The SCA Guide to Smoke Fan Service and Maintenance

This CIBSE accredited CPD will commence shortly

SMOKE CONTROL ASSOCIATION

Welcome to the SCA

Welcome to this SCA Webinar

Today we are presenting:

The SCA Guide to Smoke Fan Service and Maintenance

If you could please mute your microphones and silence your mobile phone whilst the Webinar is in progress.

If you have any questions please use the chat facility.

SMOKE CONTROL ASSOCIATION

Smoke extract fan maintenance

Smoke extract fan maintenance; Best practice guide ensuring that your life safety equipment is fit for purpose

BSI FSH/025 DOCUMENT VERSION 5.5

December 2021

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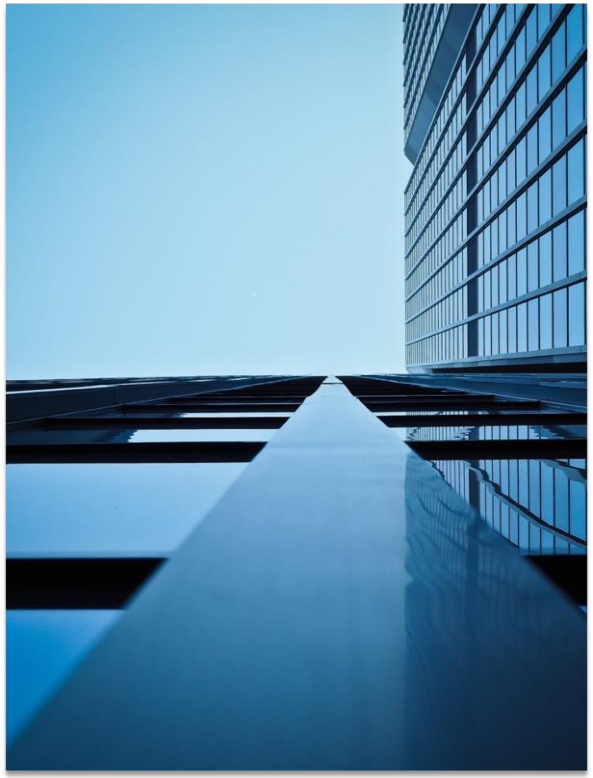
About the SCA



The Smoke Control Association (SCA) is an independent body involved in various aspects of smoke control; including design, CFD, manufacturing, install, commissioning, service and maintenance.

Past projects include the publication of guides related to the design of smoke control systems and projects.

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Why the guide?

Pre 2005 fans

- Smoke fans have been supplied to the marketplace for over 40 years
- These fans may not be fit for purpose
- Motors would have been certified by the factory, not necessarily independently

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Legislation

- Regulation – Fire Safety Order
- Building Safety Act
- BS9999
- PAS 8670

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Objectives of the guide

- Raise awareness of correctly selected products
- Manufactured and installed in accordance with EN 12101-3.2015
- Ensure they are correctly maintained
- Give maximum smoke protection in times of fire

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Guidance

- Provides guidance on deciding when fans should be placed
- New equipment which has been designed, tested, certified and manufactured to the very latest standard
- Offer building owners or operators a reduced level of risk and liability
- Providing the highest level of smoke protection for building occupants

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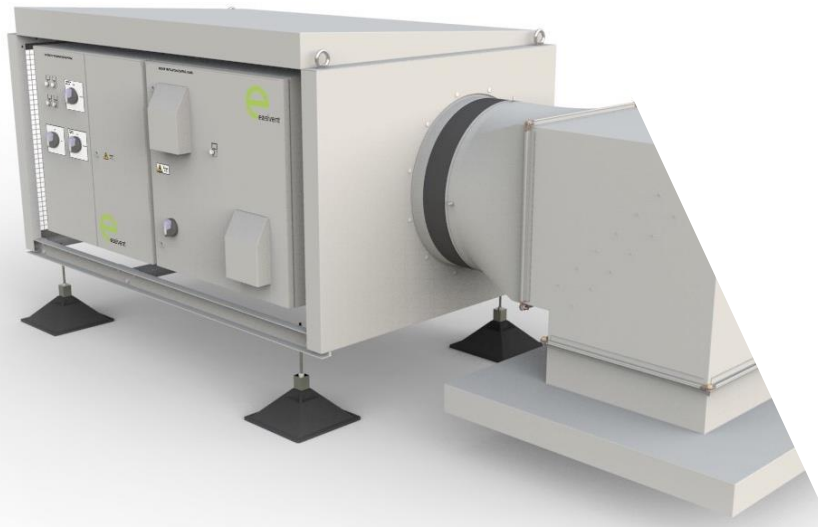
Fans



All fans used for smoke extract shall be tested and certified to BS EN 12101-3 Smoke and Heat Control Systems.

Designers should clearly define what temperature rating of fan they are using and provide a statement as to why this rating is appropriate for the project in question.

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Smoke fans

- Smoke control fans and their associated motors are a life safety product
- Maintenance rules differ from those applied to normal fans
- Smoke control fans often run during testing or if called upon to perform that primary smoke control function
- As a critical component, steps must be taken to ensure that they operate effectively during an emergency (smoke control duty)

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CE and UKCA marks

- Fans are the main airflow driver with a smoke control system and respond to alarms
- Where fans have been installed since 2012, these should be CE/UKCA labelled to confirm compliance
- This is a legal requirement
- If a fan does not have a CE/UKCA label affixed to it, further investigation into the system design is recommended
- Note: Fans manufactured from 1st January 2021 onwards may also display a UKCA mark in addition to a CE mark

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General fan maintenance

- Some maintenance advice is available within the BS EN 12101 and BS 9999 standards
- SCA recommendation is that smoke control systems should be tested weekly
- Each fan should be tested at least once per week
- Tests conducted by the building owner of by their nominated maintenance engineer to ensure that system will operate effectively

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Recommendation

- Fans should be run up in accordance with the manufacturer’s operation and maintenance documentation
- They should be run for between 15 and 30 minutes to minimise the risk of the lubrication grease hardening and to reduce bearing corrosion
- If in doubt you should contact the specific component manufacturer or system installer for further information

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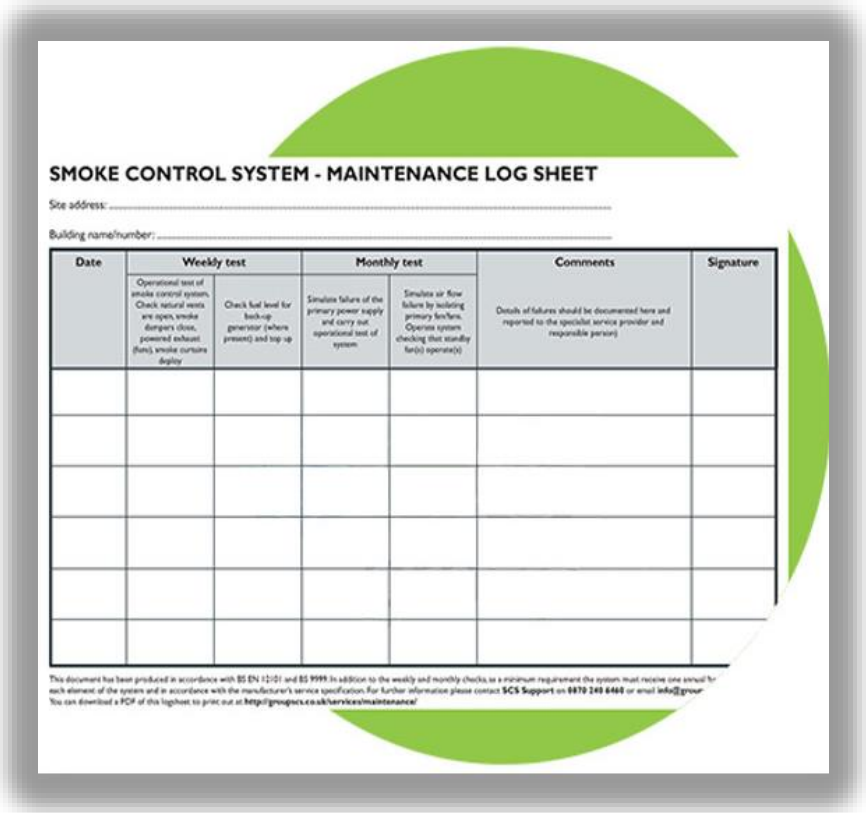
Maintenance Checklist Table 1



SMOKE CONTROL SYSTEM - MAINTENANCE LOG SHEET

Site address: .....

Building name/number: .....

Date	Weekly test		Monthly test		Comments	Signature
	Operational test of smoke control system. Check natural vents are open, smoke dampers close, powered exhaust (fans), smoke curtains deploy	Check fuel level for back-up generator (where present) and top up	Simulate failure of the primary power supply and carry out operational test of system	Simulate air flow failure by isolating primary fan/fans. Operate system checking that standby fan(s) operate(s)	Details of failures should be documented here and reported to the specialist service provider and responsible person)	

This document has been produced in accordance with BS EN 12101 and BS 9999. In addition to the weekly and monthly checks,as a minimum requirement the system must receive one annual for each element of the system and in accordance with the manufacturer's service specification. For further information please contact **SCS Support** on **0870 240 6460** or email **info@grour**

You can download a PDF of this logsheet to print out at **http://groupscs.co.uk/services/maintenance/**

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Maintenance Checklist Table 1

Routine Maintenance Schedule	Every 6 months	Every 12 months	Comments
1. Examine fan guards (if fitted)	✓		Remove any debris that may have accumulated round or on the ground surface.
2. Examine motor cooling fins	✓		Remove any material or dirt which has built-up between the cooling fins.
3. Examine impeller for dirt build-up or any physical damage	✓		Remove any build-up of dirt. Ensure impeller is secure. Replace impeller if it is damaged.
4. Check condition and tautness of fan safety support chains/harnesses/ ropes (if fitted)	✓		Clean and inspect safety supports. Replace if there is any deterioration/corrosion detected.

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Maintenance Checklist Table 1 (continued)

Routine Maintenance Schedule	Every 6 Months	Every 12 Months	Comments
5. Examine and operate vibration sensors (if fitted), and temperature sensors (if fitted)	✓		Check operation using built-in sensor test features or dummy signals. Check that the fan is automatically switched off, or that a warning is indicated, when the sensors/switches indicates a fault.
6. Examine condition of safety guards (if fitted) and associated fixings	✓		Clean safety guards. Replace if there are any signs of excessive corrosion or damage.

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Maintenance Checklist Table 1 (continued)

Routine Maintenance Schedule	Every 6 Months	Every 12 Months	Comments
7. Check operation of anti-condensation heaters (if fitted)	✓		Switch off power to the motor. Check that the anti-condensation heater is energised (i.e. it is drawing current).
8. Inspect the conditions of the packing located behind the motor shaft-seal retaining plate where the fan is of the 'bifurcated' type	✓		Replace the 130mm Duramid seal if it is damaged.

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Maintenance Checklist Table 1 (continued)

Routine Maintenance Schedule	Every 6 Months	Every 12 Months	Comments
9, Examine the clearance between the fan impeller blade tips and fan duct. Check the angle, and the security of the impeller blades		✓	Ensure that the gap between the impeller blade ends and the fan duct is even and adequate. If in doubt, please contact the fan manufacturer for advice related blade tip gap. Ensure that the impeller blades are secure. Blade angle must not be changed before contacting the manufacturer for advice.
10. Check torque of fixings used to secure the fan to its support structure.		✓	It is essential to confirm that all fixings are properly fitted, are tight and are fully driven home (see Paragraph 17.1). If in doubt, contact the fan manufacturer for advice related to the torque value of a particular fixing.

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Maintenance Checklist Table 1 (continued)

Routine Maintenance Schedule	Every 6 Months	Every 12 Months	Comments
11. Examine motor, fan and ancillary equipment fixings.		✓	It is essential to confirm all fixings are properly fitted, are tight and fully driven home (see Paragraph 17.1). If in doubt about the torque of a fixing, contact the manufacturer for advice.
12, Check movement (deflection) of vibration isolators (if fitted)		✓	Check freedom of movement. Tighten anti-vibration mount fixings if necessary.
13. Check motor voltage and current consumption		✓	Ensure voltage and full load current are as specified on the motor nameplate.

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Maintenance Checklist Table 1 (continued)

Routine Maintenance Schedule	Every 6 Months	Every 12 Months	Comments
14. Inspect paintwork / galvanizing finish.		✓	Treat any areas of damage with suitable anti-corrosion paint.
15. Grease motor bearings		✓	Check requirement in accordance with Paragraph 17.2.
16. Check fan assembly wiring		✓	Check security and condition of all wiring (including the earth).
17. Check fan operation for excessive vibration levels		✓	Vibration levels, whilst the fan is operating should not be excessive. If levels are seen to have increased since the previous inspection, the fan must not be operated until the root cause has been identified and rectified.

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Service Checklist

Control Panel – Electric - Powered Extract

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Service Checklist

Control Panel – Electric – Powered Extract

Service Inspection – Complete ALL items Complete items highlighted in BOLD only	✓
1. Complete the service pre-work checklist and if risk assessment and method statement are accurate then proceed. The RAMS documents are live documents and can be altered, with agreement of site contact, to suit.	
2. Adhere to Method Statement, Risk Assessment and Equipment Schedule. Request changes to these documents by modifying and returning to the Service Team.	
3. Using safe access methods, get adjacent to panel.	
4. Isolate electrical supply (weather permitting on fail-safe systems).	
5. Open the control panel	

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Service Checklist (continued)

Control Panel – Electric – Powered Extract

Service Inspection – Complete ALL Items Complete ALL highlighted in BOLD only	✓
6. Check the panel fixings and tighten as necessary	
7. Check all electrical connections and tighten as necessary	
8. REMOVE ALL SAFECLIP FUSES, IF FITTED, AND CHECK FOR TIGHTNESS OF FUSES IN HOLDERS AND CHECK FOR HIGH TEMPERATURE DAMAGE	
9. Service any control accessories in accordance with relevant CSS	
10. Record motor winding resistance of all fans	
11. Carry out insulation resistance tests on each fan and record results	
12. **LIVE TEST** – Operate each fan and record running currents, voltages and check for current rotation	

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Service Checklist (continued)

Control Panel – Electric – Powered Extract

Service Inspection – Complete ALL items Complete all highlighted in BOLD only	✓
13. Test system input and output conditions and where possible verify correct cause and effect sequence	
14. Check indicator lamps	
15. Check and adjust time switch if fitted	
16. Compare test results with previous records (if any) and advise of significant changes	
17. Note and advise customer of any faults found and recommend remedial action	
18. **Produce report and request for quotation if necessary**	

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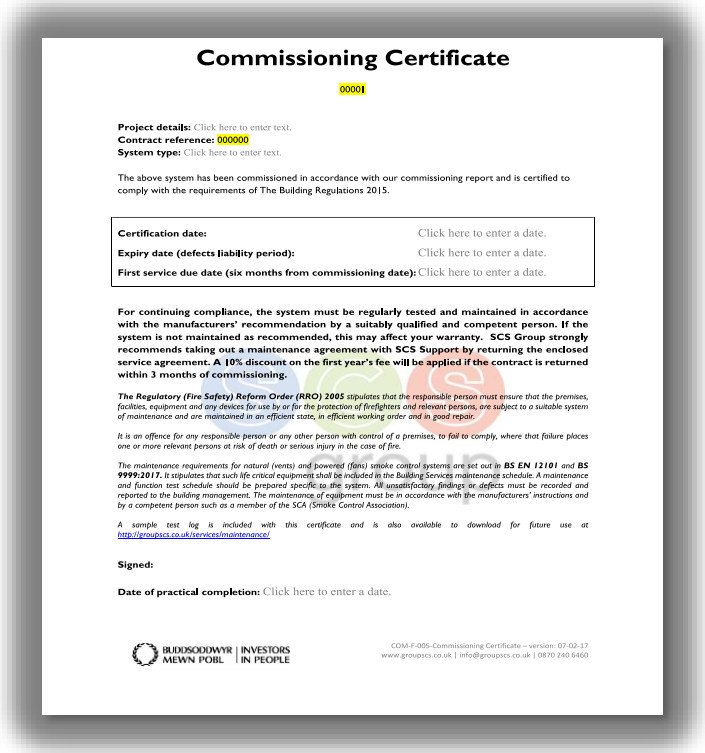
Service Intervals – Table 1

Minimum recommended test and service intervals: Table 1



Commissioning Certificate

0000**1**

Project details: Click here to enter text.
Contract reference: 000000
System type: Click here to enter text.

The above system has been commissioned in accordance with our commissioning report and is certified to comply with the requirements of The Building Regulations 2015.

Certification date:	Click here to enter a date.
Expiry date (defects liability period):	Click here to enter a date.
First service due date (six months from commissioning date):	Click here to enter a date.

For continuing compliance, the system must be regularly tested and maintained in accordance with the manufacturers' recommendation by a suitably qualified and competent person. If the system is not maintained as recommended, this may affect your warranty. SCS Group strongly recommends taking out a maintenance agreement with SCS Support by returning the enclosed service agreement. A 10% discount on the first year's fee will be applied if the contract is returned within 3 months of commissioning.

The Regulatory (Fire Safety) Reform Order (RRO) 2005 *stipulates that the responsible person must ensure that the premises, facilities, equipment and any devices for use by or for the protection of firefighters and relevant persons, are subject to a suitable system of maintenance and are maintained in an efficient state, in efficient working order and in good repair.*

It is an offence for any responsible person or any other person with control of a premises, to fail to comply, where that failure places one or more relevant persons at risk of death or serious injury in the case of fire.

The maintenance requirements for natural (vents) and powered (fans) smoke control systems are set out in ***BS EN 12101*** *and* ***BS 9999:2017.*** *It stipulates that such life critical equipment shall be included in the Building Services maintenance schedule. A maintenance and function test schedule should be prepared specific to the system. All unsatisfactory findings or defects must be recorded and reported to the building management. The maintenance of equipment must be in accordance with the manufacturers' instructions and by a competent person such as a member of the SCA (Smoke Control Association).*

A sample test log is included with this certificate and is also available to download for future use at http://groupscs.co.uk/services/maintenance/

Signed:

Date of practical completion: Click here to enter a date.

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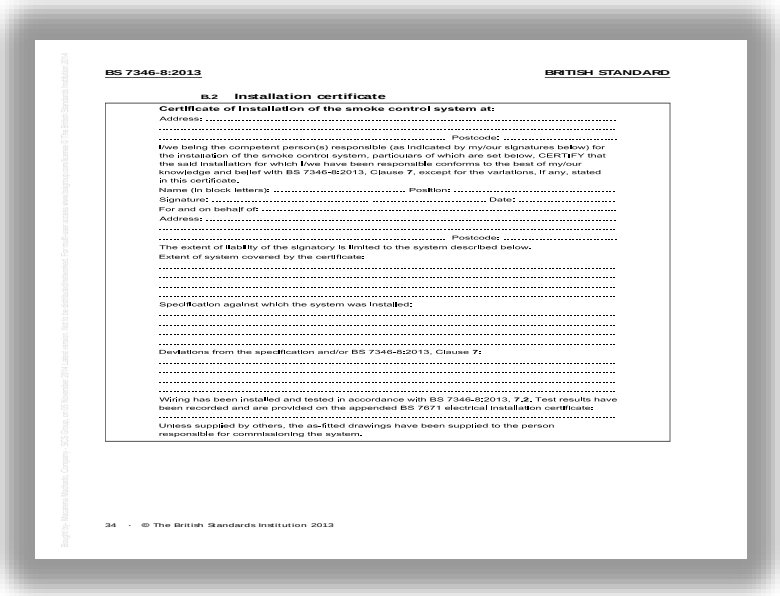

BS 7346-8:2013 BRITISH STANDARD

8.2 Installation certificate

Certificate of Installation of the smoke control system at:
Address: .....
.....
Postcode: .....
I/we being the competent person(s) responsible (as indicated by my/our signatures below) for the installation of the smoke control system, particulars of which are set below, CERTIFY that the said installation for which I/we have been responsible conforms to the best of my/our knowledge and belief with BS 7346-8:2013, Clause 7, except for the variations, if any, stated in this certificate.
Name (in block letters): ..... Position: .....
Signature: ..... Date: .....
For and on behalf of: .....
Address: .....
.....
Postcode: .....
The extent of liability of the signatory is limited to the system described below.
Extent of system covered by the certificate:
.....
.....
.....
.....
Specification against which the system was installed:
.....
.....
.....
.....
Deviations from the specification and/or BS 7346-8:2013, Clause 7:
.....
.....
.....
.....
Wiring has been installed and tested in accordance with BS 7346-8:2013, 7.2. Test results have been recorded and are provided on the appended BS 7671 electrical installation certificate.
.....
Unless supplied by others, the as-fitted drawings have been supplied to the person responsible for commissioning the system.

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Service Intervals – Table 1

Minimum recommended test and service intervals: Table 1

Fan Duty Type	Test intervals #1	Service intervals #2	Bearing Check #2	Bearing / seal change intervals #2
Dual Mode Fan (sealed for Life Bearings)	Weekly	6 months	3 months	5 years or 20,000 running hours whichever occurs first
Dual Mode Fan (bearing with relubrication facilities)	Weekly	6 months	3 months	5 years or 40,000 running hours whichever occurs first
Dedicated Smoke Extract Fan	Weekly	6 months	3 months	Checks should take place every 3 months to determine if the fan (motor) bearings have become noisy or appear to have become unbalanced. Replace in line with the manufacturer's recommendations

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Competence

- A full system inspection and test should be carried out by a suitably trained, qualified and competent person
- Recommended maintenance intervals are dependent on the fan function
- Where the fan is a dedicated hot smoke extract or pressurisation device, maintenance intervals should not be more than every six months, even if the fan has not been run
- Third party certification is important

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Fire safety motors

Super-E Motor Family

- Motors used with fire safety fans must NOT be re-wound
- It could be dangerous to refurbish such a motor using a standard motor rewind facility
- Smoke motors are specially designed for smoke control application
- If the smoke control fan is exposed to a fire situation, the motor must be replaced

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Motor health check

An indication that a fan motor may fail during an emergency scenario is if, when measured, the motor winding resistance is found to have a very low value.

This is a clear warning that the winding insulation is degrading.

The winding resistance must be greater than 10MΩ (Megaohm) or the value stated in the motor manufacturer's O&M instructions.

In some cases, it can be in excess of 100MΩ (Megaohm), when measured at 500 Volts DC to earth.

Before this test, the motor must be dry and free from condensation.

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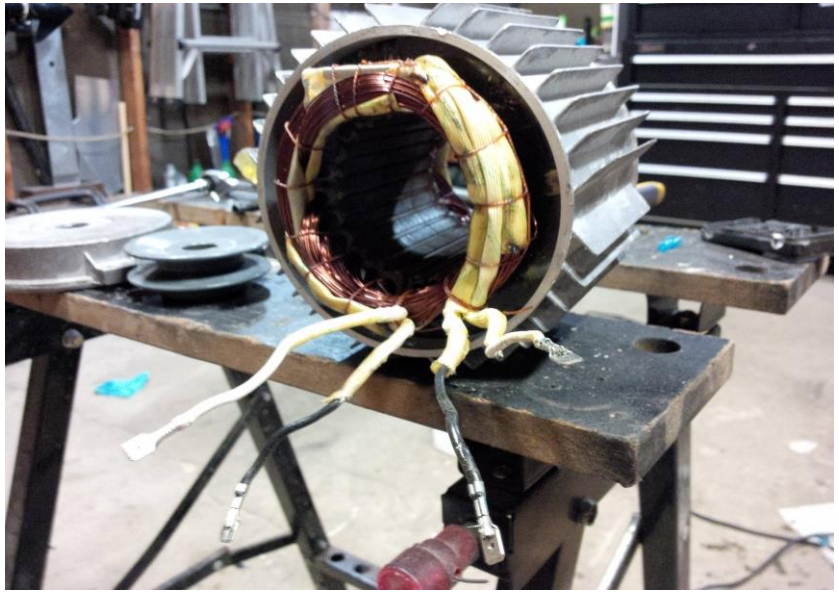
Motor winding deterioration



If after testing, the motor winding insulation has deteriorated to a level below the motor manufacturers defined limits, the recommendation is to purchase a complete fan, manufactured and certified in accordance with latest version of the EN 12101-3 standard.

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Bearing lubrication

ATTENTION!
It is necessary to record the number of hours the motor is running in order to determine when bearing relubrication is required.

ATTENTION!
Beware of all rotation parts!
Grease can cause skin and eye irritation. Follow all safety precautions specified by the grease manufacturer.

14.1 Shielded/Sealed Bearings
Small motors (frame 80-132) when fitted with ZZ/2Z bearings, greased for life must be replaced after 20,000 running hours.

Check motor nameplate for determining the used bearing type.

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Bearing lubrication (continued)

14.2 Machines fitted with grease nipples

Grease nipples are usually used in motors frame above and included 160. The purpose of this maintenance is to extend bearing lifespan.

The bearings life depends on the maintenance care and regreasing procedures, otherwise, the bearings may have their life shortened drastically.

Maintenance includes:

a) Attention to the overall bearing status

b) Cleaning and lubrication

c) Detailed inspection of the bearings

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Bearing lubrication (continued)

The motor noise should be checked at regular intervals as recommended before. A well-tuned ear is perfectly capable of distinguishing unusual noises, even with rudimentary tools (such as screwdriver, etc). For more reliable and preventive bearing analysis, sophisticated equipment is required.

Bearings should be lubricated to avoid metallic contact on the moving parts and also for protection against corrosion and wear. Lubricant properties deteriorate in the course of time and due to mechanical operation and furthermore, all lubricants are subject to contamination under working conditions. For this reason, lubricants must be renewed or replenished from time to time.

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Bearing lubrication (continued)

NOTE

Bearings with grease nipples must be replaced after 40,00 running hours.

14.3 Lubrication Intervals

ATTENTION!
If Krytox GPL226 is the grease, it may cause higher noise levels particularly at low temperatures, or when intermittent duty does not allow a running temperature above 20°C in the bearing. Please contact if the service temperature is below -5°C.

Types of grease, lubrication intervals, amounts of grease and type of bearing and clearance are indicated on the motor nameplate.

Lubrication intervals depend on motor size, speed, working conditions, type of grease used and ambient temperature.

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The process

- Designs will have fan requirements stated within the fire strategy
- Determine the year of manufacture (pre-2005 or 2005 onwards)
- Certified to EN 12101-3
- It has a CE or UKCA label attached
- Have appropriate installation, operating, maintenance and service instruction
- Valid maintenance record exists

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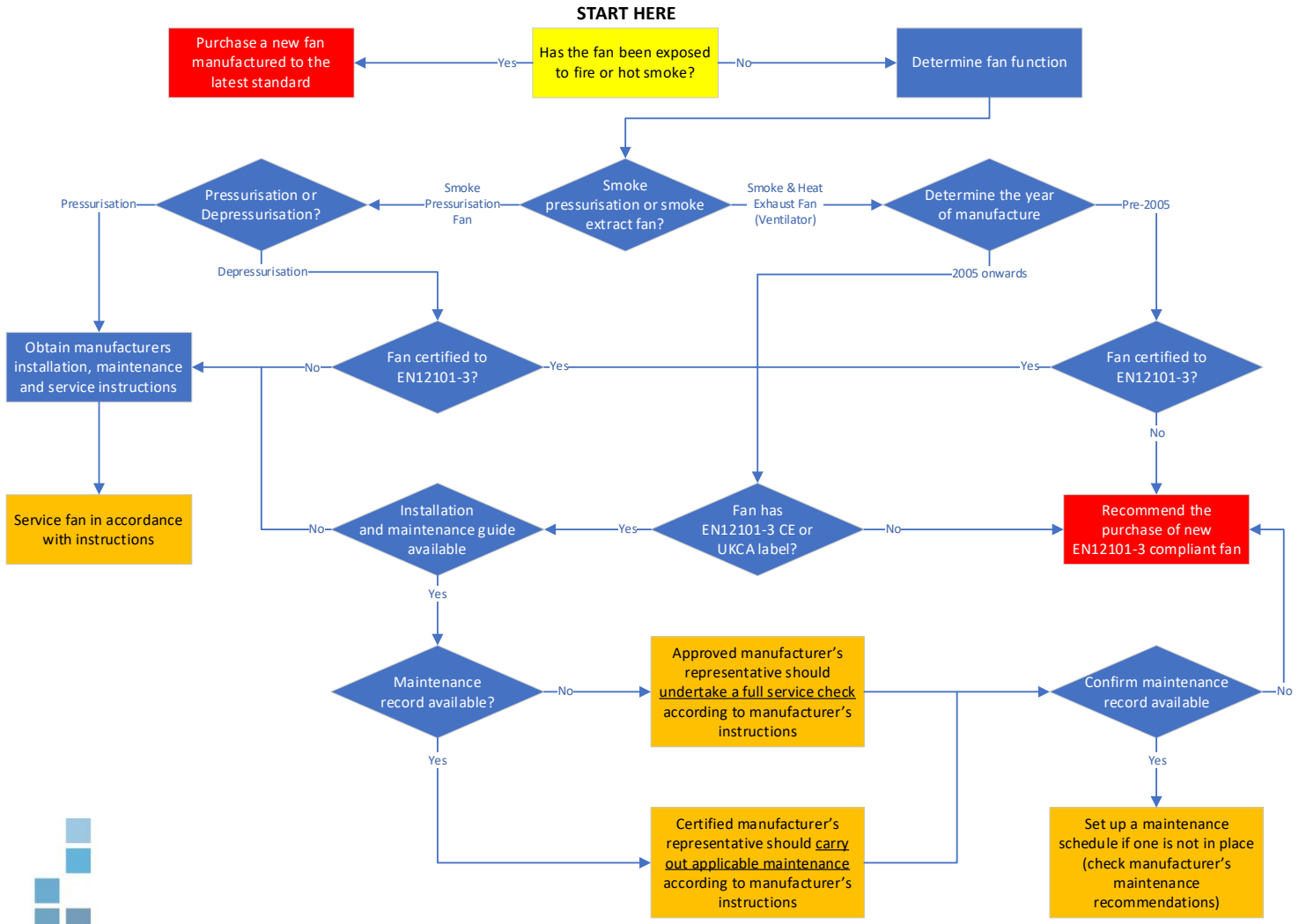
Decision flowchart



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Pre 2005 fans

- Smoke Fans manufactured before 2005 will not comply within the EN-12101-3 standard
- The recommendation is to purchase a replacement fan which complies with EN 12101-3:2015

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2005-2007 fans

- If manufactured between 2005 and 7th April 2017 (inclusive), may not be manufactured in accordance with the latest versions of EN-12101-3
- Depending on its condition (when tested) it may be possible to refurbish the fan and motor
- Must be in accordance with the manufacturer's recommendations

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Post 2017

- After 8th April 2017 it should have been manufactured in accordance with the latest version of EN 12101-3
- It may be possible to service the fan in accordance with the manufacturer's recommendations
- Only approved by a competent manufacturer's service company

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Records

- Fan installation records and associated DoP documents must be held in a safe and accessible location
- Access is for review by fire authorities, risk assessors, service and maintenance operatives
- Records are for conducting a risk assessment of the smoke control systems
- If information is available then this generally indicates that the system is being maintained
- Dated and signed records are imperative

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Rectification

- Where rectification or repair cannot be carried out immediately, a fire risk assessment should be carried out to determine whether mitigation measures should be put in place
- Mitigation measures will vary depending on the building or application
- Professional advice should be sought from a suitably qualified and competent fire engineer
- Local Fire and Rescue Services should be informed and consulted with in relation to any planned mitigation measures

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Summary

- Are maintenance records available? Take photographs to confirm fans are clean, easily accessible and there is evidence of maintenance
- Are fans running correctly?
- Are fans running in an environmental (normal ventilation) mode?
- Do fans run when the systems alarm is activated?
- If the system is more than five years old, is there evidence of an electrical thermal test being performed?
- If the system is more than five years old, is there evidence of an electrical fixed wire test being performed within the last five years?
- If the system is more than 10 years old, is there evidence of a motor winding resistance test being performed?
- Do fans have a CE or UKCA mark label? If so, is the stated temperature class in accordance with the system design?

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Finally…

- Only use SCA certified manufacturers, system designers and installers for smoke control
- Clarify when the products were made and installed
- Review all documents for service dates
- Ask for a copy of the products DoP
- Ask for a copy of the relevant test certificate
- Check the service documents are signed and dated
- Ask for a copy of the approved installer service scheme certificate
- Confirm the relevant EN and ISO standards worked to
- Follow the SCA service and maintenance guide

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Thank you

Any questions?

www.smokecontrol.org.uk

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