

Thermal performance of domestic gas appliances —

**Part 3: Specification for thermal
performance of combined appliances:
gas fire/back boiler**

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- British Non-ferrous Metals Federation
- Chartered Institution of Building Services
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The following body was also represented in the drafting of the standard, through subcommittees and panels:

Coopted member

This British Standard, having been prepared under the direction of the Gas Standards Committee, was published under the authority of the Board of BSI and comes into effect on 29 February 1984

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Foreword

This Part of BS 6332 has been prepared under the direction of the Gas Standards Committee. BS 6332 is intended to provide specifications for the thermal performance requirements and associated test methods for domestic space and water heating appliances burning 1st, 2nd and 3rd family gases. When it was first proposed that such a standard be prepared, the new standard was seen as complementing the Parts of BS 5258 that cover safety requirements and associated test methods for these appliances. The two standards, BS 5258 and BS 6332, together with Parts 1 and 2 of BS 5386, which relate to instantaneous water heaters but being based on CEN standards specify both safety and performance requirements, would then supersede and allow the withdrawal of the then existing British Standards for 1st family gas appliances, BS 1250-3 and BS 1250-4, and for 3rd family gas appliances, BS 2773 and BS 2883.

This reasoning persists but the need for up-to-date minimum values for thermal performance of gas appliances has been accentuated by the passing of the Energy Conservation Act in implementation of the EEC Heat Generator Directive. Because of this, each Part of BS 6332 will be subject to review two years after the date of its publication.

With the continuing participation of the UK in European standardization, it is probable that Parts of BS 6332 will be withdrawn, in due course, and replaced by new British Standards aligned with CEN standards.

In anticipation of this standard being the subject of third party certification schemes, it provides for a claim by the appliance manufacturer of a numerical value for the thermal efficiency of a product model. The test authority will then ascertain that a sample submitted for type approval meets this claimed value within a specified test equipment tolerance. Any sample selected from subsequent production of the particular model will be expected to comply with a verification value, which will also take into account a specified production tolerance.

Another departure from established practice is the adoption of net instead of gross calorific value as the basis of thermal performance. This change is a consequence of European harmonization.

Parts of BS 6332 already published are as follows:

- *Part 1: Specification for thermal performance of central heating boilers and circulators;*
- *Part 2: Specification for thermal performance of gas fires;*
- *Part 3: Specification for thermal performance of combined appliances: gas fireback boiler;*
- *Part 4: Specification for thermal performance of independent convector heaters.*

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 12, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of BS 6332 specifies the thermal efficiency requirements and associated methods of test for combined appliances designed to be fitted into or against a fireplace recess and consisting of a boiler or circulator together with a gas fire. The combined appliance can be of integral construction or consist of substantially independent boiler (or circulator) and gas fire units.

It also applies to boilers and circulators designed to be fitted in a fireplace recess behind a decorative closure unit.

This Part covers appliances of the following categories, as described in BS 4947:

I_T , I_N , I_L , $I_{L/B}$, $I_{L/P}$;
 II_{TN} , II_{NL} , $II_{NL/B}$, $II_{NL/P}$;
 III , $III_{TNL/B}$, $III_{TNL/P}$;

and of type B, open-flued appliances, as defined in BS 1179.

This Part of BS 6332 is applicable only to the appliances listed above that comply with BS 5258-8.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Part of this British Standard, the definitions given in BS 1179:1967 and in BS 1179-6:1980 apply, together with the following.

2.1 claimed efficiency

the net efficiency of an appliance claimed by the manufacturer (E_c)

2.2 gross efficiency

the efficiency of an appliance calculated on the assumption that the heat content of the test gas is its gross calorific value

2.3 net efficiency

the efficiency of an appliance calculated on the assumption that the heat content of the test gas is its net calorific value

2.4 test house efficiency

the net efficiency of an appliance measured at the test house on a sample submitted for type approval purposes (E_t)

2.5 verification efficiency

the net efficiency of an appliance measured during any surveillance or check testing of production appliances (E_v)

3 Thermal performance

3.1 Efficiency requirements: gas fire unit

3.1.1 The manufacturer shall claim a net overall efficiency value, E_c , which shall relate to the test method described in 4.2 and which shall be not less than the value given in Table 1 for the particular appliance type.

Table 1 — Gas fire unit: minimum claimed overall efficiency (net)^a

Appliance type	Test condition	Minimum claimed efficiency
		%
Radiant-convector	Normal	61
Radiant	Normal	64

^a The gross efficiency value is related to the net value for the four reference gases as follows:

for TGA(4)	gross value = $0.899 \times$ net value
for NGA	gross value = $0.901 \times$ net value
for LPGA	gross value = $0.926 \times$ net value
for LPGC	gross value = $0.922 \times$ net value

3.1.2 Test house efficiencies, E_t , measured, as appropriate, in accordance with the methods described in 4.2 and 4.3, shall be not less than the values given in Table 2 for each of the specified test conditions.

NOTE The difference between E_t and E_c values allows for measurement tolerance arising from differences in test apparatus.

Table 2 — Gas fire unit: minimum test house efficiency (net)^a

Appliance type	Test condition	Minimum test house efficiency	
		Overall	Radiant
Radiant-convector	Normal	$E_c - 2$	—
	Half-rate	53	—
	Updraught	53	—
Radiant	Normal	$E_c - 2$	33
	Half-rate	34	—
	Updraught	38	—

^a The gross efficiency value is related to the net value for the four reference gases as follows:

for TGA(4)	gross value = $0.899 \times$ net value
for NGA	gross value = $0.901 \times$ net value
for LPGA	gross value = $0.926 \times$ net value
for LPGC	gross value = $0.922 \times$ net value

3.1.3 The verification efficiency, E_v , measured in accordance with the method described in 4.2 and under the conditions specified in Table 1 shall be not less than E_c minus 4.

NOTE The difference between E_v and E_c values allows for the measurement tolerance referred to in 3.1.2 and also for manufacturing tolerances which will affect the efficiency levels measured.

3.2 Efficiency requirements: back boiler unit

3.2.1 The manufacturer shall claim a net efficiency value, E_c , which shall relate to the test method described in 4.4 and which shall be not less than the value given in Table 3.

Table 3 — Back boiler unit: minimum claimed efficiency (net)^a

Appliance rating	Heat input at which measurement made	Test condition	Minimum claimed efficiency	
			Boilers	Circulators
Fixed	Rated	Normal	%	%
Range	Min. of range	Normal	77	75
	Max. of range	Normal	80	78

^a The gross efficiency value is related to the net value for the four reference gases as follows:

for TGA(4)	gross value = $0.899 \times$ net value
for NGA	gross value = $0.901 \times$ net value
for LPGA	gross value = $0.926 \times$ net value
for LPGC	gross value = $0.922 \times$ net value

3.2.2 Test house efficiencies, E_t , measured in accordance with the method described in 4.4 shall be not less than the values given in Table 4 for each of the specified test conditions.

Table 4 — Back boiler unit: minimum test house efficiency (net)^a

Appliance rating	Test condition		Minimum test house efficiency (for boiler and circulators)
	Heat input	Flue	
Fixed	Rated	Normal	$E_c - 2$
Range	Min. of range	Normal	$E_c - 2$
	Max. of range	Normal	$E_c - 2$
Fixed	Rated	Updraught	74
Range	Max. of range	Updraught	74

^a The gross efficiency value is related to the net value for the four reference gases as follows:

for TGA(4)	gross value = $0.899 \times$ net value
for NGA	gross value = $0.901 \times$ net value
for LPGA	gross value = $0.926 \times$ net value
for LPGC	gross value = $0.922 \times$ net value

3.2.3 The verification efficiency, E_v , measured in accordance with the method described in 4.4 and under normal test conditions shall be not less than E_c minus 5.

3.2.4 The manufacturer shall supply drawings of the draught diverter to the test authority along with the type approval sample. Performance requirements of production appliances under updraught conditions shall be deemed to be met provided that the dimensions of the draught diverter are within the tolerances given.

3.2.5 If it is necessary to test production appliances under updraught conditions, the verification efficiency, E_v , shall be not less than E_t minus 3.

4 Test methods

4.1 General conditions of test

4.1.1 Test room. The room shall be adequately ventilated but free from draughts likely to affect the performance of the appliance. The room temperature shall be maintained at 20 ± 5 °C. During the course of a test, the ambient temperature shall not vary by more than 2 °C.

4.1.2 Preparation of appliance. The appliance shall be installed in the test box (see Figure 1) and adjusted in accordance with the manufacturer's instructions, using the appropriate reference test gas at the following inlet pressure (see clause 4 and Appendix C of BS 4947:1973).

Family	Test gas	Inlet pressure
		mbar ^a
1st	TGA	17.5
2nd	NGA	20
3rd	LPGA	28
	LPGC	37

^a 1 mbar = 100 N/m² = 100 Pa.

Before any tests are made the appliance shall be operated at its full working temperature for a period sufficient to dry the insulation and remove any temporary finish which might interfere with observations.