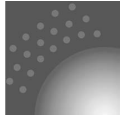


## Technical guide

**VITOMAX 200-HW** Type M236

**Oil/gas fired high pressure hot water boiler**  
in accordance with the requirements of the EC Pressure  
Equipment Directive and the TRD code of practice

**Three-pass boiler**

**Permissible operating pressure 6 to 25 bar**

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# Specification

## 1.1 Specification

Boiler size		1	2	3	4	5	6	7	8
<b>Combustion output</b> *1 to EN 12953-3	MW	0.52	0.67	0.85	1.04	1.30	1.70	2.16	2.84
<b>CE designation</b>		in accordance with the Pressure Equipment Directive							
<b>Permissible flow temperature</b> *2 (= safety temperature)									
for permissible operating pressure	6 bar °C	145							
	8 bar °C	155							
	10 bar °C	165							
	13 bar °C	175							
	16 bar °C	185							
	18 bar °C	190							
	20 bar °C	195							
	22 bar °C	200							
	25 bar °C	205							
<b>Boiler return temperature</b> (minimum value)*3	°C	65							
<b>Flue gas pressure drop</b>		see diagram on page 9							
<b>Shipping dimensions</b>									
Total length	m	2.7	2.9	3.2	3.2	3.4	3.7	4.0	4.4
Total width	m	1.6	1.6	1.7	1.8	1.9	2.0	2.1	2.3
Total height	m	1.8	1.9	2.0	2.1	2.1	2.3	2.4	2.6
<b>Total weight</b> *4									
Boiler with thermal insulation									
for permissible operating pressure	6 bar t	2.1	2.3	2.6	3.0	3.5	4.3	5.3	6.9
	8 bar t	2.2	2.4	2.7	3.5	3.7	5.0	5.5	7.0
	10 bar t	2.3	2.5	3.0	3.7	3.9	5.2	6.2	7.5
	13 bar t	2.4	2.6	3.2	3.8	4.5	5.4	6.5	8.5
	16 bar t	2.7	2.8	3.5	4.1	4.9	5.9	7.2	9.0
	18 bar t	3.0	3.2	3.7	4.4	5.1	6.2	7.5	9.0
	20 bar t	3.4	3.6	4.0	5.0	6.0	7.0	8.0	–
	22 bar t	3.8	4.0	4.4	5.5	6.5	7.5	–	–
	25 bar t	4.2	4.5	5.0	6.0	7.0	–	–	–
<b>Content boiler water</b>	m <sup>3</sup>	1.7	2.0	2.5	2.9	3.4	4.6	5.5	7.3
<b>Boiler connections</b>									
Boiler flow and return*5 at rated output*6 and temperature spread	20 K DN	65	65	80	100	100	125	125	150
Safety valve connector									
for permissible operating pressure	6 bar PN 40 DN	20	25	32	32	32	40	50	50
	8 bar PN 40 DN	20	20	25	32	32	40	40	50
	10 bar PN 40 DN	20	20	25	25	32	32	40	40
	13 bar PN 40 DN	20	20	20	25	25	32	32	40
	16 bar PN 40 DN	20	20	20	20	25	25	32	32
	18 bar PN 40 DN	20	20	20	20	20	25	32	32
	20 bar PN 40 DN	20	20	20	20	20	25	25	–
	22 bar PN 40 DN	25	25	25	25	25	25	–	–
	25 bar PN 40 DN	25	25	25	25	25	–	–	–
Feedwater connector	PN 40 DN	25	25	25	32	32	32	32	32
<b>Flue gas mass flow rate</b>									
- for natural gas	kg/h	1.5225 x combustion output in kW							
- for fuel oil EL	kg/h	1.5 x combustion output in kW							
<b>Flue gas volume</b>	m <sup>3</sup>	0.60	0.75	0.95	1.10	1.40	1.95	2.55	3.35
<b>Flue gas connection</b>	Ext. Ø mm	250	250	300	300	350	350	450	450
	Int. Ø mm	240	240	290	290	340	340	440	440

\*1 The maximum boiler output varies subject to the required emission values, the pressure stage and the fuel used. Check with the burner manufacturer.

\*2 The maximum achievable flow temperature is approx. 15 K below the permissible flow temperature (= safety temperature).

\*3 During the combustion of fuel oil S according to DIN 51603-5 the average boiler temperature must be at least 90 °C.

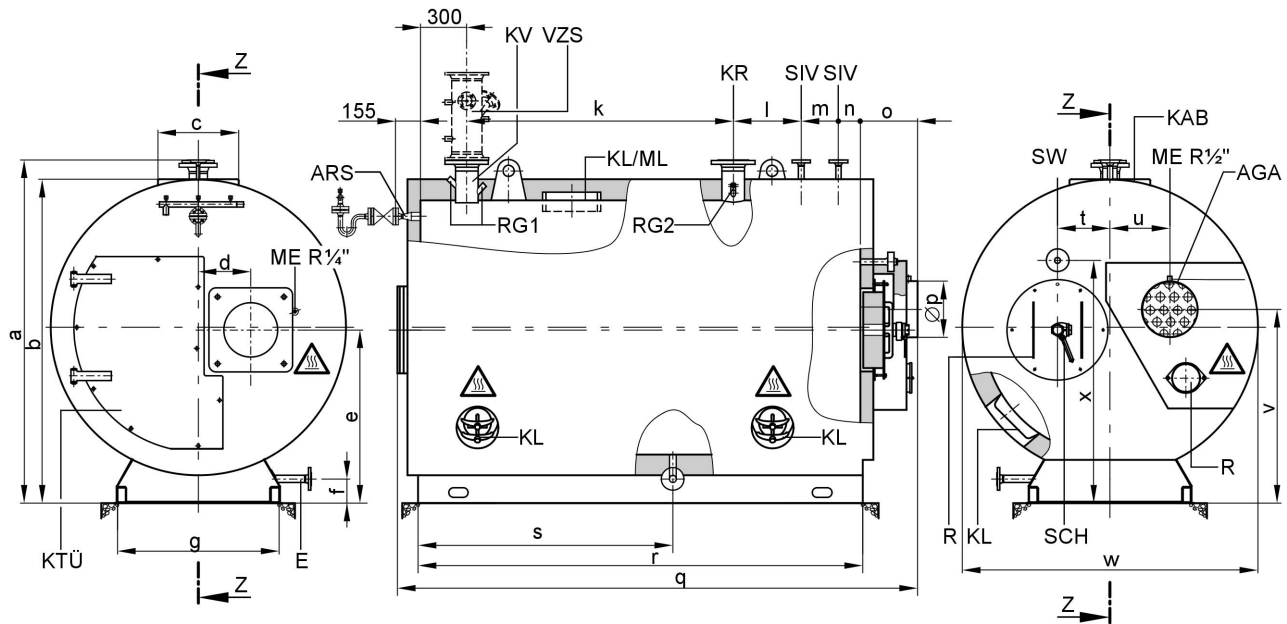
\*4 Specific variations are possible.

\*5 For boilers up to 10 bar, the flange connections are PN 16, from 13 to 18 bar they are PN 25 and from 20 to 25 bar they are PN 40.

\*6 Alternative internal diameters are possible when the output is adjusted.

## Specification (cont.)

### 1.2 Dimensions



Watch out! Hot surfaces.

AGA Flue outlet	ML Manhole (from boiler size 4)
ARS Connector DN 20 PN 40 for instrument base (pressure regulator, pressure limiter and pressure gauge)	R Cleaning aperture
E Connector DN 25 PN 40 for drain	RG1 2 fem. connections R 1/2" for temperature controller and high limit safety cut-out
KAB Boiler cover	RG2 Female connection R 1/2" for additional control equipment
KL Head hole	SCH Inspection aperture
KR Boiler return	SIV Safety valve connector
KTÜ Boiler door	SW Feedwater connector
KV Boiler flow	VZS Intermediate flow piece as accessory
ME Test (fem.) connection	

#### Note

Illustration of standard version. The boiler can be mirrored along the Z-Z axis if required.

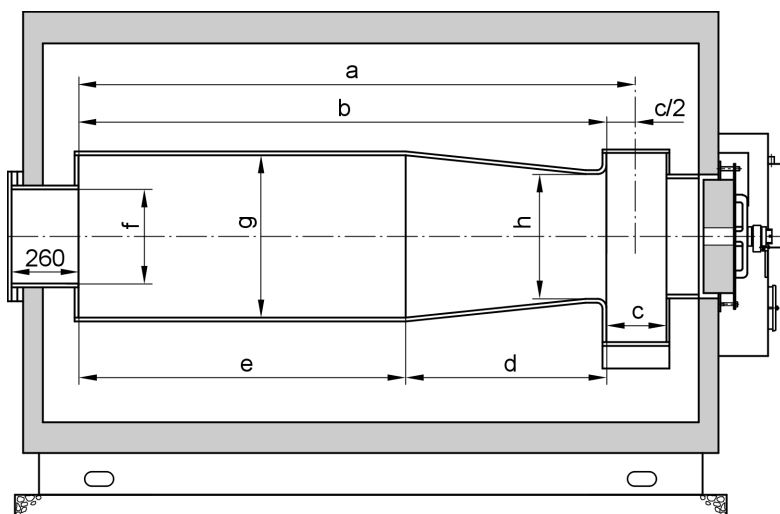
#### Dimensions\*1

Boiler size		1	2	3	4	5	6	7	8
a	mm	1830	1880	1950	2050	2130	2300	2380	2550
b	mm	1710	1760	1830	1930	2010	2180	2260	2430
c	mm	500	500	500	600	600	600	600	600
d	mm	285	285	305	320	325	365	380	425
e	mm	935	950	995	1030	1075	1145	1195	1275
f	mm	140	140	140	140	150	160	160	160
g	mm	950	970	1000	1020	1060	1110	1130	1170
k	mm	1205	1360	1470	1470	1520	1670	2020	2190
l	mm	250	250	300	350	500	600	600	600
m	mm	200	200	250	250	250	250	250	380
n	mm	75	100	150	150	150	150	150	200
o	mm	315	315	340	340	340	340	340	340
p	Internal Ø mm	240	240	290	290	340	340	440	440
q	mm	2500	2680	2960	3010	3230	3480	3820	4150
r	mm	2060	2240	2500	2550	2750	3000	3350	3700
s	mm	1030	1120	1250	1275	1575	1500	1675	1850
t	mm	265	275	295	320	325	365	380	425
u	mm	300	300	325	335	370	370	405	410
v	mm	1050	1085	1100	1150	1200	1375	1380	1430
w	mm	1530	1580	1650	1750	1830	2000	2080	2250
x	mm	1270	1305	1358	1430	1500	1660	1715	1790

\*1 Nominal dimensions, subject to modification.

## Specification (cont.)

### 1.3 Specification, for burner selection



Boiler size		1	2	3	4	5	6	7	8		
Maximum permissible combustion output according to EN 12953-3	MW	0.52	0.67	0.85	1.04	1.30	1.70	2.16	2.84		
Flue gas pressure drop	- for natural gas	mbar	5.3	7.6	8.3	9.3	11.0	9.9	10.0	11.9	
	- for fuel oil EL	mbar	4.8	6.9	7.6	8.4	10.0	8.9	9.0	10.7	
<b>Combustion chamber dimensions</b>											
<b>Length</b>											
- Approved for flames	Dimension a	mm	1635	1815	2075	2125	2325	2575	2925	3375	
- Flame tube	Dimension b	mm	1510	1690	1950	2000	2200	2450	2800	3250	
- Flame tube	Dimension e	mm	800	980	1240	1240	1365	1680	1990	2440	
- Flame tube	Dimension d	mm	710	710	710	760	835	770	810	810	
- Reversing chamber	Dimension c	mm	250								
<b>Diameter 1</b>	Dimension g	∅ mm	540	565	590	630	690	760	800	870	
<b>Diameter 2</b>	Dimension h	∅ mm	372	397	422	635	520	596	636	706	
<b>Burner connection dimensions</b>											
<b>Minimum flame tube length</b>		mm	260								
<b>Max. burner head diameter</b>	Dimension f	∅ mm	290		350		380		410		
<b>Combustion chamber volume</b>											
<b>Flame tube</b>		m <sup>3</sup>	0.300	0.376	0.483	0.625	0.752	1.041	1.330	1.847	
<b>Flame tube and reversing chamber</b>		m <sup>3</sup>	0.328	0.407	0.518	0.705	0.805	1.111	1.409	1.945	

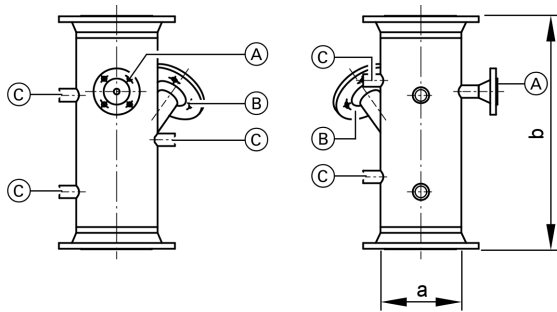
#### Note

Max. installed height 500 m above sea level, max. boiler flow temperature 190 °C.

## Specification (cont.)

### 1.4 Intermediate flow piece

(order separately)

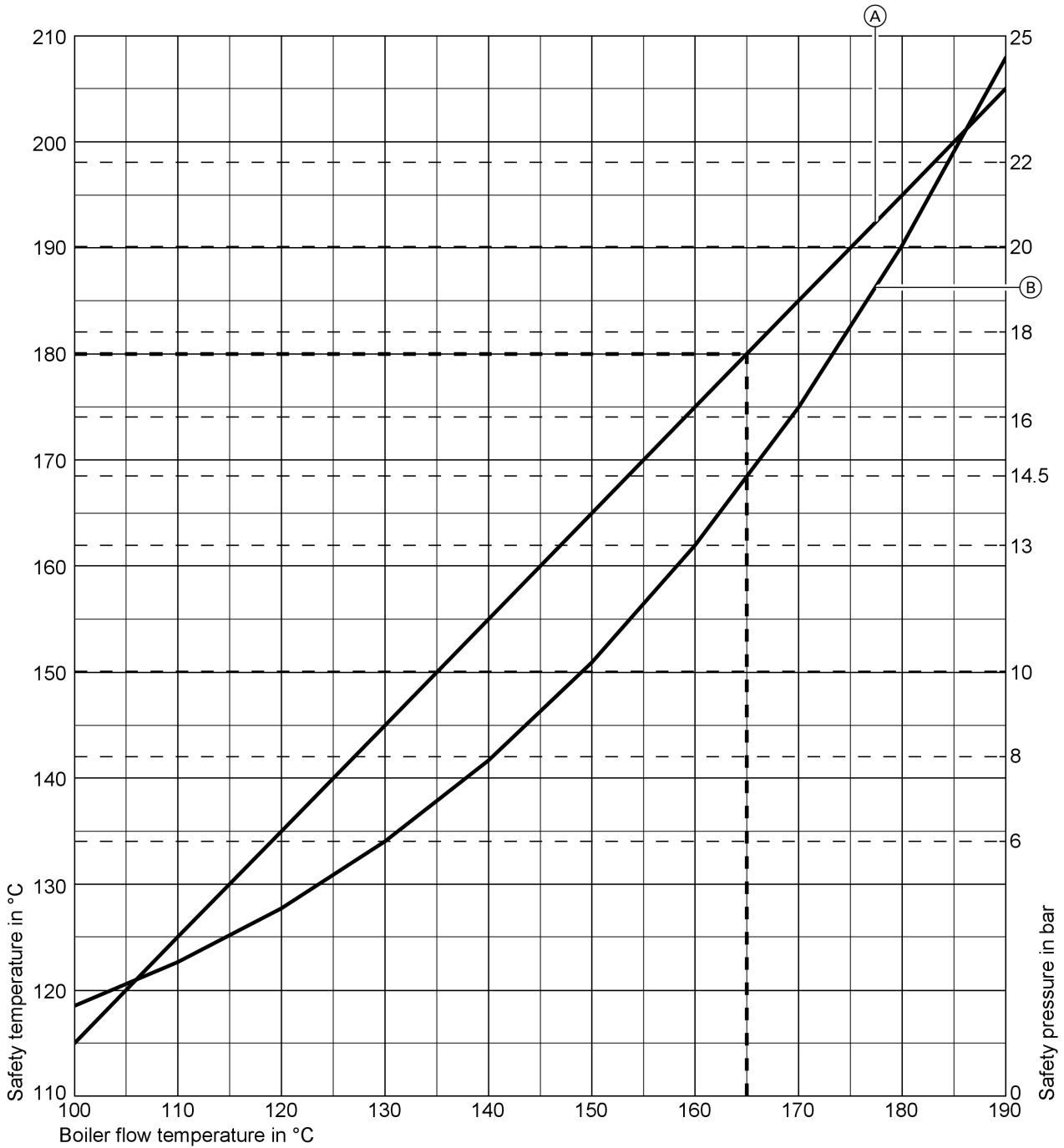


a	DN	65	80	100	125	150
b	mm	500				

- Ⓐ Connector DN 20 PN 40 for instrument base (pressure regulator, pressure limiter and pressure gauge)
- Ⓑ Connector DN 50 PN 40 for electrode water level limiter
- Ⓒ 5 fem. connections R 1/2" for thermometer, sample valve and additional control equipment

### 1.5 Diagrams for the selection of the boiler size

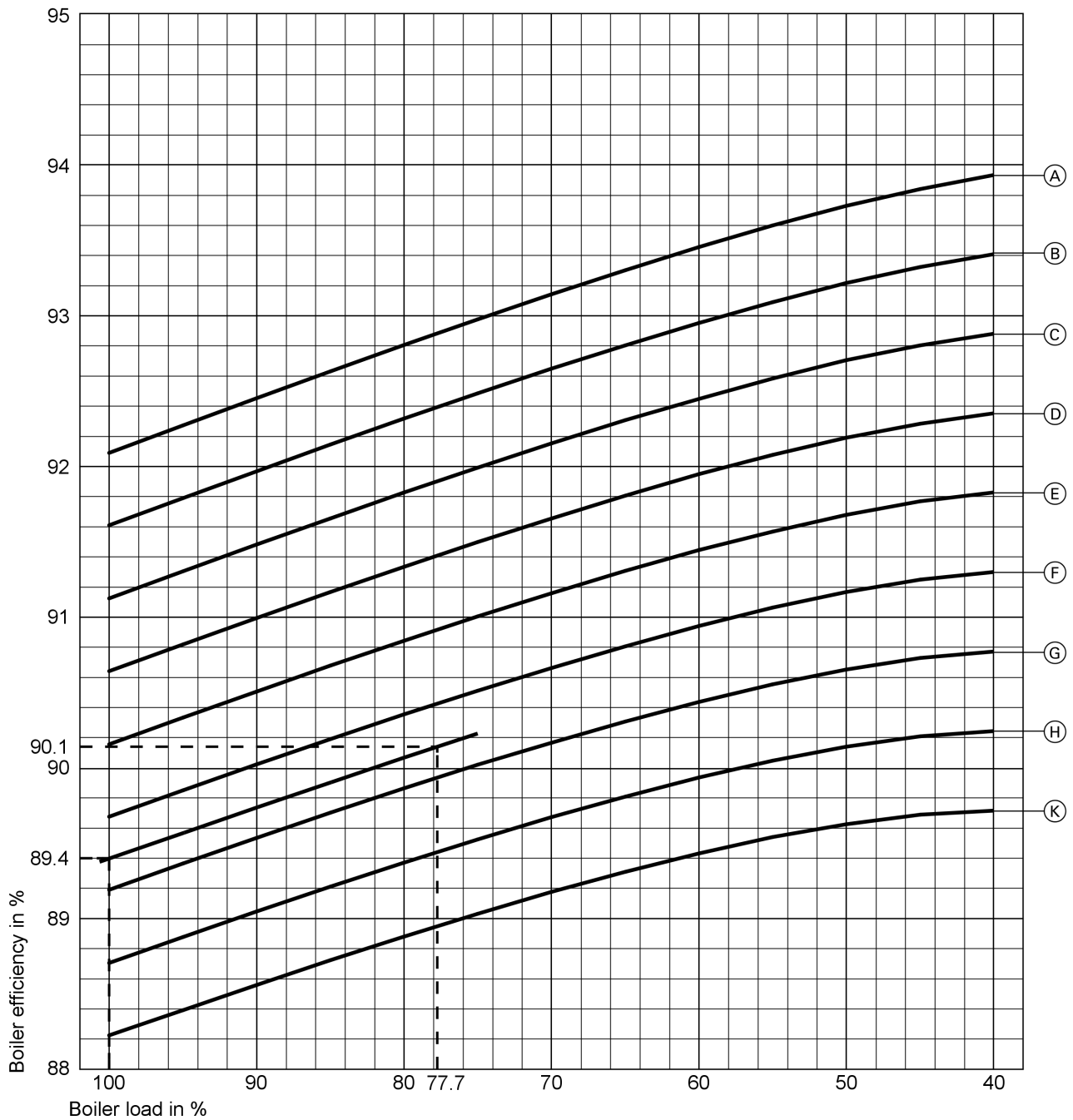
Diagram 1: Safety temperature and safety pressure subject to the boiler flow temperature



- Ⓐ Safety temperature
- Ⓑ Safety pressure (permis. operating pressure)

## Specification (cont.)

Diagram 2: Boiler efficiency subject to the boiler flow temperature



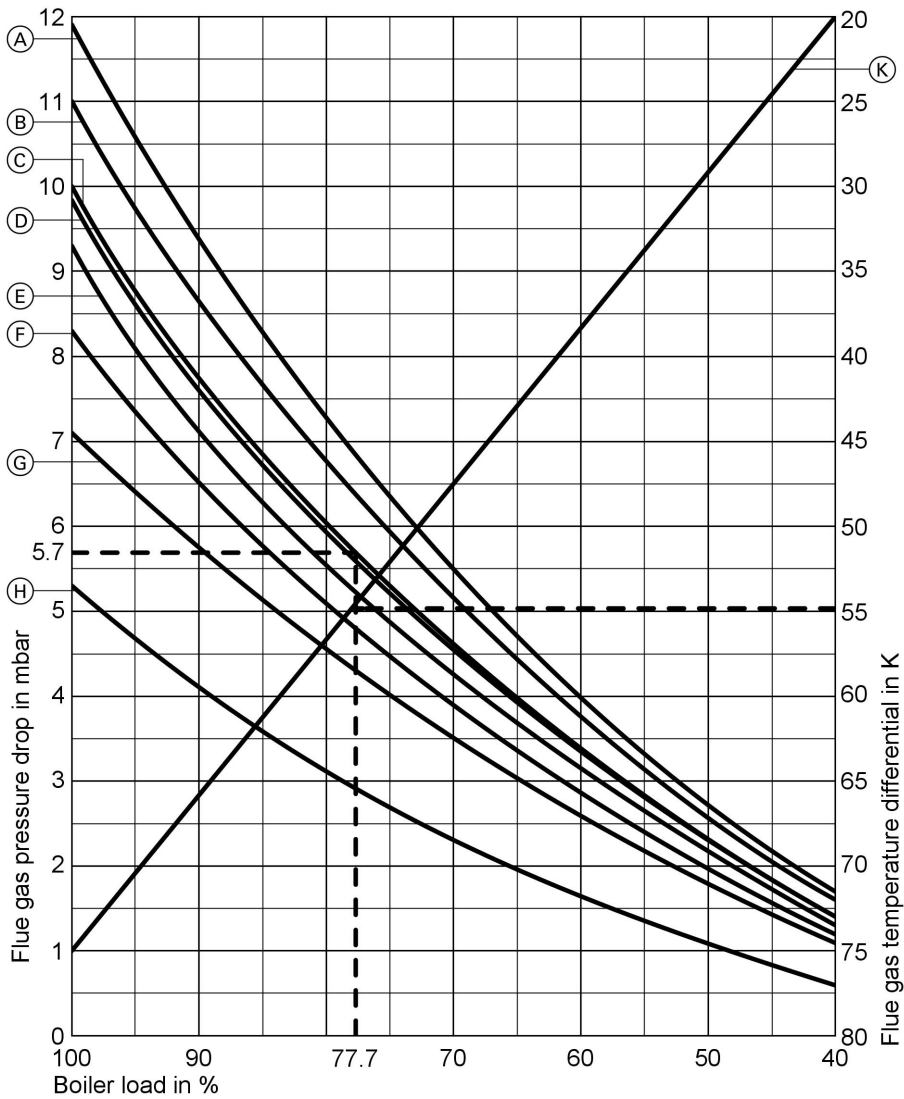
- (A) Boiler flow temperature 100 °C
- (B) Boiler flow temperature 110 °C
- (C) Boiler flow temperature 120 °C
- (D) Boiler flow temperature 130 °C
- (E) Boiler flow temperature 140 °C

- (F) Boiler flow temperature 150 °C
- (G) Boiler flow temperature 160 °C
- (H) Boiler flow temperature 170 °C
- (K) Boiler flow temperature 180 °C



## Specification (cont.)

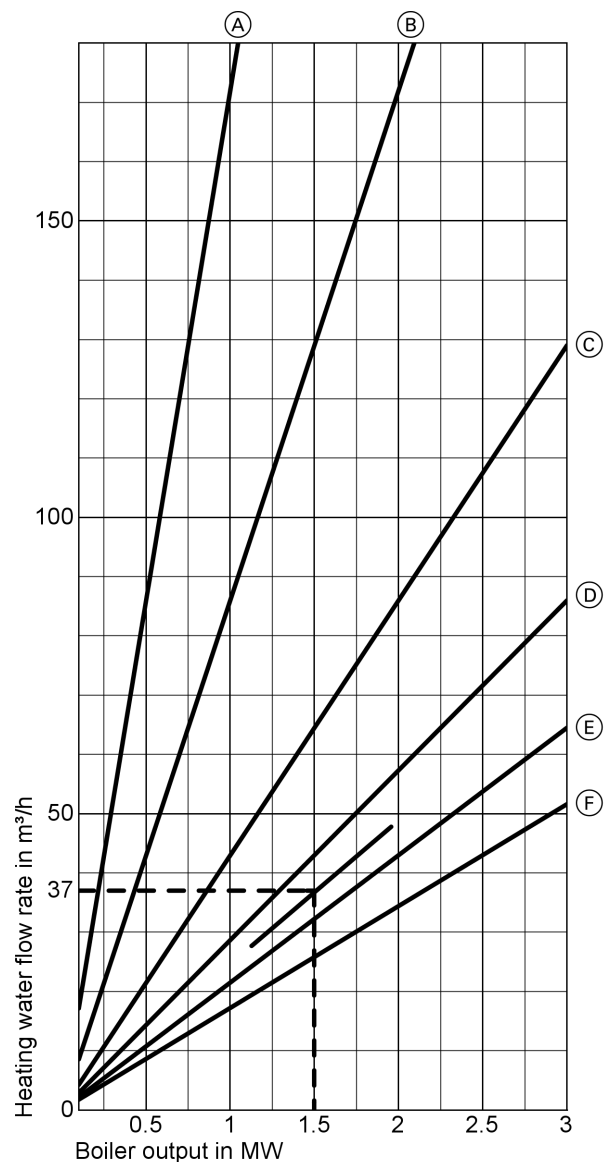
**Diagram 3: Flue gas pressure drop and flue gas temperature differential subject to boiler output**



- (A) Boiler size 8
- (B) Boiler size 3
- (C) Boiler size 7
- (D) Boiler size 6
- (E) Boiler size 2

- (F) Boiler size 5
- (G) Boiler size 1
- (H) Boiler size 4
- (K) Temperature differential between the flue gas temperature at the boiler outlet and the boiler flow temperature

Diagram 4: Heating water flow rate subject to the temperature spread

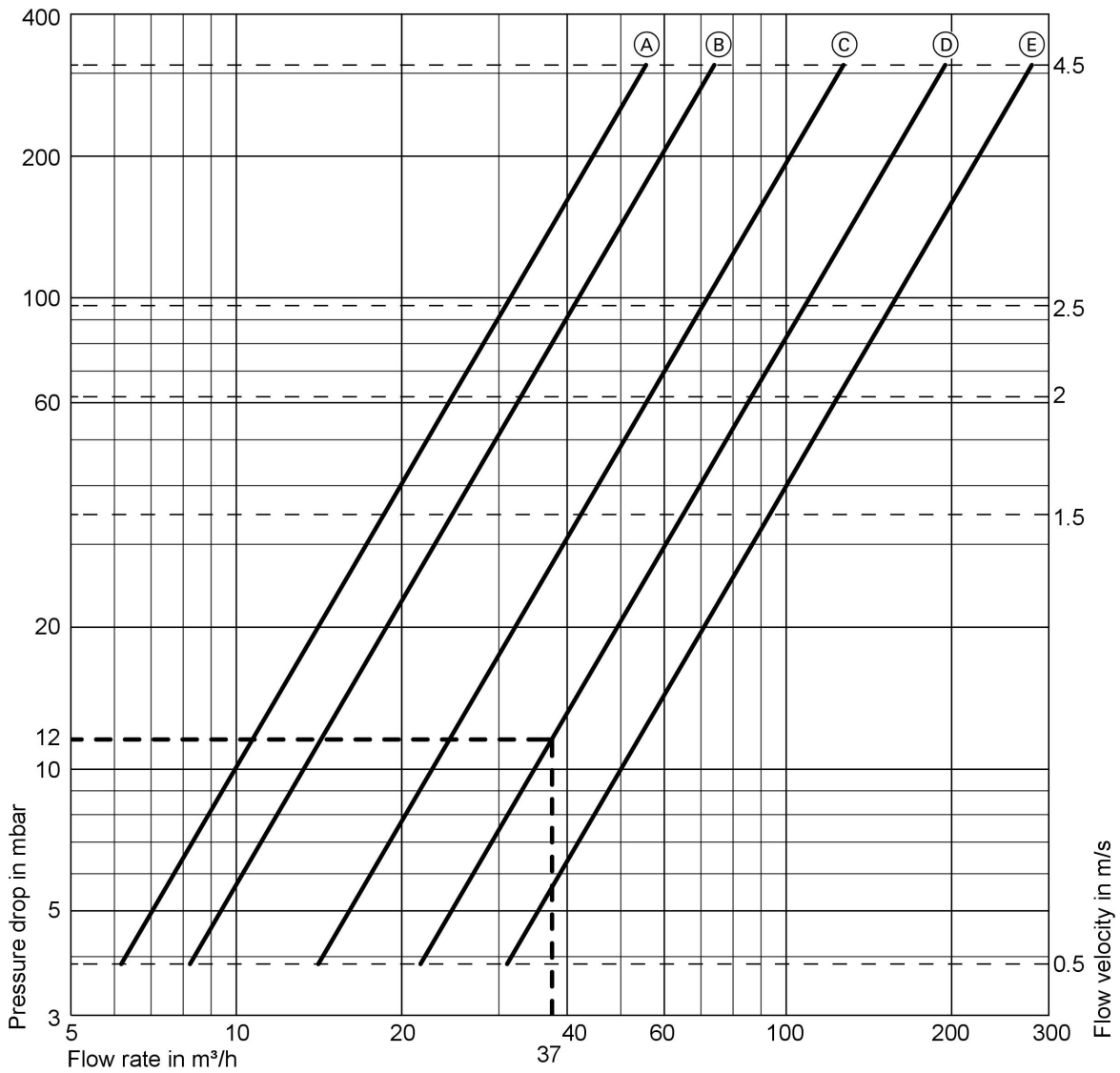


- Ⓐ Temperature spread 5 K
- Ⓑ Temperature spread 10 K
- Ⓒ Temperature spread 20 K

- Ⓓ Temperature spread 30 K
- Ⓔ Temperature spread 40 K
- Ⓕ Temperature spread 50 K

## Specification (cont.)

Diagram 5: Pressure drop on the heating water side



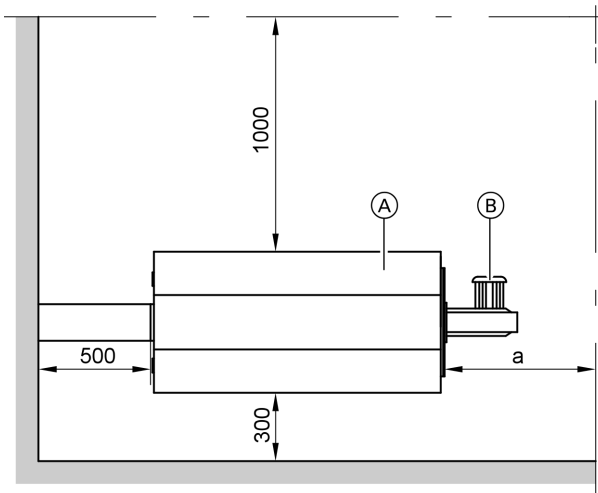
- (A) Connectors for boiler flow and return DN 65
- (B) Connectors for boiler flow and return DN 80
- (C) Connectors for boiler flow and return DN 100

- (D) Connectors for boiler flow and return DN 125
- (E) Connectors for boiler flow and return DN 150

## Specification (cont.)

### 1.6 Positioning

#### Recommended clearances



Observe the stated dimensions to ensure easy installation and maintenance.

Clearances relate to the boiler.

The clearances must be checked in accordance with the applicable code of practice at the installation site, subject to the fitted equipment (accessories).

- (A) Boiler
- (B) Burner

Boiler size		1	2	3	4	5	6	7	8
a	mm	2000	2200	2400	2500	2700	2900	3200	3500
a <sub>min.</sub>	mm	1000	1100	1300	1300	1400	1500	1700	1900

Dim. a: This clearance is recommended for boiler cleaning.

Dim. a<sub>min.</sub>: A greater minimum size may be required because of the burner dimensions.

#### Installation conditions

Install hot water boilers in rooms that comply with TRD 403 [or local regulations].

- Avoid very dusty conditions
- Avoid high levels of humidity
- Protect against frost and ensure good ventilation

Otherwise, the system may suffer faults and damage.

In rooms where air contamination through **halogenated hydrocarbons** may occur, install the boiler only if adequate measures can be taken to provide a supply of uncontaminated combustion air.

#### Standard delivery

Boiler with fitted door and thermal insulation.

Sight glass and flame tube gasket are supplied inside the boiler.

The burner plate is supplied separately.

## Boiler selection

### 3.1 Schematic diagram to assist in selecting a boiler and determining parameters

Pos.	Procedure	Example	Customer	Notes
	<b>Required parameters</b>			
a	Boiler output	1500 kW		Actual required heat demand
b	Boiler flow temperature (see also permiss. flow temperature, page 3)	165 °C		The return temperature must be raised for differentials greater than 50 K
c	Boiler return temperature	130 °C		
d	Fuel quality	Natural gas H		Attach DIN or fuel analysis
e	Emission constraints	Low NO <sub>x</sub>		
f	Burner manufacturer/burner type			Option
	<b>Boiler selection</b>			
1	Check permiss. flow temperature and permiss. operating pressure → selected pressure stage of the boiler	180 °C 14.5 bar 16 bar		Diagram 1 on page 7, enter the required flow temperature; check system requirements
2	Read off the efficiency level	89.4%		Diagram 2 on page 8 at 100% load
3	Calculate the required combustion output	$\frac{1500 \text{ kW}}{0.894} = 1678 \text{ kW}$		<u>Pos. a</u> <u>Pos. 2</u>
4	Determine the required combustion chamber geometry	Natural gas H: a <sub>min</sub> = 2550 mm g <sub>min</sub> = 780 mm		Send burner technical guide or table on page 14 and Fig. on page 5 to the burner manufacturer
5	Select the required boiler size	Size 7 2160 kW		Table on page 14 and Fig. on page 5 Maintain dimensions a and g
6	Calculate the boiler load	$\frac{1678 \text{ kW}}{2160 \text{ kW}} \times 100\% = 77.7\%$		<u>Pos. 3</u> <u>Pos. 5</u>
7	Efficiency level at existing boiler load	90.1 %		Diagram 2 on page 8, Continue with pos. 3
8	Read off flue gas pressure drop	5.7 mbar		Diagram 3 on page 9
9	Select burner fan			Burner datasheet or burner manufacturer's details in table on page 14
	<b>Optimisation options</b>			
10	Efficiency level with heat exchanger*1			Continue with pos. 3
	<b>Parameters for peripheral equipment</b>			
11	Read off the temperature differential for flue gas outlet – and boiler flow	approx. 55 K above t <sub>KV</sub>		Diagram 3 on page 9
12	Heating water flow rate	approx. 37 m <sup>3</sup> /h		Diagram 4 on page 10
13	Internal diameter of KV connector	DN 125		Table on page 3
14	Pressure drop on the heating water side	approx. 12 mbar		Diagram 5 on page 11
15	Checking the safety valve blow-off capacity	DN 32 at 1500 kW and 16 bar		


\*1 It may be more economical to install a heat exchanger downstream. By using a heat exchanger it may be possible to install the next boiler size down.

## Boiler selection (cont.)

### 3.2 Details for burner selection by the burner manufacturer

In conjunction with the details on page 5.

#### System parameters

Height above sea level	Up to 500 m		m
	above 500 m		m
Inlet air temperature, if preheated			°C
Boiler flow temperature			°C
Additional flue gas pressure drop due to heat exchanger, silencer etc.			mbar
Fuel	Natural gas	H / L	
	Fuel oil EL		
	Fuel oil S		Attach fuel analysis
	Other		Attach fuel analysis
Emission requirements	Burnout free of soot		
	1st BImSchV		
	LRV 		
	Other		Attach limit values

#### Burner manufacturer's details

Burner type	
Required boiler size	
Max. combustion output	kW

### 3.3 Selection of a safety valve

**Note**

*Sizing the safety valves in accordance with EN 12953 sheet 8, section 4.2.2, paragraph 2.*

*A steam flow corresponding to the permissible heat output is expelled.*

*Please direct any further questions regarding the safety valve to the relevant Viessmann sales engineer.*

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