REFRIGERATION TECHNOLOGY

Evaporative condenser

TYP NRV

Capacity 225 to 3143 kW

Quality and Certification

To maintain standards we pay strict attention to quality control.

The constant control of quality during manufacture guarantees that we can meet the highest standards required by our customers.

The components on our equipment are carefully selected and subjected to testing which guarantees consistency and reliability.

Our procedures have been approved and the certification is the mark of quality of our products.

CE

GENERAL

The evaporative condensers NRV comprises 51 models ranging from a capacity of 225 up to 3143 kW.

The new range of evaporative condensers NRV is designed to accomodate all types of applications.

Their compact modular construction makes installation easier.

All models can be installed either inside or outside.

Thanks to the moisture eliminators on the top of the unit, which separates droplets from the air stream, only a small quantity of fresh make-up water has to be added.

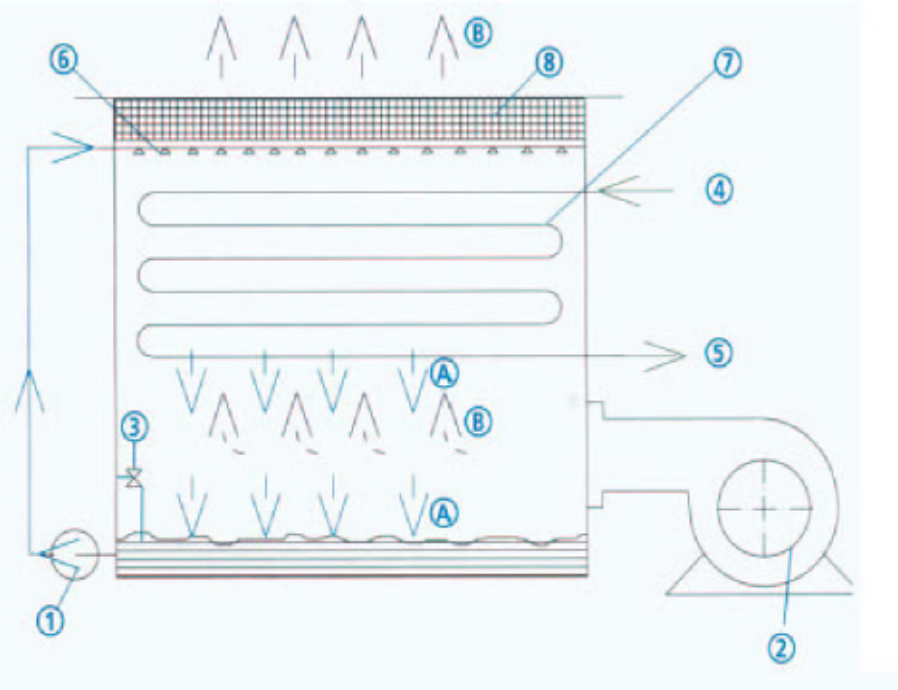
It may be necessary to treat the fresh water, i.e. the pH- value should be kept in the neutral range and hardness around 5 to 10° dH.

A desuperheater can be fitted on the air outlet after spray nozzles to precool condenser gas. This reduces lime scaling of the main heat exchanger.

WORKING PRINCIPLE

Water is drawn by a re-circulating pump from a water sump below and forced through a sprinkler system above the closely spaced condenser coil. It then trickles along the outside of the pipes and runs back into the water sump.

Water evaporates in the strong air current giving the most efficient thermodiffusion effect.



1. Pump
2. Radial Fan
3. Brass float valve
4. Refrigerant - in
5. Refrigerant - out
6. Spray nozzles
7. Pipe coil
8. Mist collector

A. Recirculating water

B. Air

These designs which are shown here, are examples.

DESCRIPTION OF THE EVAPORATIVE CONDENSER

This unit is in two parts : a fan section and a heat exchanger section.

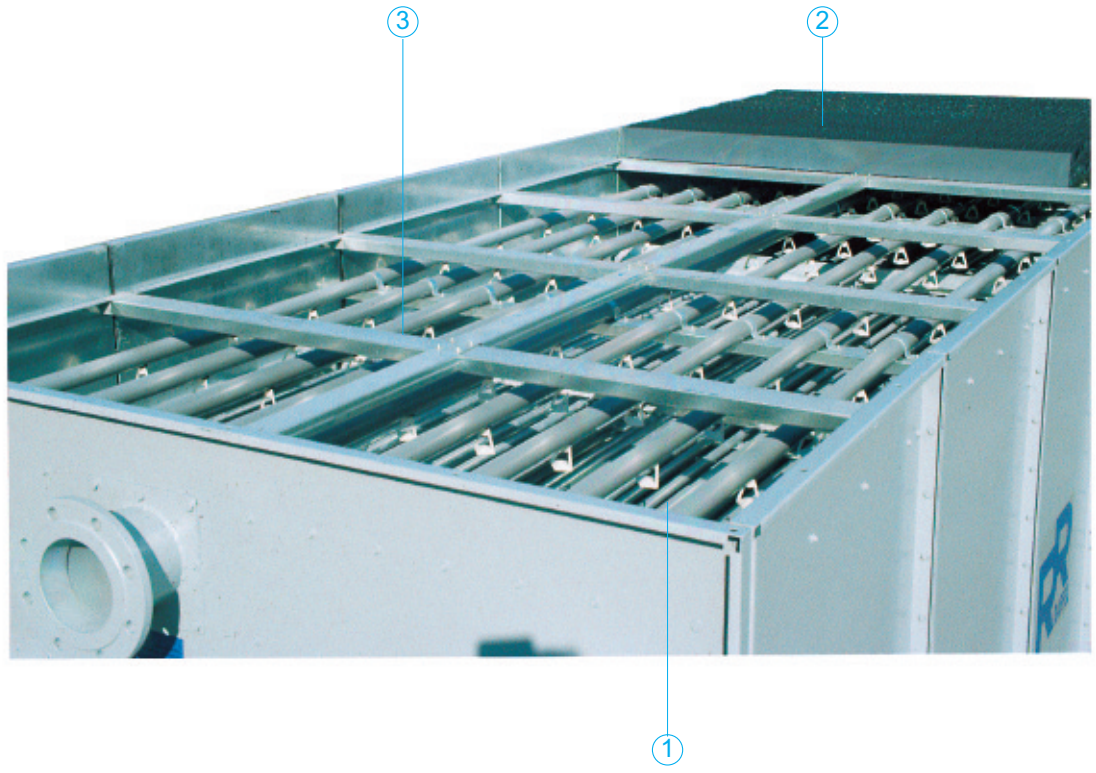
The casing is constructed from galvanized steel with a standard zincpaint coat, (RAL 7001, grey). All fixing are stainless steel.

Heat Exchanger Section

This consists of a hot dipped galvanised steel coil, a sprinkler system and moisture eliminators (plastic).

All these elements are protected by a casing manufactured from galvanized steel.

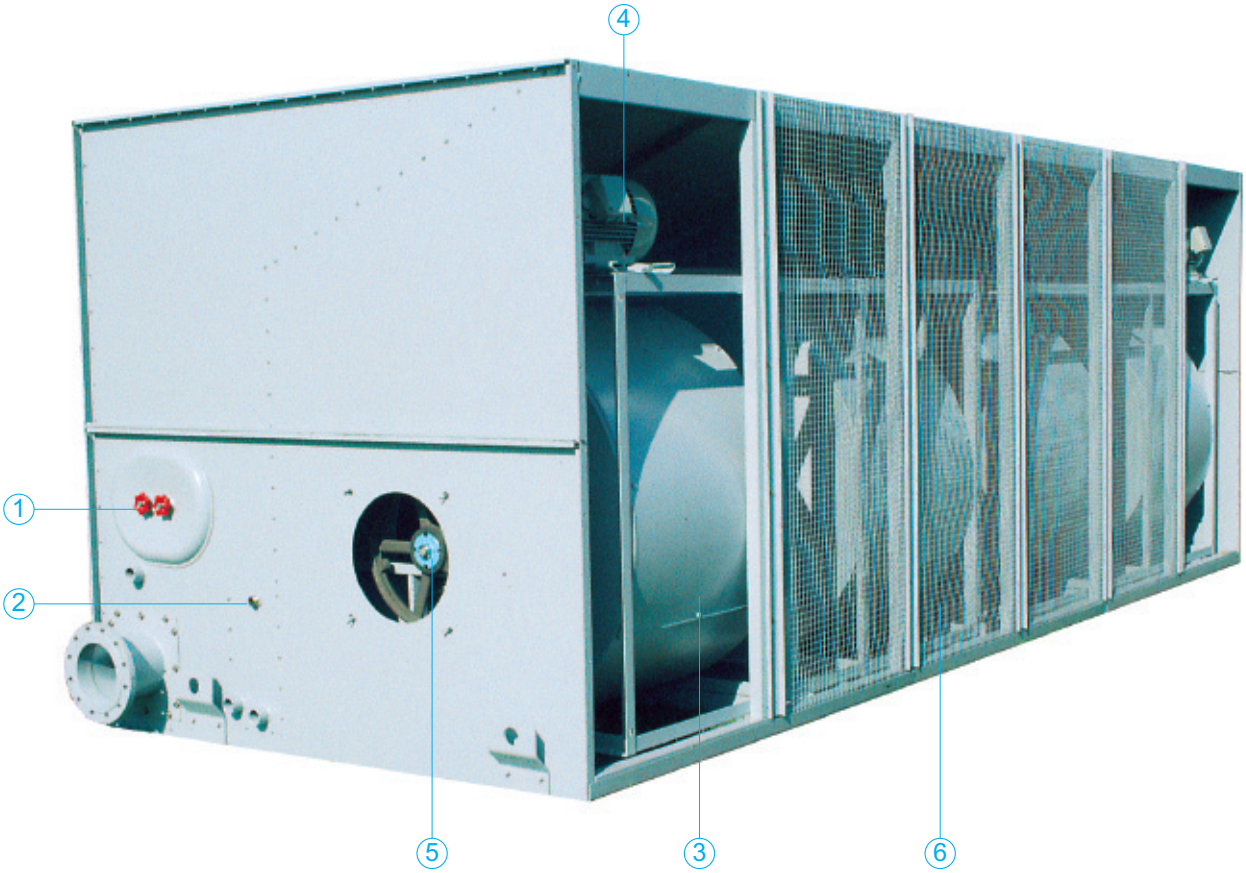
1. Heat exchanger : The exchanger is a matrix of steel tubes configured to produce maximum heat transfer with minimum air pressure drop. The pipe matrix is assembled within a steel frame, the complete assembly in hot dipped galvanized after fabrication in our own galvanizing facility.
   A pressure test to 30 bar is carried out before and after galvanization.
2. Eliminator section : An ultraviolet resistant plastic is used to manufacture the water spray collector. Its efficiency is 99 %.
   The sections of the collector can be removed for access/cleaning. The casing is manufactured from galvanized steel and incorporates an inspection hatch.
3. Water distribution system : This system consists of a sprinkler system and plastic spray nozzles. Optimum spraying of the heat exchanger is achieved by an array of spray nozzles fed from a manifold.
   The distribution system is manufactured in plastic including the spray nozzles. For ease of maintenance the nozzles are quick release type.



Fan Section

The fan section consists of a water sump, fan, motors and V-belt drives. Fan motors and V-belt drives are assembled on a base frame, they are never in contact with the water. All these components are made of galvanized steel with a standard zincpaint coat, except for motors and V-belt drives.

1. Inspection hatch enables easy access to the drip tray for cleaning and adjustment of brass float valve.
2. Brass float valve consists of a plastic or stainless steel ball float regulating the fresh make-up water. The adjustment of the water level is by a lever system.
3. Fan section is constructed in galvanized steel. The impellers are fitted with adjustable tensioning rods to achieve maximum rigidity and concentricity. The hollow drive shaft is mounted in ball bearings with external greasing points for ease of maintenance.
4. Motors driving fans are in accordance with IEC-norm (IP 55 protection). All motors are designed to work in dry operation.
5. V-belt drive incorporates pulleys with removable hubs.
6. All detachable components are protected by a galvanized grille, placed on inlet side. An inspection hatch enables easy access to fans for cleaning.



OPTIONAL FEATURES

Accessories

These accessories are available on request :

- pump and piping.
- trace heating with thermostat
- two speeds fans
- electric level indicator
- pressure-activated dampers in centrifugal fans, including motor and pressure switches
- water regulated solenoïd valve
- heat exchanger made of stainless steel
- desuperheater

Raffelprotect : coating against corrosion

The casing, water sump, support, etc, are manufactured from galvanized steel sheet on which is applied a special polymerized metal painting.

In salt spray tests for accelerated corrosion this coating has demonstrated significant life extension.

Furthermore this painting does not pollute the atmosphere on application and thus cuts out the problem of emission of organic solvents.

Low Sound Level and Directional Capability

The design of this NRV range has been developed in such a way to limit noise levels (see table IV).

The single-fan side design allows the noise to be directed toward the least sensitive area and therefore improve our environment.

Silencer

Where noise level restrictions are in force, silencers are available for either/or the air inlet and air discharge. Various specifications are available.

RELIABILITY

Raffel has its own galvanizing facility. This enables the quality control of the heat exchanger assembly at every stage of manufacture ensuring excellent resistance against corrosion and longlivety.

All components are hot galvanized to a temperature close to 450° C in our factory.

SHIPMENT AND RIGGING

All models in the NRV range are factory assembled into a complete unit at the plant to ensure quality performance. For shipment and ease of site handling they are delivered in two sections. Road transport is normally made by flat bed lorry.

Both sections are equipped with lifting points.

Only for final assembly is a crane required to locate the two sections together.

SELECTION PROCEDURE

Given

To select NRV evaporative condenser, the following specific data is required :

- rejection capacity (kW)	n	Qc
- refrigerant	n	NH_3
- correction factor	n	Fc

Solution

1) To determine the correction factor to use, refer to table I or table II

   Qn = Nominal capacity
   Qc = Rejection capacity
   Fc = Correction factor

   Look up known condensing temperature and known wet bulb temperature in table I. Correction factor will befound at the intersection point.

2) With the use of the correction factor, determine the nominal capacity by referring to this formula :

   Qn = Qc/ Fc

3) Compare the result into table III under the column ”Nominal Capacity” to obtain the correct selection.

Example 1 :

Given :
* rejection capacity Qc : 320 kW
* refrigerant : NH_3
* condensing temperature : 30°C
* wet bulb temperature : 22°C

Solution :
* according to table I, Fc : 0,549
* nominal capacity
  Qn = Qc/Fc : 320/ 0,549 = 583 kW
* referring to table III, a model NRV 402C will be selected.

Example 2 :

For a selection with desuperheater (E) :
* nominal capacity Qn = 320/0,549 = 583 kW
* according to table III, a model NRV 402AE or NRV 403 CE will be selected.

Example 3 :

Given :
* rejection capacity Qc : 320 kW
* refrigerant : R22, R502
* condensing temperature : 30°C
* wet bulb temperature : 22°C

Solution :
* according to table II, Fc : 0,494
* nominal capacity
  Qn = Qc/Fc : 320/ 0,494 = 647 kW
* referring to table III, a model NRV 403B will be selected.

Table I : Correction Factor NH_3 (R717)

Condensing Temperature (°C)	Wet Bulb Temperature (°C)																		
	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9		
30	1,030	0,983	0,933	0,878	0,832	0,779	0,722	0,666	0,613	0,549	0,488	0,425	0,359	0,290	0,219	0,148	0,078		
31	1,100	1,054	1,007	0,953	0,907	0,854	0,797	0,741	0,688	0,624	0,563	0,501	0,435	0,367	0,297	0,226	0,156	0,081	
32	1,176	1,129	1,082	1,028	0,982	0,929	0,872	0,816	0,764	0,700	0,640	0,579	0,514	0,446	0,375	0,303	0,233	0,131	
33	1,252	1,205	1,157	1,103	1,058	1,004	0,915	0,893	0,841	0,778	0,719	0,658	0,592	0,524	0,453	0,382	0,315	0,243	
34	1,327	1,282	1,234	1,180	1,136	1,083	1,027	0,974	0,921	0,857	0,798	0,737	0,671	0,604	0,536	0,466	0,396	0,325	
35	1,406	1,360	1,312	1,259	1,215	1,163	1,107	1,051	1,000	0,937	0,878	0,818	0,754	0,687	0,617	0,548	0,481	0,410	
36	1,485	1,440	1,393	1,339	1,296	1,243	1,187	1,131	1,080	1,018	0,961	0,901	0,835	0,769	0,702	0,634	0,568	0,498	
37	1,567	1,521	1,473	1,420	1,376	1,324	1,268	1,214	1,165	1,103	1,044	0,985	0,921	0,854	0,790	0,721	0,657	0,585	
38	1,648	1,603	1,554	1,501	1,459	1,408	1,353	1,296	1,248	1,186	1,130	1,070	1,009	0,943	0,878	0,810	0,744	0,673	
39	1,730	1,686	1,639	1,587	1,545	1,492	1,437	1,382	1,334	1,274	1,219	1,160	1,087	1,032	0,966	0,898	0,834	0,764	
40	1,817	1,771	1,723	1,671	1,630	1,579	1,524	1,471	1,423	1,364	1,308	1,249	1,186	1,121	1,056	0,998	0,926	0,856	
41	1,902	1,857	1,811	1,759	1,717	1,667	1,614	1,560	1,513	1,452	1,399	1,338	1,276	1,211	1,148	1,081	1,019	0,950	
42	1,989	1,945	1,900	1,850	1,809	1,758	1,704	1,651	1,603	1,542	1,489	1,430	1,368	1,304	1,242	1,176	1,114	1,046	
43	2,083	2,037	1,991	1,940	1,900	1,849	1,795	1,740	1,694	1,635	1,581	1,523	1,462	1,398	1,337	1,271	1,211	1,144	
44	2,173	2,128	2,083	2,031	1,990	1,940	1,887	1,834	1,788	1,728	1,677	1,619	1,557	1,495	1,435	1,369	1,310	1,241	
45	2,264	2,220	2,175	2,123	2,084	2,034	1,981	1,929	1,883	1,824	1,772	1,715	1,656	1,567	1,532	1,467	1,438	1,407	
46		2,314	2,269	2,217	2,178	2,129	2,077	2,025	1,980	1,922	1,872	1,815	1,754	1,691	1,631	1,565	1,505	1,443	
47			2,364	2,314	2,277	2,227	2,175	2,122	2,079	2,021	1,971	1,913	1,853	1,790	1,730	1,664	1,607	1,539	
48			2,463	2,412	2,374	2,326	2,274	2,228	2,178	2,121	2,070	2,013	1,952	1,890	1,831	1,766	1,709	1,644	

Table II : Correction Factor R22, R502

Condensing Temperature (°C)	Feuchtkugeltemperatur (°C)																		
		13		14		15		16		17		18		19					
30	0,927	0,885	0,840	0,790	0,749	0,701	0,650	0,599	0,552	0,494	0,439	0,383	0,323	0,261	0,197	0,133	0,070		
31	0,990	0,949	0,906	0,858	0,816	0,769	0,717	0,667	0,619	0,562	0,507	0,451	0,392	0,330	0,267	0,203	0,140	0,073	
32	1,058	1,016	0,974	0,925	0,884	0,836	0,785	0,734	0,688	0,630	0,576	0,521	0,463	0,401	0,338	0,273	0,210	0,118	
33	1,127	1,085	1,041	0,993	0,952	0,904	0,824	0,804	0,757	0,700	0,647	0,592	0,533	0,472	0,408	0,344	0,284	0,219	
34	1,194	1,154	1,111	1,062	1,022	0,975	0,924	0,877	0,829	0,771	0,718	0,663	0,604	0,544	0,482	0,419	0,356	0,293	
35	1,265	1,224	1,181	1,133	1,094	1,047	0,996	0,946	0,900	0,843	0,790	0,736	0,679	0,618	0,555	0,493	0,433	0,369	
36	1,337	1,296	1,254	1,205	1,166	1,119	1,068	1,018	0,972	0,916	0,865	0,811	0,752	0,692	0,632	0,571	0,511	0,448	
37	1,410	1,369	1,326	1,278	1,238	1,192	1,141	1,093	1,049	0,993	0,940	0,887	0,829	0,769	0,711	0,649	0,591	0,527	
38	1,483	1,443	1,399	1,351	1,313	1,267	1,218	1,166	1,123	1,067	1,017	0,963	0,908	0,849	0,790	0,729	0,670	0,606	
39	1,557	1,517	1,475	1,428	1,391	1,343	1,293	1,244	1,201	1,147	1,097	1,044	0,978	0,929	0,869	0,808	0,751	0,688	
40	1,635	1,594	1,551	1,504	1,467	1,421	1,372	1,324	1,281	1,228	1,177	1,124	1,067	1,009	0,950	0,898	0,833	0,770	
41	1,712	1,671	1,630	1,583	1,545	1,500	1,453	1,404	1,362	1,307	1,259	1,204	1,148	1,090	1,033	0,973	0,917	0,855	
42	1,790	1,751	1,710	1,665	1,628	1,582	1,534	1,486	1,443	1,388	1,340	1,287	1,231	1,174	1,118	1,058	1,003	0,941	
43	1,875	1,833	1,792	,1746	1,710	1,664	1,616	1,566	1,525	1,472	1,423	1,371	1,316	1,258	1,203	1,144	1,090	1,030	
44	1,956	1,996	1,875	1,828	1,791	1,746	1,698	1,651	1,609	1,555	1,509	1,457	1,401	1,346	1,292	1,232	1,179	1,117	
45	2,038	1,998	1,958	1,911	1,876	1,831	1,783	1,736	1,695	1,642	1,595	1,544	1,490	1,410	1,379	1,320	1,266	1,294	
46		2,083	2,042	1,995	1,960	1,916	1,869	1,823	1,782	1,730	1,685	1,634	1,579	1,522	1,468	1,409	1,355	1,299	
47			2,128	2,083	2,049	2,004	1,958	1,910	1,871	1,819	1,774	1,722	1,668	1,611	1,557	1,498	1,446	1,385	
48			2,217	2,171	2,137	2,093	2,047	2,005	1,960	1,909	1,863	1,812	1,757	1,701	1,648	1,589	1,538	1,480	

TECHNICAL DATA

Table III

Model		Nominal Capacity (kW)		Shipping weight (kg)		Operating weight (kg)		Refrigerant charge approx. (l)
Without desuperheater	With desuperheaer	Without desuperheater	With desuperheater	Without desuperheater	With desuperheater	Without desuperheater	With desuperheater	
NRV 301A	NRV 301AE	225	252	1562	2020	2365	2830	61
NRV 301B	NRV 301BE	238	267	1562	2020	2365	2830	61
NRV 301C	NRV 301CE	258	289	1574	2032	2365	2830	61
NRV 302A	NRV 302AE	305	342	1793	2251	2655	3120	89
NRV 302B	NRV 302BE	324	363	1793	2251	2655	3120	89
NRV 302C	NRV 302CE	351	393	1805	2263	2655	3120	89
NRV 303A	NRV 303AE	392	439	2096	2554	3015	3480	117
NRV 303B	NRV 303BE	415	465	2108	2566	3015	3480	117
NRV 303C	NRV 303CE	451	505	2110	2568	3015	3480	117
NRV 304A	NRV 304AE	473	530	2329	2787	3365	3830	145
NRV 304B	NRV 304BE	501	561	2341	2799	3365	3830	145
NRV 304C	NRV 304CE	544	609	2378	2836	3365	3830	145
NRV 304D	NRV 304DE	577	646	2403	2861	3365	3830	145
NRV 402A	NRV 402AE	523	586	2696	3267	3960	4530	155
NRV 402B	NRV 402BE	554	620	2696	3267	3960	4530	155
NRV 402C	NRV 402CE	601	673	2733	3304	3960	4530	155
NRV 403A	NRV 403AE	631	707	3006	3577	4375	4950	192
NRV 403B	NRV 403BE	669	749	3043	3614	4375	4950	192
NRV 403C	NRV 403CE	725	812	3043	3614	4375	4950	192
NRV 403D	NRV 403DE	769	861	3068	3639	4375	4950	192
NRV 404A	NRV 404AE	740	829	3950	4895	5765	6710	214
NRV 404B	NRV 404BE	784	878	3987	4932	5765	6710	214
NRV 404C	NRV 404CE	851	953	4012	4957	5765	6710	214
NRV 404D	NRV 404DE	903	1011	4052	4997	5765	6710	214
NRV 405A	NRV 405AE	950	1064	4665	5610	6585	7530	282
NRV 405B	NRV 405BE	1007	1128	4690	5635	6585	7530	282
NRV 405C	NRV 405CE	1093	1224	4690	5635	6585	7530	282
NRV 406A	NRV 406AE	1146	1284	5228	6173	7355	8300	350
NRV 406B	NRV 406BE	1215	1361	5253	6198	7355	8300	350
NRV 406C	NRV 406CE	1318	1476	5298	6243	7355	8300	350
NRV 406D	NRV 406DE	1398	1566	5316	6261	7355	8300	350
NRV 408A	NRV 408AE	1425	1596	6461	7806	8895	10330	423
NRV 408B	NRV 408BE	1510	1691	6521	7806	8895	10330	423
NRV 408C	NRV 408CE	1639	1836	6521	7866	8895	10330	423
NRV 409A	NRV 409AE	1719	1925	7309	8654	10125	11470	525
NRV 409B	NRV 409BE	1822	2041	7309	8714	10125	11470	525
NRV 409C	NRV 409CE	1977	2214	7449	8794	10125	11470	525
NRV 502A	NRV 502AE	1427	1598	6660	8006	9505	10860	418
NRV 502B	NRV 502BE	1512	1693	6660	8006	9505	10860	418
NRV 502C	NRV 502CE	1640	1837	6734	8080	9505	10860	418
NRV 503A	NRV 503AE	1717	1923	7502	8848	10605	11960	521
NRV 503B	NRV 503BE	1821	2040	7576	8922	10605	11960	521
NRV 503C	NRV 503CE	1975	2212	7576	8922	10605	11960	521
NRV 503D	NRV 503DE	2095	2346	7626	8972	10605	11960	521
NRV 505A	NRV 505AE	2140	2397	9169	11086	12895	14820	627
NRV 505B	NRV 505BE	2268	2540	9259	11176	12895	14820	627
NRV 505C	NRV 505CE	2460	2755	9289	11206	12895	14820	627
NRV 506A	NRV 506AE	2576	2885	10432	12349	14595	16520	781
NRV 506B	NRV 506BE	2731	3059	10522	12439	14595	16520	781
NRV 506C	NRV 506CE	2963	3319	10672	12589	14595	16520	781
NRV 506D	NRV 506DE	3143	3520	10672	12589	14595	16520	781

(1) Without silencer
(2) With silencer

Raffel reserve the right to change any specification detailed in this bochure at any time.

Note :

- The models shown in the table III represent the most economic models.
  Other models can be offered to respond to hypothetical

Air flow (m^3/h)	Water flow (m^3/h)	Motor Power				Motor Power Pump (kW)	Trace heating -8°C with thermostat (kW)
		Fan (kW)	Fan (kWe)	Two speeds fan (kW) (1)	(2)		
29705	41,5	1 x 5,50	1 x 3,40	1 x 1,5/4,9	1 x 1,5/4,9	1,1	1 x 1,50
32765	41,5	1 x 5,50	1 x 4,60	1 x 1,7/6,5	1 x 1,7/6,5	1,1	1 x 1,50
35645	41,5	1 x 7,50	1 x 6,00	1 x 3,0/10,0	1 x 3,0/10,0	1,1	1 x 1,50
29705	41,5	1 x 5,50	1 x 3,80	1 x 1,5/4,9	1 x 1,5/4,9	1,1	1 x 1,50
32765	41,5	1 x 7,50	1 x 5,00	1 x 1,7/6,5	1 x 1,7/6,5	1,1	1 x 1,50
35645	41,5	1 x 7,50	1 x 6,50	1 x 3,0/10,0	1 x 3,0/10,0	1,1	1 x 1,50
29705	41,5	1 x 5,50	1 x 4,30	1 x 1,5/4,9	1 x 1,7/6,5	1,1	1 x 1,50
32765	41,5	1 x 7,50	1 x 6,60	1 x 1,7/6,5	1 x 3,0/10,0	1,1	1 x 1,50
35645	41,5	1 x 11,00	1 x 7,30	1 x 3,0/10,0	1 x 3,0/10,0	1,1	1 x 1,50
29705	41,5	1 x 5,50	1 x 4,70	1 x 1,7/6,5	1 x 1,7/6,5	1,1	1 x 1,50
32765	41,5	1 x 7,50	1 x 6,10	1 x 3,0/10,0	1 x 3,0/10,0	1,1	1 x 1,50
35645	41,5	1 x 11,00	1 x 8,00	1 x 3,0/10,0	1 x 3,0/10,0	1,1	1 x 1,50
38615	41,5	1 x 15,00	1 x 10,40	1 x 3,0/12,5	1 x 4,0/16,0	1,1	1 x 1,50
39640	55,4	1 x 7,50	1 x 5,10	1 x 1,7/6,5	1 x 3,0/10,0	1,5	1 x 2,00
43605	55,4	1 x 7,50	1 x 6,60	1 x 3,0/10,0	1 x 3,0/10,0	1,5	1 x 2,00
47465	55,4	1 x 11,00	1 x 8,50	1 x 3,0/12,5	1 x 3,0/12,5	1,5	1 x 2,00
39640	55,4	1 x 7,50	1 x 6,70	1 x 1,7/6,5	1 x 3,0/10,0	1,5	1 x 2,00
43605	55,4	1 x 11,00	1 x 7,30	1 x 3,0/10,0	1 x 3,0/10,0	1,5	1 x 2,00
47465	55,4	1 x 11,00	1 x 9,50	1 x 3,0/12,5	1 x 3,0/12,5	1,5	1 x 2,00
51535	55,4	1 x 15,00	1 x 12,50	1 x 4,0/16,0	1 x 4,0/16,0	1,5	1 x 2,00
72075	100,7	1 x 7,50	1 x 6,40	1 x 3,0/10,0	1 x 3,0/10,0	3	1 x 4,00
79285	100,7	1 x 11,00	1 x 8,40	1 x 3,0/10,0	1 x 3,0/12,5	3	1 x 4,00
86490	100,7	1 x 15,00	1 x 10,90	1 x 3,0/12,5	1 x 4,0/16,0	3	1 x 4,00
93695	100,7	1 x 18,50	1 x 14,20	1 x 4,0/16,0	1 x 5,0/22,0	3	1 x 4,00
72075	100,7	1 x 11,00	1 x 7,70	1 x 3,0/10,0	1 x 3,0/12,5	3	1 x 4,00
79285	100,7	1 x 15,00	1 x 9,90	1 x 3,0/12,5	1 x 4,0/16,0	3	1 x 4,00
86490	100,7	1 x 15,00	1 x 12,80	1 x 4,0/16,0	1 x 5,0/22,0	3	1 x 4,00
72075	100,7	1 x 11,00	1 x 8,80	1 x 3,0/10,0	1 x 3,0/12,5	3	1 x 4,00
79285	100,7	1 x 15,00	1 x 11,30	1 x 3,0/12,5	1 x 4,0/16,0	3	1 x 4,00
86490	100,7	1 x 18,50	1 x 14,70	1 x 4,0/16,0	1 x 5,0/22,0	3	1 x 4,00
93695	100,7	1 x 22,00	1 x 19,30	1 x 5,0/22,0	1 x 7,0/28,0	3	1 x 4,00
108110	151	1 x 22,00	1 x 17,60	1 x 5,0/22,0	1 x 7,0/28,0	4	1 x 4,00
118920	151	1 x 30,00	1 x 22,90	1 x 7,0/28,0	1 x 8,0/31,5	4	1 x 4,00
129735	151	1 x 37,00	1 x 29,50	1 x 9,25/37,0	1 x 11,0/44,0	4	1 x 4,00
108110	151	1 x 22,00	1 x 19,00	1 x 5,0/22,0	1 x 7,0/28,0	4	1 x 4,00
118920	151	1 x 30,00	1 x 24,70	1 x 7,0/28,0	1 x 9,25/37,0	4	1 x 4,00
129735	151	1 x 37,00	1 x 32,10	1 x 9,25/37,0	1 x 11,0/44,0	4	1 x 4,00
108110	151	2 x 7,50	2 x 5,30	2 x 1,7/6,5	2 x 3,0/10,0	5,5	1 x 6,00
118920	151	2 x 7,50	2 x 6,80	2 x 3,0/10,0	2 x 3,0/10,0	5,5	1 x 6,00
129735	151	2 x 11,00	2 x 8,70	2 x 3,0/12,5	2 x 3,0/12,5	5,5	1 x 6,00
108110	151	2 x 7,50	2 x 6,00	2 x 3,0/10,0	2 x 3,0/10,0	5,5	1 x 6,00
118920	151	2 x 11,00	2 x 7,70	2 x 3,0/10,0	2 x 3,0/12,5	5,5	1 x 6,00
129735	151	2 x 15,00	2 x 10,00	2 x 3,0/12,5	2 x 4,0/16,0	5,5	1 x 6,00
140545	151	2 x 15,00	2 x 12,20	2 x 4,0/16,0	2 x 5,0/22,0	5,5	1 x 6,00
162010	226,4	2 x 15,00	2 x 11,90	2 x 4,0/16,0	2 x 4,0/16,0	7,5	1 x 6,00
178210	226,4	2 x 18,50	2 x 15,50	2 x 5,0/22,0	2 x 5,0/22,0	7,5	1 x 6,00
194415	226,4	2 x 22,00	2 x 19,90	2 x 7,0/28,0	2 x 7,0/28,0	7,5	1 x 6,00
162010	226,4	2 x 15,00	2 x 12,90	2 x 4,0/16,0	2 x 4,0/16,0	7,5	1 x 6,00
178210	226,4	2 x 18,50	2 x 16,70	2 x 5,0/22,0	2 x 5,0/22,0	7,5	1 x 6,00
194415	226,4	2 x 30,00	2 x 21,70	2 x 7,0/28,0	2 x 7,0/28,0	7,5	1 x 6,00
210615	226,4	2 x 37,00	2 x 28,20	2 x 9,25/37,0	2 x 9,25/37,0	7,5	1 x 6,00

limitations of power requirements or dimensions.

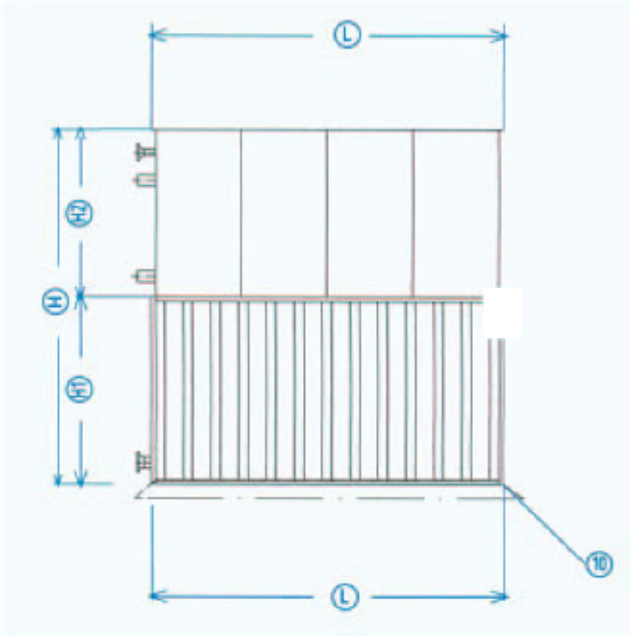
• Models with desuperheater have a suffix E.
Example : NRV 302AE

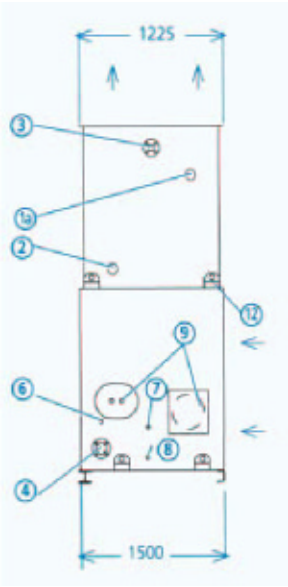
• Table III gives nominal capacity for :

- NH_3
- a condensing temperature of + 35°C
- a wet bulb temperature of + 21°C

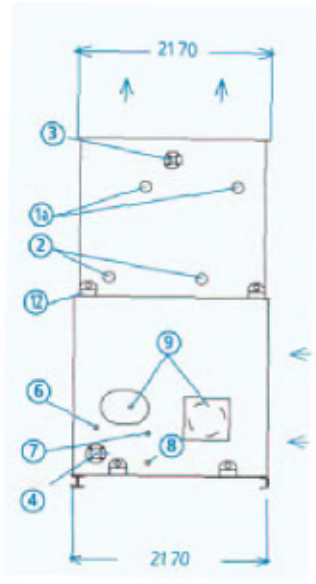
DIMENSIONS (mm)
STANDARD MODEL

Some typical designs are shown here. For accurate scale drawings please contact us.

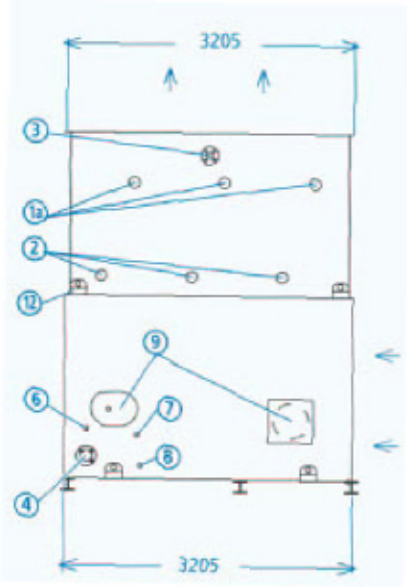




NRV 301 to 304
NRV 402 to 403



NRV 404 to 406
NRV 502 to 503



NRV 408 to 409
NRV 505 to 506

Raffel reserve the right to make changes in specifications or design at any time.

Model	Nominal Diameter			
	1a	2	3	4
NRV 301	DN 80	DN 80	DN 80	DN 80
NRV 302	DN 80	DN 80	DN 80	DN 80
NRV 303	DN 80	DN 80	DN 80	DN 80
NRV 304	DN 80	DN 80	DN 80	DN 80
NRV 402	DN 100	DN 100	DN 100	DN 100
NRV 403	DN 100	DN 100	DN 100	DN 100
NRV 404	DN 100	DN 100	DN 100	DN 100
NRV 405	DN 100	DN 100	DN 100	DN 100
NRV 406	DN 100	DN 100	DN 100	DN 100
NRV 408	DN 100	DN 100	DN 125	DN 125
NRV 409	DN 100	DN 100	DN 125	DN 125
NRV 502	DN 100	DN 100	DN 125	DN 125
NRV 503	DN 100	DN 100	DN 125	DN 125
NRV 505	DN 100	DN 100	DN 150	DN 150
NRV 506	DN 100	DN 100	DN 150	DN 150

Model	Lenght	Width	Height				
	L mm	mm	H mm	Fan Section H1		Heat Exchanger Section H2	
				mm	kg	mm	kg
NRV 301	2885	1500	2802	1400	640	1402	935
NRV 302	2885	1500	2802	1400	640	1402	1170
NRV 303	2885	1500	3270	1400	640	1870	1470
NRV 304	2885	1500	3270	1400	700	1870	1700
NRV 402	3820	1500	3270	1400	830	1870	1900
NRV 403	3820	1500	3270	1400	855	1870	2215
NRV 404	3820	2170	3502	2100	1550	1402	2500
NRV 405	3820	2170	3970	2100	1515	1870	3180
NRV 406	3820	2170	3970	2100	1575	1870	3740
NRV 408	3820	3205	3970	2100	1930	1870	4590
NRV 409	3820	3205	3970	2100	2010	1870	5440
NRV 502	5690	2170	4200	2100	2080	2100	4660
NRV 503	5690	2170	4200	2100	2130	2100	5500
NRV 505	5690	3205	4200	2100	2600	2100	6690
NRV 506	5690	3205	4200	2100	2720	2100	7950

Caption :

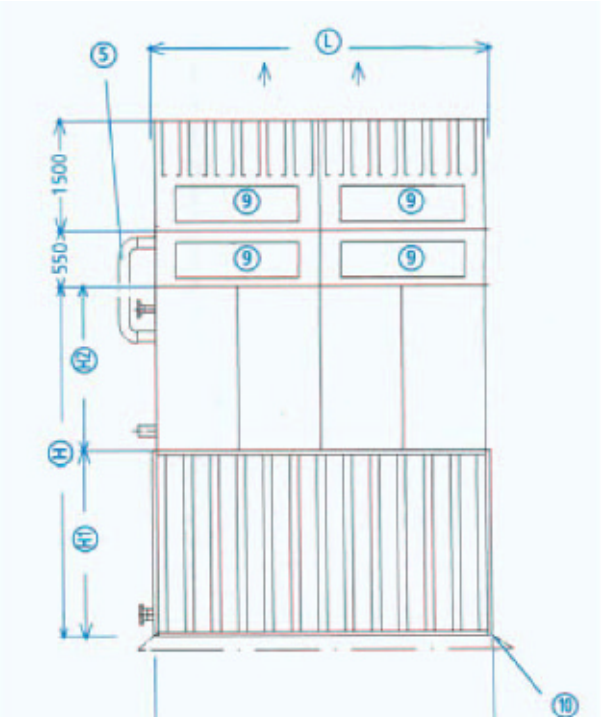
1a Refrigerant - hotgas
2 Refrigerant - liquid
3 Water - inlet
4 Water - outlet
6 Overflow, socket R $1^1/_2$”
7 Floating valve R $^3/_4$”, (from NRV 404 ƒ R 1”)
8 Drain connection, socket R $1^1/_2$”
9 Access door
10 Mounting holes Ø 18 mm
12 Lifting device

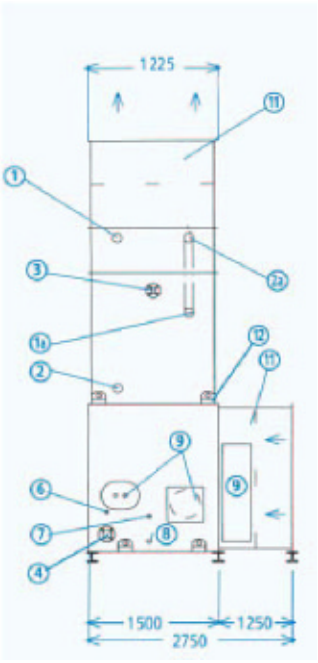
Note :
For standards models : input on the right.
On request : input on the left.

DIMENSIONS (mm)

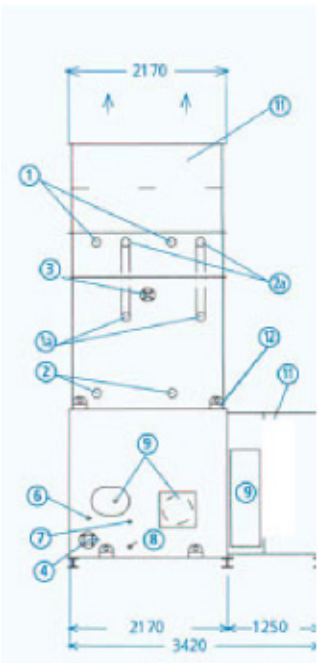
MODELS WITH ACCESSORIES

Some typical designs are shown here. For accurate scale drawings please contact us.

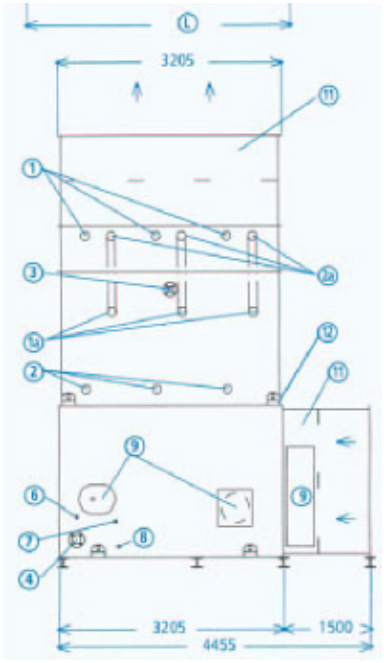




NRV 301 to 304
NRV 402 to 403



NRV 404 to 406
NRV 502 to 503



NRV 408 to 409
NRV 505 to 506

Raffel reserve the right to make changes in specifications or design at any time.

Model	Nominal Diameter					
	1	1a	2	2a	3	4
NRV 301	DN 80	DN 80	DN 80	DN 80	DN 80	DN 80
NRV 302	DN 80	DN 80	DN 80	DN 80	DN 80	DN 80
NRV 303	DN 80	DN 80	DN 80	DN 80	DN 80	DN 80
NRV 304	DN 80	DN 80	DN 80	DN 80	DN 80	DN 80
NRV 402	DN 100	DN 100	DN 100	DN 100	DN 100	DN 100
NRV 403	DN 100	DN 100	DN 100	DN 100	DN 100	DN 100
NRV 404	DN 100	DN 100	DN 100	DN 100	DN 100	DN 100
NRV 405	DN 100	DN 100	DN 100	DN 100	DN 100	DN 100
NRV 406	DN 100	DN 100	DN 100	DN 100	DN 100	DN 100
NRV 408	DN 100	DN 100	DN 100	DN 100	DN 125	DN 125
NRV 409	DN 100	DN 100	DN 100	DN 100	DN 125	DN 125
NRV 502	DN 100	DN 100	DN 100	DN 100	DN 125	DN 125
NRV 503	DN 100	DN 100	DN 100	DN 100	DN 125	DN 125
NRV 505	DN 100	DN 100	DN 100	DN 100	DN 150	DN 150
NRV 506	DN 100	DN 100	DN 100	DN 100	DN 150	DN 150

Model	Dimensions and weight										
	Length	Width			Height						
	L		Silencer inlet side		H	Fan Section H1		Heat Exchanger Section H2		Desuper-heater	Silencer outlet side
	mm	mm	mm	kg	mm	mm	kg	mm	kg	kg	kg
NRV 301	2885	1500	1250	412	2802	1400	640	1402	935	458	462
NRV 302	2885	1500	1250	412	2802	1400	640	1402	1170	458	462
NRV 303	2885	1500	1250	412	3270	1400	640	1870	1470	458	462
NRV 304	2885	1500	1250	412	3270	1400	700	1870	1700	458	462
NRV 402	3820	1500	1250	535	3270	1400	830	1870	1900	571	618
NRV 403	3820	1500	1250	535	3270	1400	855	1870	2215	571	618
NRV 404	3820	2170	1250	716	3502	2100	1550	1402	2500	945	857
NRV 405	3820	2170	1250	716	3970	2100	1515	1870	3180	945	857
NRV 406	3820	2170	1250	716	3970	2100	1575	1870	3740	945	857
NRV 408	3820	3205	1500	869	3970	2100	1930	1870	4590	1345	1152
NRV 409	3820	3205	1500	869	3970	2100	2010	1870	5440	1345	1152
NRV 502	5690	2170	1250	1004	4200	2100	2080	2100	4660	1345	1207
NRV 503	5690	2170	1250	1004	4200	2100	2130	2100	5500	1345	1207
NRV 505	5690	3205	1500	1219	4200	2100	2600	2100	6690	1917	1618
NRV 506	5690	3205	1500	1219	4200	2100	2720	2100	7950	1917	1618

Caption

1 Desuperheater - inlet
1a Refrigerant - hotgas
2 Refrigerant - liquid
2a Desuperheater - outlet
3 Circulating water - inlet
4 Circulating water - outlet
5 Connection desuperheater
6 Overflow, socket R $1^1/_2$”
7 Floating valve R $^3/_4$”, (From NRV 404 ƒ R 1”)
8 Drain connection, socket R $1^1/_2$”
9 Access door
10 Mounting holes Ø 18 mm
11 Silencer
12 Lifting device

Note :
For models with silencer and desuperheater : input on the right.
On request : input on the left

NOISE LEVELS dB(A)

Table IV

Model		Sound Pressure Level dB(A)								
		Without silencer			With silencer inlet side			With silencer inlet and outlet side		
Without Desuperheater	With Desuperheater	Ansaug-seite	Stirn- und Rückseite	Aus-blasseite	Ansaug-seite	Stirn- und Rückseite	Aus-blasseite	Ansaug-seite	Stirn- und Rückseite	Aus-blasseite
NRV 301 A	NRV 301 AE	60	49	60	49	49	60	47	47	47
NRV 301 B	NRV 301 BE	63	51	63	51	49	63	49	47	49
NRV 301 C	NRV 301 CE	65	53	63	53	50	65	51	48	51
NRV 302 A	NRV 302 AE	60	49	60	49	49	60	47	47	47
NRV 302 B	NRV 302 BE	63	51	63	51	49	63	49	47	49
NRV 302 C	NRV 302 CE	66	53	63	53	50	66	51	48	51
NRV 303 A	NRV 303 AE	61	49	61	50	50	61	48	48	48
NRV 303 B	NRV 303 BE	64	51	64	52	50	64	50	48	50
NRV 303 C	NRV 303 CE	66	53	66	54	51	66	52	49	52
NRV 304 A	NRV 304 AE	61	49	61	50	50	61	48	48	48
NRV 304 B	NRV 304 BE	64	51	64	52	50	64	50	48	50
NRV 304 C	NRV 304 CE	67	53	67	54	51	67	52	49	52
NRV 304 D	NRV 304 DE	69	55	69	56	52	69	54	50	54
NRV 402 A	NRV 402 AE	60	52	60	51	49	60	49	47	49
NRV 402 B	NRV 402 BE	62	54	62	53	50	62	51	48	51
NRV 402 C	NRV 402 CE	65	56	65	55	51	65	53	49	53
NRV 403 A	NRV 403 AE	61	52	61	51	49	61	49	47	49
NRV 403 B	NRV 403 BE	63	54	63	53	50	63	51	48	51
NRV 403 C	NRV 403 CE	66	56	66	55	51	66	53	49	53
NRV 403 D	NRV 403 DE	68	58	68	57	53	68	55	51	55
NRV 404 A	NRV 404 AE	53	47	53	44	44	53	42	42	42
NRV 404 B	NRV 404 BE	56	49	56	46	46	56	44	44	44
NRV 404 C	NRV 404 CE	58	51	58	48	48	58	46	46	46
NRV 404 D	NRV 404 DE	60	53	60	50	50	60	48	48	48
NRV 405 A	NRV 405 AE	55	47	55	44	44	55	42	42	42
NRV 405 B	NRV 405 BE	57	49	57	46	46	57	44	44	44
NRV 405 C	NRV 405 CE	59	51	59	48	48	59	46	46	46
NRV 406 A	NRV 406 AE	57	47	57	45	45	57	43	43	43
NRV 406 B	NRV 406 BE	58	49	58	47	47	58	45	45	45
NRV 406 C	NRV 406 CE	61	51	61	49	49	61	47	47	47
NRV 406 D	NRV 406 DE	63	53	63	51	51	63	49	49	49
NRV 408 A	NRV 408 AE	63	53	63	49	49	63	47	47	47
NRV 408 B	NRV 408 BE	65	55	65	51	51	65	49	49	49
NRV 408 C	NRV 408 CE	68	57	68	53	53	68	51	51	51
NRV 409 A	NRV 409 AE	63	53	63	49	49	63	47	47	47
NRV 409 B	NRV 409 BE	66	55	66	51	51	66	49	49	49
NRV 409 C	NRV 409 CE	69	57	69	53	53	69	51	51	51
NRV 502 A	NRV 502 AE	58	50	58	45	45	55	43	43	43
NRV 502 B	NRV 502 BE	61	52	61	47	47	58	45	45	45
NRV 502 C	NRV 502 CE	63	54	63	49	49	60	47	47	47
NRV 503 A	NRV 503 AE	59	50	59	45	45	56	43	43	43
NRV 503 B	NRV 503 BE	61	52	61	47	47	58	45	45	45
NRV 503 C	NRV 503 CE	64	54	64	49	49	61	47	47	47
NRV 503 D	NRV 503 DE	66	56	66	51	51	63	49	49	49
NRV 505 A	NRV 505 AE	68	56	68	50	50	65	48	48	48
NRV 505 B	NRV 505 BE	70	58	70	52	52	67	50	50	50
NRV 505 C	NRV 505 CE	73	60	73	54	54	70	52	52	52
NRV 506 A	NRV 506 AE	68	56	68	52	52	68	50	50	50
NRV 506 B	NRV 506 BE	70	58	70	54	54	70	52	52	52
NRV 506 C	NRV 506 CE	73	60	73	56	56	73	54	54	54
NRV 506 D	NRV 506 DE	76	62	76	58	58	76	56	56	56

Raffel reserve the right to change any specification detailed in this brochure at any time

Note: The sound pressure levels are calculated at 10 m for free field conditions.