



**B**



**ADVANCED HEAT EXCHANGERS**

**SHELL & TUBE CONDENSERS**





## COMPANY OVERVIEW

For more than 20 years, ONDA has been a leading manufacturer of process heat exchangers for the refrigeration and air conditioning markets, partnering with many key OEM customers throughout the world. We offer a full range of shell & tube (DX & Flooded) and brazed-plate heat exchangers, in standard and custom configurations. Our heat exchangers are available with different raw materials and can be used with a variety of fluids. Our systems are compatible with many different refrigerants as HFC, HFO, HFC-HFO mixtures and natural ones. We can provide multiple certifications, including ASME, PED/CE and others. All products are manufactured in compliance with ISO 9001 standards.

**CERTIFICATO MODULO HI**  
Conformità basata sulla garanzia totale di qualità con controllo della progettazione delle Attrezzature a pressione

Certificato n.:	INAIL/004-Q/19/UE	X revisione: 1 <sup>ra</sup>	Data 1° emiss.: 11/10/2019
		C2 RIVALUTAZIONE COMPLETA:	Data emiss. estesa: 15/07/2020
			Data scadenza: 10/10/2022

X Fabricante: **Onida Spa - Via Dante Alighieri, 27b - 36065 Mussolente (VI)**  
 Stabilimento di: **36065 Mussolente (VI)**  
 Apprensore autorizzato: **36065 Mussolente (VI)**  
 Scopo del sistema di qualità: Progettazione, costruzione, ispezione finale e collaudi

Certificato di Esame UE del Progetto: **001/P/001/01 ONDA Rev.1 del 15/07/2020** Codice di calcolo: **VSR-UN/PNR 15-2019**

Numero identificativi del progetto/diagramma:  
 AD-E-01-15-2012\_Rev2 (E1-E3); AD-E-01-16-2012\_Rev3 (E1-E3); AD-E-01-17-2012\_Rev2 (E1-E3); AD-E-01-18-2012\_Rev2 (E1-E3); C15-00-2014\_Rev1 (C9-C10); C16-01-2014\_Rev3 (C9-C12); C17-2014-01\_Rev3 (E40-E41); E15-00-2014\_Rev2 (E0-E10); E16-01-2014\_Rev2 (E0-E10); E17-00-2014\_Rev1 (E0N-E0N E1); E18-01-2014\_Rev1 (E0N-E0N E1); E19-00-2014\_Rev1 (E0-E14); E20-01-2014\_Rev1 (E0-E14); E21-00-2014\_Rev1 (E0-E14); E22-01-2014\_Rev1 (E0-E14); E14-00-2014\_Rev1 (E0-E14); E15-00-2014\_Rev1 (E0-E14); E16-00-2014\_Rev1 (E0-E14)

Descrizione dell'attrezzatura e/o nome commerciale: **Scambiatori di calore (evaporatori - condensatori - evaporatori/condensatori per condizionamento, refrigerazione ed industria) - ricevitori**

Categoria di rischio: **Tab. di appartenenza AII, II PED: 1** Codice: **II-A / II-A**

Integratore	valori	Press/Potenza (bar)	Temperatura (°C)	Capacità/Volume (l) / (DN)	Fluido	Stato del Fluido
Carica principale	45	-57/+120	vari	vari	Acqua/Aria Refrig.	L/G
Intercambio	45	-57/+120	vari	vari	Acqua/Aria Refrig.	L/G
Intercambio	50	-57/+120	vari	vari	Acqua/Aria Refrig.	L/G

Capacità totale max (litri): **5.600 L.**

**CERTIFICATE OF AUTHORIZATION**

The named company is authorized by The American Society of Mechanical Engineers (ASME) for the scope of activity shown below in accordance with the applicable rules of the ASME Boiler and Pressure Vessel Code. The use of the ASME Single Certification Mark and the authority granted by this Certificate of Authorization are subject to the provisions of the agreement set forth in the application. Any construction stamped with the ASME Single Certification Mark shall have been built strictly in accordance with the provisions of the ASME Boiler and Pressure Vessel Code.

COMPANY: **ONDA S.p.A.**  
Via Lord Baden Powell, 11  
Lomigo (VI) 36045  
Italy

SCOPE: **Manufacture of pressure vessels at the above location only**

AUTHORIZED: December 11, 2020  
EXPIRES: December 11, 2023  
CERTIFICATE NUMBER: 35709

*David E. Tuttle*  
Board Chair, Conformity Assessment

*Paul Chang*  
Managing Director, Conformity Assessment

**CERTIFICATE OF AUTHORIZATION**

The named company is authorized by The American Society of Mechanical Engineers (ASME) for the scope of activity shown below in accordance with the applicable rules of the ASME Boiler and Pressure Vessel Code. The use of the ASME Single Certification Mark and the authority granted by this Certificate of Authorization are subject to the provisions of the agreement set forth in the application. Any construction stamped with the ASME Single Certification Mark shall have been built strictly in accordance with the provisions of the ASME Boiler and Pressure Vessel Code.

COMPANY: **ONDA S.p.A.**  
Via Dante Alighieri, 27  
Mussolente, (VI) 36065  
Italy

SCOPE: **Manufacture of pressure vessels at the above location only**

AUTHORIZED: December 11, 2020  
EXPIRES: December 11, 2023  
CERTIFICATE NUMBER: 49153

*David E. Tuttle*  
Board Chair, Conformity Assessment

*Paul Chang*  
Managing Director, Conformity Assessment



## TECHNICAL INFORMATION

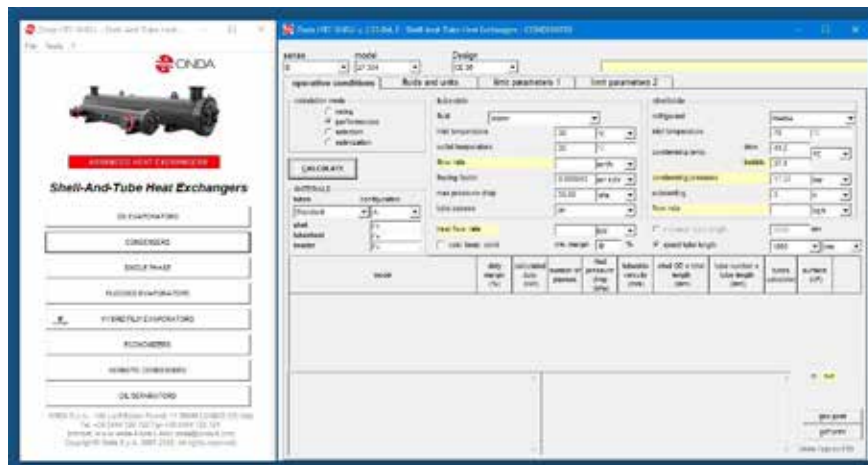
The Onda "B" condenser product family has been designed for air conditioning and process cooling applications using HFC and HFO refrigerants as primary fluid, the secondary fluid is usually water or glycols.

Thanks to an high thermal performance tube the B condenser has a compact design reducing the refrigerant charge of about - 35% vs traditional condensers with a competitive market price.

The capacity range is from 50 to 1500 kW, custom models are also available for higher capacity demands.

Two model range are available at 30 and 45 barg on shell side, tube side is at 10 barg. The standard configuration is 2 passes with tube length 1850 mm.

Other tube length and number of passes are also available to match different operating conditions, please refer to Onda's HTC-Shell software



## B CONSTRUCTION:

<b>Shell</b>	Carbon steel pipe, sand blasted and cleaned prior to assembly.
<b>Tubes</b>	Copper, high-performance, enhanced design, roll expanded into multiple-grooved tubesheet.
<b>Tubesheets</b>	Carbon steel plate, precision machined by ONDA
<b>Tube Supports</b>	Carbon steel plate, machined by ONDA, with close tolerances to minimize vibrations.
<b>Covers</b>	Cast iron or carbon steel plate,
<b>Water connections</b>	Female threaded connection according to ISO 228-G, flexible joint from DN 80 (3") or flanged.
<b>Refrigerant connections</b>	Carbon steel pipe, suitable for ODS copper pipe brazing usually up to ODS 64mm and OD for larger connection.
<b>Other connections</b>	All condensers include additional fittings for safety valves, auxiliary connections, vents and drains.
<b>External painting</b>	Exterior surfaces are cleaned and painted with a high quality alkyd-phenolic primer, for rust prevention. RAL9005. Other painting more corrosion resistance are available on request

## ONDA B Condenser Design Suggestions

The fouling factor (f.f.) is essential for the correct condenser selection. ONDA uses the following guidelines:

Normal city water	f.f. = 0.000043 [W m <sup>2</sup> /W]
Treated tower water	f.f. = 0.000043 [W m <sup>2</sup> /W]
River water	f.f. = 0.000086 [W m <sup>2</sup> /W]
Glycol solutions < 40%	f.f. = 0.000086 [W m <sup>2</sup> /W]
Glycol solutions > 40%	f.f. = 0.000172 [W m <sup>2</sup> /W]

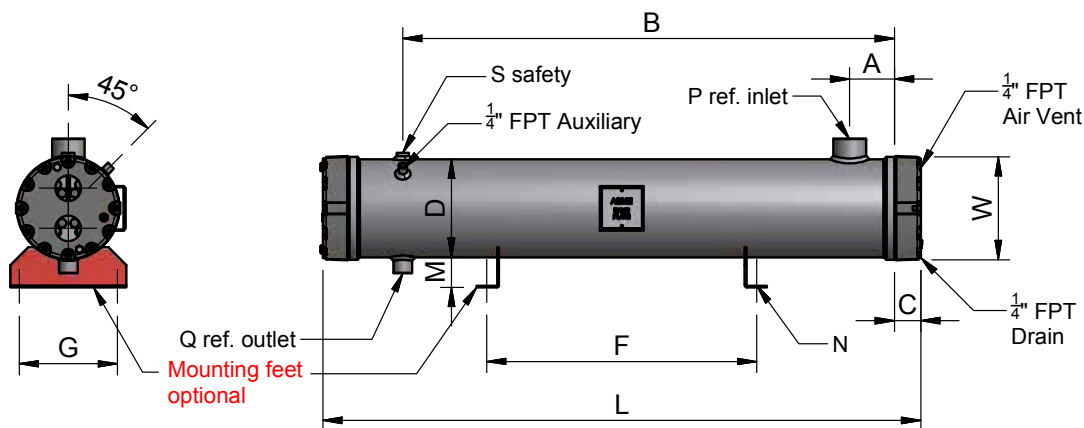
The recommended water velocity range inside the tubes is between 1.0 and 2.9 m/s, optimum range 1.5 – 2.3 m/s.

## QUALIFICATIONS

B condenser standard range meets PED/CE directive and ASME VIII Div 1. Other type of qualifications are available on demand. The heat exchanger is pneumatically pressure tested according to PED/CE and ASME standards.

Approvazione / Approval	Temperatura di progetto (°C) / Design temperature (°C)	Pressione di progetto (bar) / Design pressure (bar)	
		Mantello / Shell side	Tubi / Tubes side
CE-30	-10 / +120	30,0	10,0
CE-45	-10 / +120	45,0	10,0
ASME-23	-	330 p.s.i. @ 150 °F	-
ASME-45	-	650 p.s.i. @ 150 °F	-
RINA et al.	-10 / +90	27,0	10,0

**PLEASE READ OPERATING AND INSTRUCTIONS MANUAL BEFORE USE**



MODEL	B17 (EU)	17.301	17.302	17.304	17.305	17.307
<b>NOMINAL DATA</b>						
Capacity	kW	50	66	82	98	115
Water pressure drop	kPa	38	39	39	40	40
Water flow rate	m <sup>3</sup> /h	9	11	14	17	20
Max flow rate	m <sup>3</sup> /h	11	15	18	22	26
Refrigerant volume	L	28	26	24	22	20
Weight	Kg	79	82	86	90	93

Number of water passes		2
------------------------	--	---

Dimensions [mm]	A	100
	B	1750
	C	41
	D	168
	F	1100
	G	180
	M	58
	N	12
	L	1940
W	180	

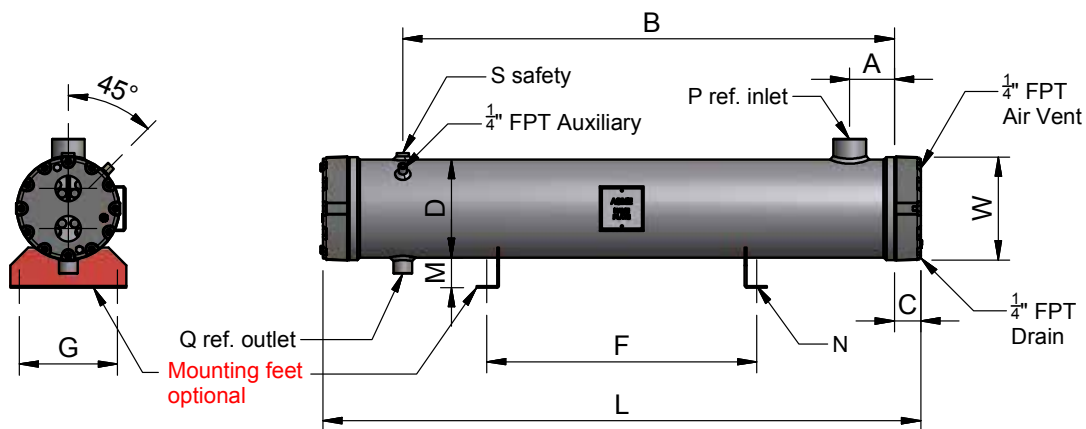
Refrigerant connections R449A	P	ODS 35
	Q	ODS 28
	S	1/2" GAS

Water connections 2 passes		2"
----------------------------	--	----

Inlet water temperature	30	°C
Outlet water temperature	35	°C
Condensing temperature (dew point)	41.5	°C
Subcooling	3	K
Waterside fouling factor	0,000043	m <sup>2</sup> K/W



# B19-22 CONDENSERS



MODEL	B19-22 (EU)	19.301	19.302	19.303	19.304	22.301	22.302
<b>NOMINAL DATA</b>							
Capacity	kW	115	131	147	163	179	195
Water pressure drop	kPa	38	37	37	38	38	38
Water flow rate	m <sup>3</sup> /h	20	23	26	28	31	34
Max flow rate	m <sup>3</sup> /h	26	29	33	36	37	41
Refrigerant volume	L	32	30	28	26	38	36
Weight	Kg	113	117	120	124	135	139

Number of water passes	2
------------------------	---

Dimensions [mm]	A	100	100
	B	1750	1750
	C	55	55
	D	194	219
	F	1100	1100
	G	220	220
	M	66	68
	N	12	12
	L	1968	1968
W	230	230	

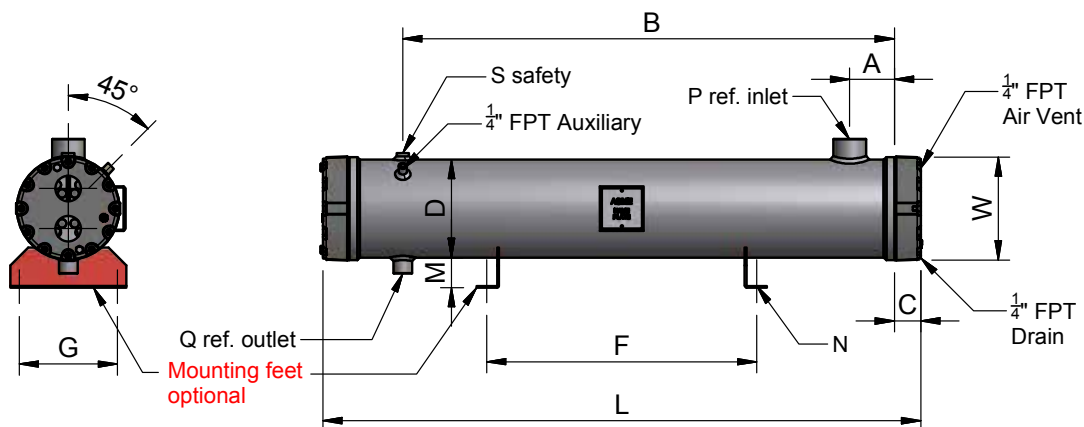
Refrigerant connections <b>R449A</b>	P	ODS 42
	Q	ODS 35
	S	1"

Water connections 2 passes	2"1/2
----------------------------	-------

Inlet water temperature	30	°C
Outlet water temperature	35	°C
Condensing temperature (dew point)	41.5	°C
Subcooling	3	K
Waterside fouling factor	0,000043	m <sup>2</sup> K/W



# B27-32 CONDENSERS



MODEL	B27 (EU)	27.301	27.302	27.303	27.304	32.301	32.302	32.303
<b>NOMINAL DATA</b>								
Capacity	kW	243	275	323	353	419	465	497
Water pressure drop	kPa	37	37	37	37	36	36	36
Water flow rate	m <sup>3</sup> /h	42	48	56	61	73	81	86
Max flow rate	m <sup>3</sup> /h	54	61	76	83	90	100	107
Refrigerant volume	L	65	61	55	51	84	77	73
Weight	Kg	188	195	206	213	263	273	280

Number of water passes	2							
------------------------	---	--	--	--	--	--	--	--

Dimensions [mm]	A	150			150				
	B	1700			1700				
	C	62			70				
	D	273			324				
	F	1100			1100				
	G	280			300				
	M	88			95				
	N	14			16				
	L	1980			2000				
	W	285			335			335	

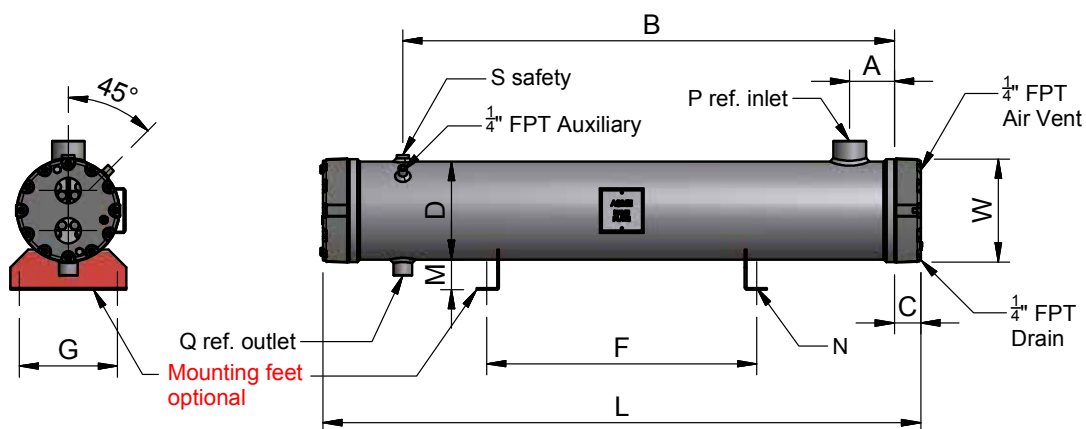
Refrigerant connections R449A	P	ODS 64			0		
	Q	ODS 54			0		
	S	1"			2x1"		

Water connections 2 passes	3"		4"		4"	
----------------------------	----	--	----	--	----	--

Inlet water temperature	30			°C		
Outlet water temperature	35			°C		
Condensing temperature (dew point)	41.5			°C		
Subcooling	3			K		
Waterside fouling factor	0,000043			m <sup>2</sup> K/W		



# B36 CONDENSERS



MODEL	B36 (EU)	36.301	36.302	36.303	36.304
<b>NOMINAL DATA</b>					
Capacity	kW	513	561	608	639
Water pressure drop	kPa	36	37	37	37
Water flow rate	m <sup>3</sup> /h	89	97	105	111
Max flow rate	m <sup>3</sup> /h	120	131	142	150
Refrigerant volume	L	98	91	85	81
Weight	Kg	334	344	355	362

Number of water passes	2
------------------------	---

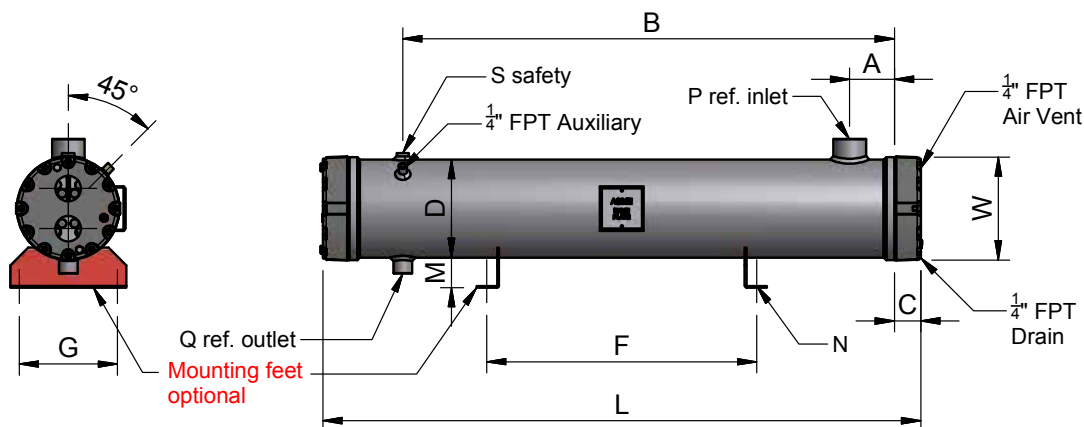
Dimensions [mm]	A	150
	B	1700
	C	70
	D	355
	F	1100
	G	300
	M	95
	N	16
	L	2800
	W	420

Refrigerant connections R449A	P	DN 80
	Q	ODS 64
	S	3x1"

Water connections 2 passes	5"
----------------------------	----

Inlet water temperature	30	°C
Outlet water temperature	35	°C
Condensing temperature (dew point)	41.5	°C
Subcooling	3	K
Waterside fouling factor	0,000043	m <sup>2</sup> K/W





MODEL	B41 (EU)	41.301	41.302	41.303	41.304	41.305
<b>NOMINAL DATA</b>						
Capacity	kW	658	687	736	798	833
Water pressure drop	kPa	38	38	38	38	39
Water flow rate	m <sup>3</sup> /h	114	119	127	138	144
Max flow rate	m <sup>3</sup> /h	139	147	160	167	194
Refrigerant volume	L	131	127	121	113	108
Weight	Kg	420	427	137	451	458

Number of water passes	2
------------------------	---

Dimensions [mm]	A	150
	B	1700
	C	85
	D	406
	F	1100
	G	400
	M	94
	N	16
	L	2028
	W	420

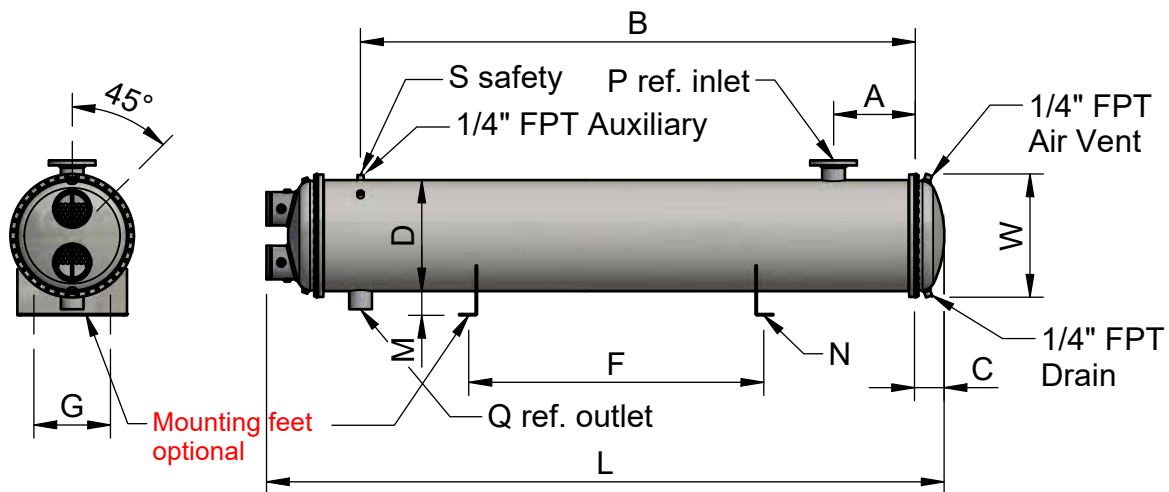
Refrigerant connections R449A	P	DN 80
	Q	ODS 64
	S	3x1"

Water connections 2 passes	5"
----------------------------	----

Inlet water temperature	30	°C
Outlet water temperature	35	°C
Condensing temperature (dew point)	41.5	°C
Subcooling	3	K
Waterside fouling factor	0,000043	m <sup>2</sup> K/W



# B46 CONDENSERS



MODEL	B46 (EU)	46.301	46.302	46.303	46.304
<b>NOMINAL DATA</b>					
Capacity	kW	833	895	989	1013
Water pressure drop	kPa	35	35	35	35
Water flow rate	m <sup>3</sup> /h	144	155	171	175
Max flow rate	m <sup>3</sup> /h	194	209	231	236
Refrigerant volume	L	168	160	147	144
Weight	Kg	483	496	517	522

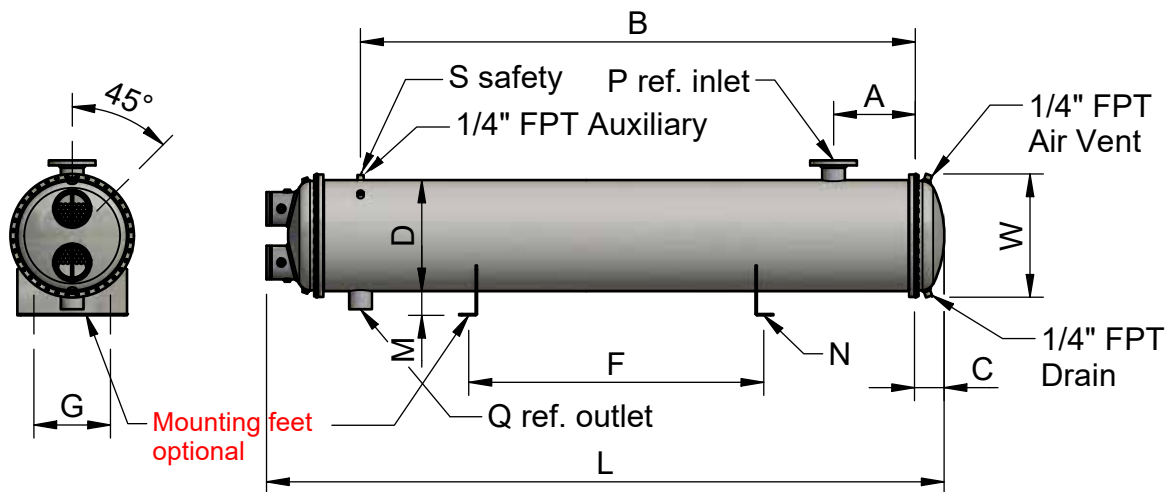
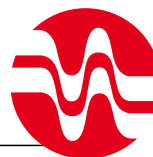
Number of water passes	2
------------------------	---

Dimensions [mm]	A	200
	B	1650
	C	110
	D	457
	F	1100
	G	400
	M	100
	N	16
	L	2235
	W	520

Refrigerant connections R449A	P	DN 100
	Q	ODS 80
	S	3x1"

Water connections 2 passes	6"
----------------------------	----

Inlet water temperature	30	°C
Outlet water temperature	35	°C
Condensing temperature (dew point)	41.5	°C
Subcooling	3	K
Waterside fouling factor	0,000043	m <sup>2</sup> K/W



MODEL	B51 (EU)	51.301	51.302	51.303	51.304
<b>NOMINAL DATA</b>					
Capacity	kW	1100	1162	1253	1283
Water pressure drop	kPa	35	35	35	35
Water flow rate	m <sup>3</sup> /h	191	210	217	222
Max flow rate	m <sup>3</sup> /h	209	229	237	242
Refrigerant volume	L	194	186	174	170
Weight	Kg	636	649	669	675

Number of water passes	2
------------------------	---

Dimensions [mm]	A	200
	B	1650
	C	140
	D	508
	F	1100
	G	400
	M	95
	N	18
	L	2235
	W	570

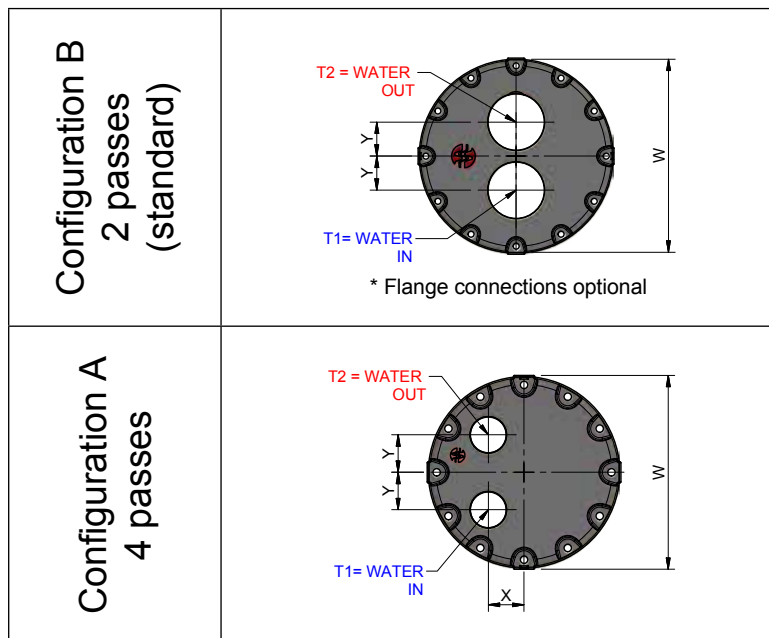
Refrigerant connections R449A	P	DN 100
	Q	ODS 80
	S	3x1"

Water connections 2 passes	6"
----------------------------	----

Inlet water temperature	30	°C
Outlet water temperature	35	°C
Condensing temperature (dew point)	41.5	°C
Subcooling	3	K
Waterside fouling factor	0,000043	m <sup>2</sup> /K/W



### WATER CONNECTIONS

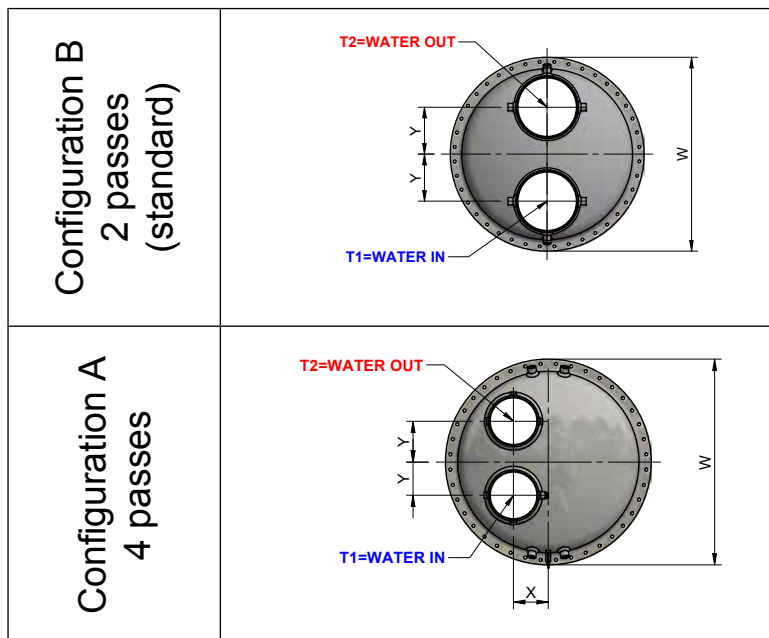


FOR MODEL B		B-17		B-19		B-22		B27	
Figure		B	A	B	A	B	A	B	A
Passes		2	4	2	4	2	4	2	4
W	inches	180	180	230	230	230	230	285	285
X		\	30	\	45	\	45	\	55
Y		38	35	55	45	55	45	63	55
T1		2"	1"1/2	2"1/2	2"	2"1/2	2"	3"	2"1/2
T2		2"	1"1/2	2"1/2	2"	2"1/2	2"	3"	2"1/2

FOR MODEL B		B27		B-32		B-36		B-41	
Figure		B	A	B	A	B	A	B	A
Passes		2	4	2	4	2	4	2	4
W	inches	335	335	335	335	420	420	420	420
X		\	55	\	55	\	70	\	70
Y		63	55	63	55	90	70	90	70
T1		4"	3"	4"	3"	5"	3"1/2	5"	3"1/2
T2		4"	3"	4"	3"	5"	3"1/2	5"	3"1/2



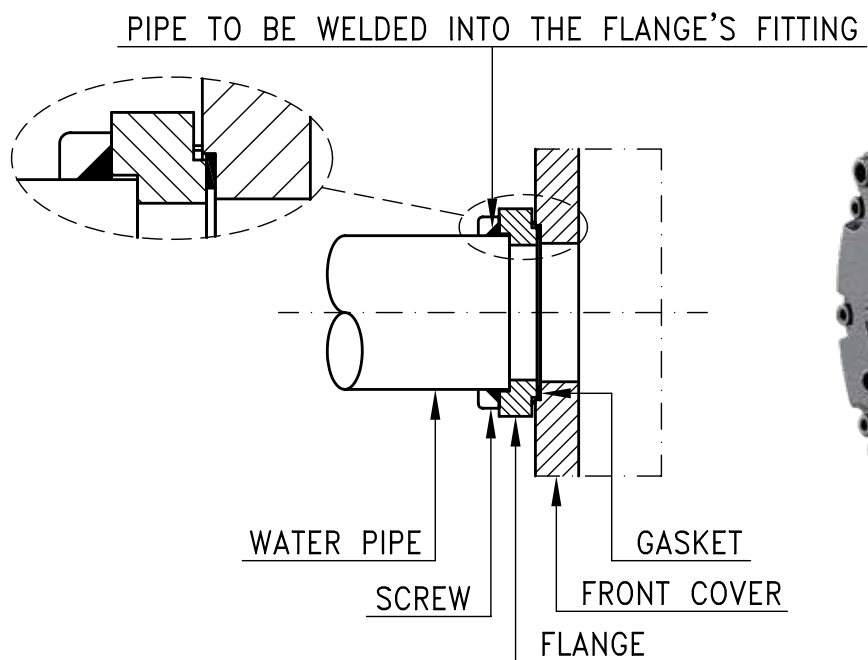
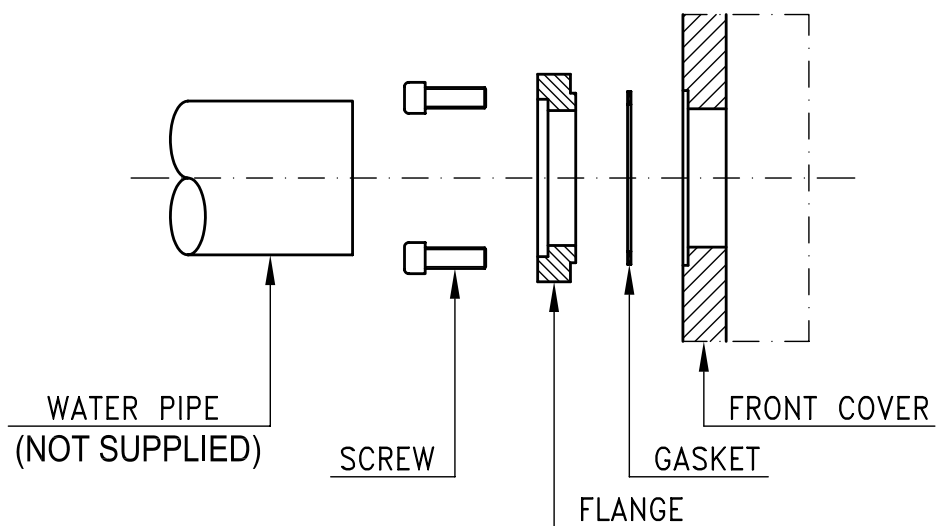
## WATER CONNECTIONS



FOR MODEL B		B-46		B-51	
Figure		B	A	B	A
Passes		2	4	2	4
W	inches	520	520	570	570
X		\	80	\	90
Y		120	100	\	100
T1		6"	5"	6"	5"
T2		6"	5"	6"	5"



## SQUARE FLANGE FOR CORNER JOINT TO PIPE







# ONDA S.p.A.

[onda@onda-it.com](mailto:onda@onda-it.com)  
[www.onda-it.com](http://www.onda-it.com)

#### PLANT 1 Headquarters

Via Dante Alighieri, 27B  
 36065 Mussolente (VI)  
 Italy  
 t. +39 0424 87633

#### PLANT 2

Via L. Baden Powell, 11  
 36045 Lonigo (VI)  
 Italy  
 t. +39 0444 720720

#### PLANT 3

Via Vittoria, 158A  
 36065 Mussolente (VI)  
 Italy  
 t. +39 0424 87506

#### PLANT 4

**Onda USA L.L.C.**  
 600 London Rd  
 Delaware, OH 43015  
 t. +1 614 321 3342  
[www.onda-us.com](http://www.onda-us.com)  
[onda@onda-us.com](mailto:onda@onda-us.com)

#### PLANT 5

**Onda Nordic OY**  
 Lentolantie 22 - 36220  
 Kangasala Tampere, Finland  
 t. +35 8331437300  
 m. +35 8409012999  
[www.ondanordic.com](http://www.ondanordic.com)  
[pasi.makinen@ondanordic.com](mailto:pasi.makinen@ondanordic.com)

#### Onda France S.A.R.L.

320, Avenue Berthelot  
 69008 Lyon France  
 t. +33 472784606  
 m. +33 608341000  
[www.onda-fr.com](http://www.onda-fr.com)  
[abouzat@onda-fr.com](mailto:abouzat@onda-fr.com)

#### Onda RU

Mayakovskogo Street, 18a, Khimki,  
 Moscow Region, Russia 141402  
 t. +7 916 676 16 54  
 m. +7 495 971 88 53  
[www.onda-it.com](http://www.onda-it.com)  
[info@onda-ru.com](mailto:info@onda-ru.com)

#### Onda Shanghai

Heat Exchanger Co., Ltd.  
 瓊蕙啞 (上海) 热交换有限公司  
 Shanghai, Changning District,  
 Anhua Road 492, Building 1 Tower A, Room 126  
 上海市长宁区安化路492号1幢 (A座) 126室A092  
 t. +86 021 6056 4838 (ext.1000)  
 m. +33 6 08 34 10 00