Larger diameter permitting more wings of improved section; improved pressure/vol. characteristics and excellent air throw. Similar aerofoil/zero external pressure.

**AEROFOIL** Multi-wing, short case axial with close tolerance between impeller tip & case.

**AEROFOIL** 0.5' external. Higher pitch angle and motor power to suit appropriate for blast freezing.

TABLE 1