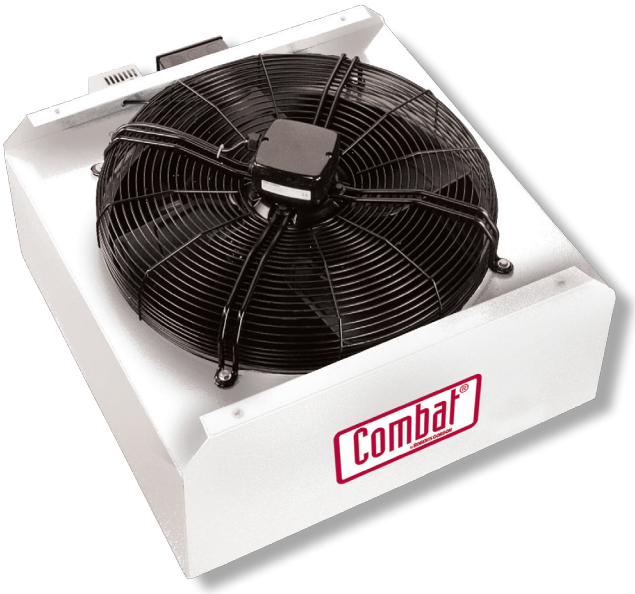
Combat®

Energy-Saving Fans

with Control Options

Improving comfort, protecting the environment and saving money!



- Improves heating system efficiency by keeping valuable warm air down at working level, reducing heat losses through the roof stucture
- Easy to install and operate
- Ease of use provided by automatic or manual speed controls
- Flexibility provided by wide range of units to suit most applications

Combat® HVAC LIMITED

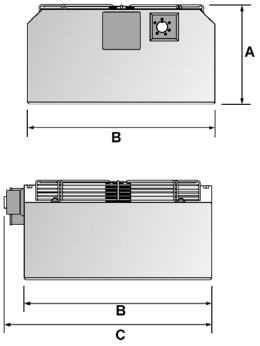
CE 0063

Technical Data - HVE Range

Model		HVE 400	HVE 450	HVE 650
Air Capacity	[m^3/sec]	1.1	1.8	3.0
	[ft^3/min]	2,120	3,710	6,360
Fan Diameter	[mm]	400	500	650
Motor Speed	[RPM]	1,400	1,430	890
Motor Size	[W]	165	410	370
Electrical Load	[W]	179	499	598
Capacitor	[µF]	3	10	12
Electrical Supply			230 V/50 Hz/1Ø	
Starting Current	[A]	1.5	10	6
Running Current	[A]	0.8	2.7	2.6
Noise Level @ 3m	NR dB [A]	55	68	70
Maximum Ambient Temperature		60	50	40
Thermostat				
Recommended Minimum	[°C]	15	15	15
Setting Maximum Setting	[°C]	30	30	30
Recommended Minimum Set Room Temperature	[°C]	3	3	3

Dimension Data Controls

Model		HVE 400	HVE 450	HVE 650
'A' Depth	[mm]	300	305	284
'B' Casing Width	[mm]	527	610	790
'C' Overall Width	[mm]	582	665	845
Weight	[kg]	15	25	33
Minimum Recommended Mounting Height	[m]	6	11	14
Maximum Recommended Mounting Height	[m]	11	18	25
Minimum Wall Clearance	[m]	1.75	1.75	1.75
Minimum Roof Clearance	[m]	1	1	1



Construction - HVE Range

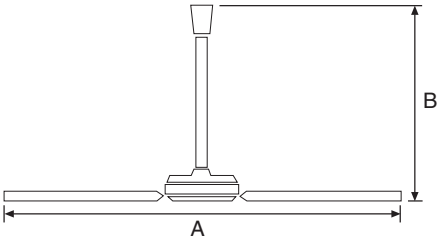
Casing - 'Zintec' zinc-coated steel with polyester powder finish
External - rotor motor housing integral impeller blades - die-cast aluminum with polyester powder finish
Fan guard - welded wire fabrication with polyester powder finish • Outlet grille - satin finish anodised aluminium

Technical Data ESF Range

Air Displacement	[m^3/sec]	4.17
	[ft^3/min]	8836
Motor Speed	[RPM]	220
Motor Size	[W]	60
Capacitor	[µF]	1.6
Electrical Supply		230 V/50 Hz/1Ø
Starting Current	[A]	0.30
Running Current	[A]	0.22
Maximum Ambient Temperature	[°C]	40
Weight	[kg]	7

Dimension Data - ESF Range

Model		ESF 14
'A' Sweep Diameter	[mm]	1400
'B' Overall Drop	[mm]	610 or 360
Maximum Recommended Mounting Height	[mm]	8000
Minimum Recommended Mounting Height	[mm]	2750
Minimum Wall Clearance	[m]	2.75
Minimum Roof Clearance	[m]	1



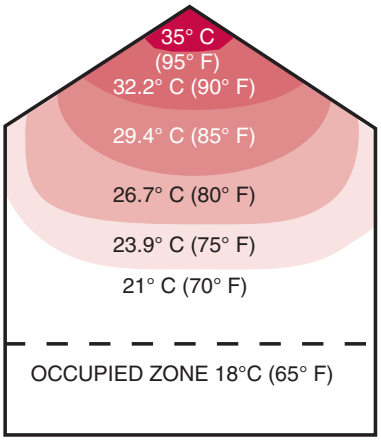
Construction ESF - Range Fan blades, suspension rod and lower motor cover - all steel • Finish to all parts - enamel

ESF FAN BENEFITS:

- Suitable for most commercial and industrial applications
- Keeps warmth at working level by moving warm air from high level and returning it to the occupied zone
- Provides savings up to 20% on running costs at optimum air change rate
- Reduced heat loss through the roof
- Improved comfort and faster heat recovery from uniform heating
- Extends life of heating equipment thereby contributing directly to global environment protection
- Protects ceiling finishes and lighting from thermal degradation
- Design flexibility
- More gentle and even air distribution pattern due to greater volume of air movement

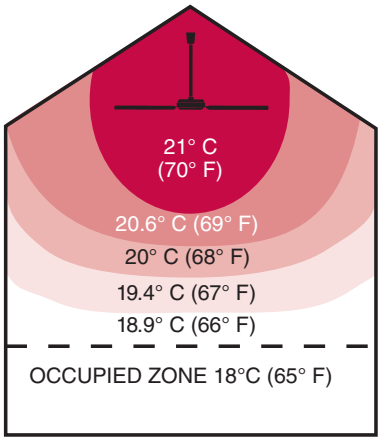
HVE FAN BENEFITS:

- Returns warm air to ground level in high bay applications
- Directs air between racking from high levels
- Includes thermostat



Problem

With any conventional heating systems, natural convection increases the temperature gradient. This results in the ambient temperature at the apex of the roof being greater than the required design temperature in the occupied zone at floor level.



Solution

By using a system of destratification fans, the hot air in the roof space is directed down to the required area, thus reducing the heating load.

General Design Guide

At the survey stage, care should be taken to ensure that the air, which has convected to high level, is of sufficient quality to be returned to floor level. Additionally, the fan unit should not be sited in an area where there are aggressive or corrosive vapours which may attack the fan components. The fan units should not be sited where the air flow might adversely affect the operation of heating, ventilating or other process equipment.

ESF fans are most commonly installed in conjunctioon with a speed controller which is used to adjust the fan speed to provide optimum effect and comfort.

HVE fans are most commonly installed in conjunction with an ON/OFF control which utilises the fan's built-in thermostat to operate the fan when heat is available and are used mainly in high bay areas.

The design specifications for energy saving fan installations will depend upon the size and shape of the heated space. When designing the system, calculate the number of fans based on the air exchange rate within the heated space.

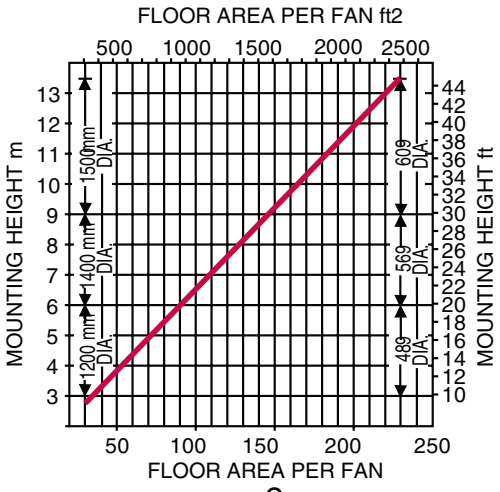
Then position the fans to create an even distribution with relationship to the size and shape of the floor.

Design and Selection Guide - 'ESF' Fans [ESF 14 Fans]

To determine the number of fans required by air exchange rate:

1. Calculate the volume of the building in cubic meters.
2. Multiply by 8 and divide by 15,000 [fan air displacement in m^3/hour]

For energy conservation, fan selection is dependent upon area and mounting height. Estimate the height at which the fan can be mounted and then calculate the relevant fan size from the table. Move to meet the diagonal line and then read down to find out how much floor area per fan is suitable.



Design Guide - 'HVE' Fans

To determine the number of fans required:

First calculate one third of the building volume:

i.e. $\frac{\text{L x W x Average height}}{3}$ m^3=*FIG. 1*

Assume a displacement of 5 air changes per hour, so: Result of *FIG. 1* x 5 m^3/hr=*FIG. 2* As the fan performance data is in m^3/sec:

$\frac{\text{Result of } FIG.\ 2}{3600}$ m^3/sec=*FIG. 3*

The number of fans required is:

$\frac{\text{Result of } FIG.\ 3}{1.14}$ **or HVE 400 fans,**

or

$\frac{\text{Result of } FIG.\ 3}{1.77}$ **or HVE 450 fans,**

or

$\frac{\text{Result of } FIG.\ 3}{3.0}$ **or HVE 650 fans,**

Round up to the nearest whole number to give the number of fans required.

Control Options

Manual on/off - all models

Manual adjustment of fan speed to suit prevailing conditions - WAC6, BP6 & FMP10 models

Automatic adjustment of fan speed according to roof-space temperature - BJ8

BJ8

WAC6

Selection Details - Controls

Model		WAC6	BP6	FMP10	BJ8
Control Unit Capacity [No. of fans]	ESF	6	10	20	20*
	HVE400	1	4	8	8
	HVE450	N/A	1	2	2
	HVE650	N/A	1	2	2
Manual On/Off		Yes	Yes	Yes	Yes
Manual Fan Speed Adjustment		Yes	Yes	Yes	No
Automatic Fan Speed Adjustment		No	No	No	Yes
Maximum Fan Speed Override		No	Yes	Yes	Yes
Fans 'ON' Neon Indicator		Yes	No	Yes	No
Temperature Sensor Range	[°C]	N/A	N/A	N/A	0-40
Temperature Sensor Cable Length	[m]	N/A	N/A	N/A	10
Maximum Starting Current	[A]	3	10	20	20
Maximum Running Current	[A]	1.5	5	10	10

***Note:** A minimum of 10 ESF fans is required for the BJ8 Controller to function correctly

Dimension Data - Controls

Model		WAC6	BP6	FMP10	BJ8
Width	[mm]	85	90	168	168
Depth [Box Only]	[mm]	50	45	107	107
Depth [Including Switches]	[mm]	55	55	125	125
Height	[mm]	85	150	80	220
Mounting Holes-					
Horizontal Distance-Between Centres	[mm]	60	N/A	N/A	155
Vertical Distnace-Between Centres	[mm]	60	130	150	203

Installation Code and Annual Inspections:
All installation and service of COMBAT® equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Combat HVAC Ltd and conform to all requirements set forth in the COMBAT® manuals and all applicable governmental authorities pertaining to the installation, service and operation of the equipment. To help facilitate optimum performance and safety, COMBAT recommends that a qualified contractor conduct, at a minimum, annual inspections of your COMBAT® equipment and perform service where necessary, using only replacement parts sold and supplied by Combat HVAC Ltd.

Further Information: Applications, engineering and detailed guidance on systems design, installation and equipment performance is available through COMBAT® representatives. Please contact us for any further information you may require, including the Installation, Commissioning, Operation and Service Manual.

This product is not for residential use.

This document is intended to assist licensed professionals in the exercise of their professional judgment.

Combat HVAC Ltd
Unit 20 Red Mill Trading Estate,
Rigby Street, Wednesbury,
West Midlands, WS10 0NP
Telephone: +44 (0)121 506 7700
Fax: +44 (0)121 506 7701
Service Telephone: +44 (0)121 506 7709 Service Fax: +44 (0)121 506 7702
E-mail: uksales@combat.co.uk
E-mail: export@combat.co.uk
www.combat.co.uk

2017 Combat HVAC Ltd

All rights reserved. No part of this work covered by the copyrights herein may be reproduced or copied in any form or by any means – graphic, electronic, or mechanical, including photocopying, recording, taping, or information storage and retrieval systems – without written permission of Combat HVAC.