



klīma celje

INDUSTRIJA AEROTERMIČNIH NAPRAV D.D.



TOPLITNI IZMENJEVALCI KG, NL, RC
HEAT EXCHANGERS KG, NL, RC

PROIZVODNI PROGRAM TOPLOTNIH IZMENJEVALCEV:

Toplotni izmenjevalci z ovalnimi cevmi:

- KG 28 - lamelni izmenjevalci

Spiralni toplotni izmenjevalci – navite cevi:

- RC - normalna lamela
- HC - visoka lamela

Lamelni toplotni izmenjevalci:

- NL - lamelni izmenjevalci

UPORABA:

Največ se uporabljajo kot:

grelci zraka s toplo ali vročo vodo, paro in oljem - KG, RC, HC, NL;

hladilci zraka s hladno vodo, hladilci vode in olja z zrakom - KG, RC, HC, NL;

PODROČJE UPORABE:

- v kemični, lesni, prehrabeni, tekstilni, papirni, tobačni, industriji;
- v klimatizaciji – vgradnja v zračne kanale, v različne vrste klimatskih naprav;
- v livarnah;

MATERIALI TOPLOTNIH IZMENJEVALCEV:

KG 28, RC, HC, NL:

- v celoti izdelani iz jekla, lamelni paket vroče cinkan;

RC:

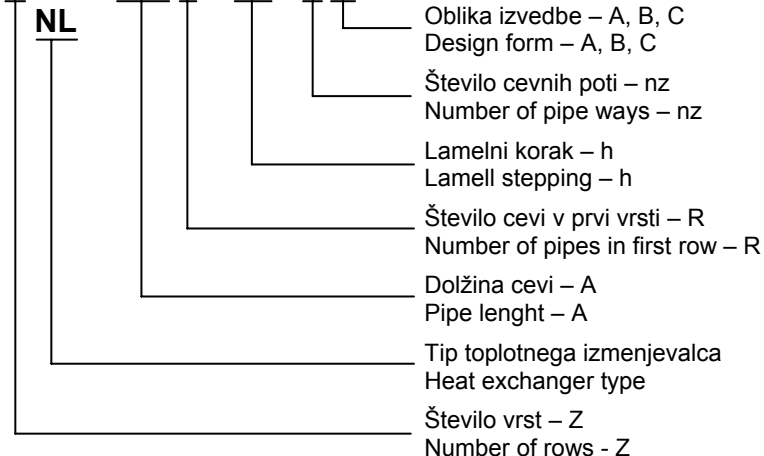
- v celoti izdelani iz nerjavnega jekla;
- lamelni paket izdelan iz nerjavnega jekla, okvir in zbirni kapi izdelani iz jekla;

PREDNOSTI TOPLOTNIH IZMENJEVALCEV KLIMA CELJE:

- dolgoletne izkušnje pri proizvodnji toplotnih izmenjevalcev
- primerni za težke pogoje obratovanja (visoki tlaki, visoke temperature,...)
- hitra in optimalna izbira s pomočjo računalnika
- dobra toplotna prevodnost med cevjo in lamelo dosežena z vročim cinkanjem
- prilagajanje zahtevam kupca, po dimenzijah, materialu,...
- ponudba različnih oblik, dimenzij cevi, lamelnega koraka
- zelo dolga življenska doba
- visoka zaščita proti koroziji (vroče cinkanje)

OZNAČEVANJE:

KG
2 RC – 700/6 – h5 – 2/B
NL



HEAT EXCHANGERS PRODUCTION PROGRAM:

Oval tubing heat exchangers:

- KG 28 – lamell heat exchangers

Spiral heat exchangers – coiled tubing:

- RC – normal lamell
- HC – high lamell

Lamell heat exchangers:

- NL – lamell heat exchangers

APPLICATION:

Heat exchangers are mainly used as:

air heaters with warm or hot water, steam or oil - KG, RC, HC, NL;

air coolers with cold water, water or oil coolers with air - KG, RC, HC, NL;

APPLICATION AREA:

- in chemical, wood, food, textile, paper, tobacco, ... industry;
- in air-condition – to build-in air ducts and various air conditioning systems,
- in foundries;

HEAT EXCHANGERS MATERIAL:

KG 28, RC, HC, NL:

- entirely made of steel, hot galvanized lamell package;

RC:

- entirely made of stainless steel;
- stainless steel lamell package, frame in collecting caps made of mild steel;

ADVANTAGES OF KLIMA CELJE'S HEAT EXCHANGERS:

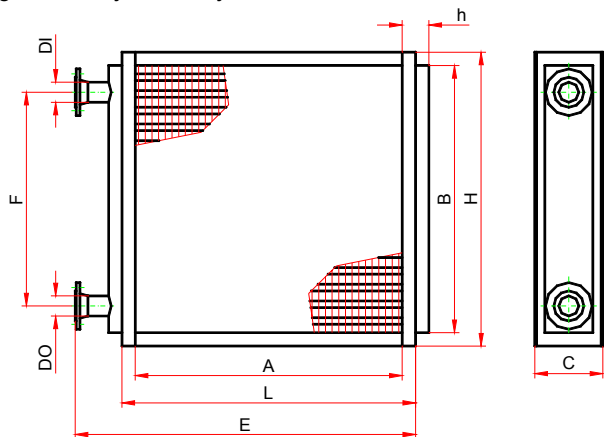
- long years of experience in heat exchangers production
- suitable for hard operating conditions (high pressure, high temperatures,...)
- quick and optimal computer selection
- good heat conductivity between pipe and lamell achieved with hot galvanization
- conformation to customer's needs – dimensions, material,...
- offer of various shapes, pipe dimensions, lamell stepping
- very long life expectancy
- high corrosion protection (hot galvanization)

DESIGNATION:

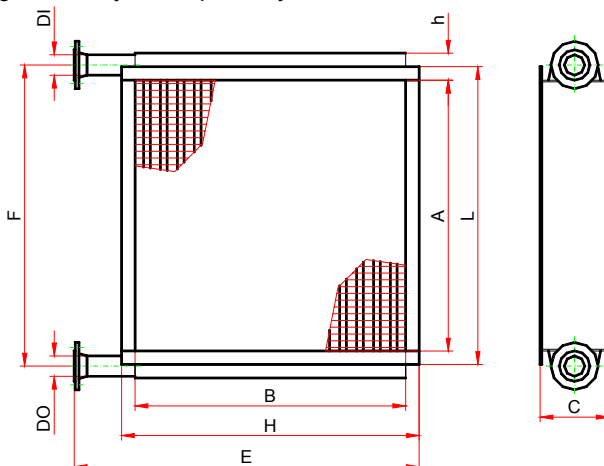
OBLIKA IZVEDBE:

Z okvirjem With frame

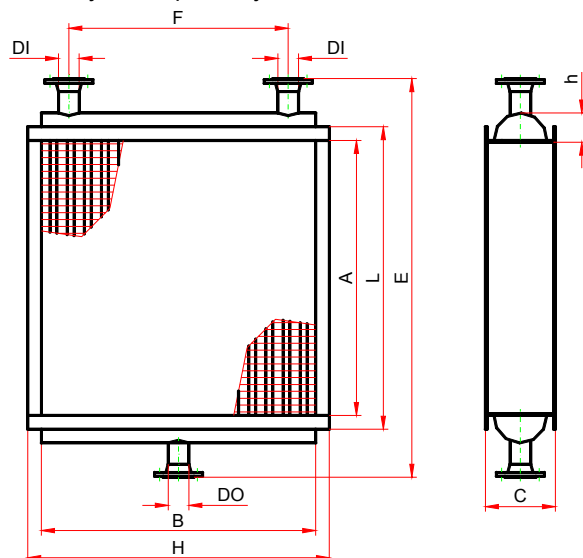
Izvedba A:
grelni medij: voda, olje;



Izvedba B:
grelni medij: voda, para, olje;



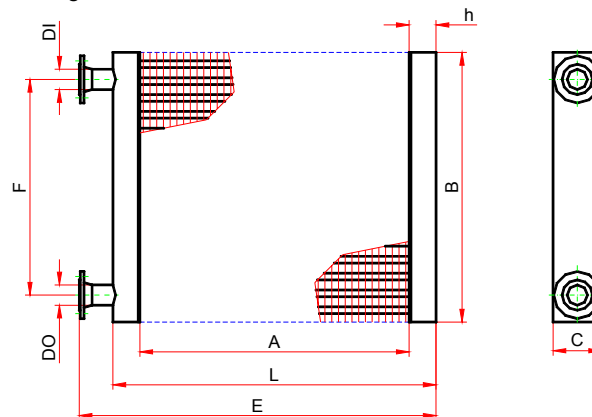
Izvedba C:
Grelni medij: voda, para, olje;



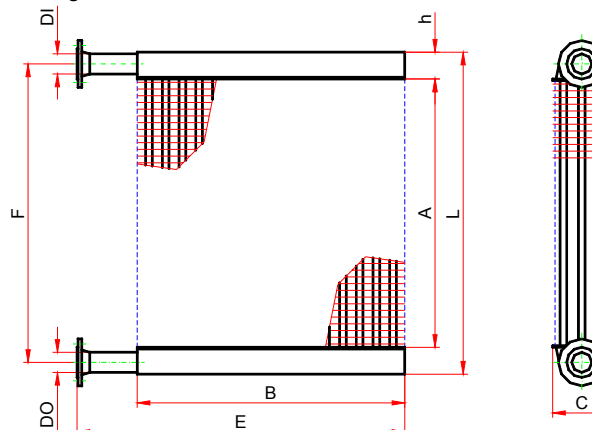
DESIGN FORM:

Brez okvirja Without frame

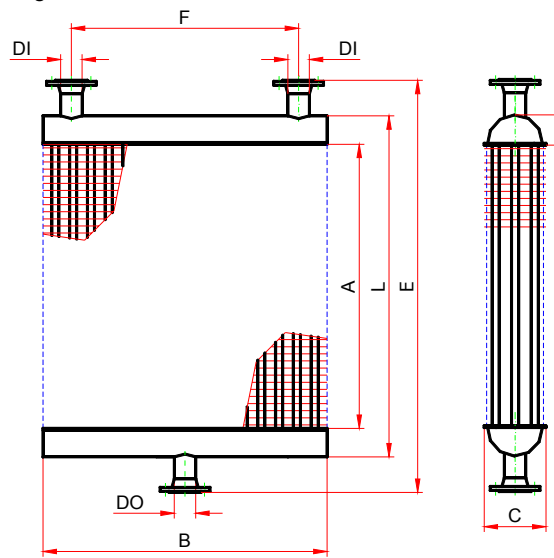
Type A:
heating medium: water, oil;



Type B:
heating medium: water, steam, oil;



Type C:
Heating medium: water, steam, oil;



IZBIRA TOPLOTNIH IZMENJEVALCEV:

Dimenzioniranje in izbira se vrši s pomočjo računalniškega programa. Na podlagi kupčevih zahtev, izkušenj KLIMA Celje in možnostjo izbire med različnimi tipi izberemo tehnično in cenovno najustreznejši toplotni izmenjevalec.

ZAHTEVE ZA IZBIRO:

ZRAK

- pretok zraka (volumski ali masni)
- vstopna temperatura zraka
- izstopna temperatura zraka ali potrebna toplotna moč
- absolutni tlak zraka

Upošteva se tudi želja kupca glede max. padca tlaka na zračni strani ali čelnega preseka izmenjevalca

MEDIJ: voda, olje

- vstopna temperatura medija
- izstopna temperatura medija
- absolutni tlak medija

Upošteva se tudi želja kupca glede pretoka medija in max. padca tlaka medija.

MEDIJ: para

- absolutni tlak pare

HEAT EXCHANGERS SELECTION:

Dimensioning and selection is done with computer programme. Based upon customer's demands, KLIMA Celje's experiences and possibility to select between various types, the most suitable heat exchanger is selected, regarding technical and price demands.

SELECTION REQUIREMENTS:

AIR

- air flow (volume or mass)
- entry air temperature
- exit air temperature or necessary heating power
- absolute air pressure

The customer's wish regarding max. pressure drop on air side or frontal cross-section of heat exchanger is also considered.

MEDIUM: water, oil

- entry medium temperature
- exit medium temperature
- absolute medium pressure

The customer's wish regarding medium flow rate and max. pressure drop of medium is also considered.

MEDIUM: steam

- absolute steam pressure

PRIPOROČLJIVE ČELNE HITROSTI V_F :

RECOMMENDED FRONTAL VELOCITIES V_F :

Vrsta toplotnih izmenjevalcev Heat exchanger type	V_F (m/s)	Z
Grelec zraka - gole cevi Air heater – bare pipes	4-8	2-6
Grelec zraka - lamelni, spiralni Air heater – lamell, spiral	2-5	1-4
Hladilec zraka - lamelni, spiralni Air cooler – lamell, spiral	2-3,5*	2-6
Hladilec vode ali olja Water or oil cooler	2-5	1-6
Hladilec zraka – rekuperator Air cooler – recuperator	1-3	2-6
Grelec zraka – rekuperator Air heater - recuperator	1-3	2-6

Z – število vrst

Z – number of rows

* V primeru $V_F > 2,5$ m/s in kondenzacije je potreben eliminator vodnih kapljic

* In case $V_F > 2,5$ m/s and condensation the water drops eliminator is needed

PRIKLJUČKI DI - DO (mm)

CONNECTIONS DI - DO (mm)

	voda water	kondenz condense	nasičena vodna para – abs. tlak p (bar) saturated water steam – abs. pressure p (bar)						
			1,2	1,6	2	4	6	8	10
NO	(m³/h)	(KW)	(KW)						
25	4	125	15	20	24	45	70	90	110
32	6	200	25	32	40	75	110	150	190
40	10	320	40	50	60	120	180	240	300
50	16	500	60	80	100	180	300	360	460
65	25	850	100	130	160	320	480	620	800
80	40	1250	160	200	250	480	750	950	1200
100	70	2000	240	320	400	750	1200	1500	2000

OPIS:

Toplotni izmenjevalci so izdelani iz lamelnega paketa, ki je vroče cinkan (razen nerjavne izvedbe), jeklenega okvirja in jeklenih zbirnih komor. Vroče cinkanje omogoča optimalni spoj med lamelo in cevjo. Cevi paketa so med seboj povezane v cevne poti, ki se določijo za vsak izmenjevalec posebej in omogočajo njegovo optimalno delovanje. Na zbirnih komorah so privarjeni priključki za vstop in izstop medija. Okvir izmenjevalca omogoča pritrditev na določeno napravo. Pri toplotnih izmenjevalcih večjih dimenzij in visokih delovnih temperatur pride do raztezka materiala, zato so okvirji izdelani tako, da je ena komora pomična. Jekleni okvir in zbirne komore so protikorozijsko zaščiteni s temperaturno odporno barvo. Vsak toplotni izmenjevalec se preizkusi na tesnost z vodnim preizkusnim tlakom.

NAVODILA ZA VGRADNJO IN OBRATOVANJE:

VGRADNJA

Toplotni izmenjevalec se preko prirobnice - okvirja z izvrtinami privijači na prirobnico zračnega kanala. Med prirobnici je zaželeno vstaviti tesnilo, zaradi čim manjšega prepuščanja zraka.

Priključne cevi za medij morajo dopuščati prosto raztezanje in krčenje izmenjevalca.

Prav tako se preko cevi ne smejo prenašati vibracije na dovodni in odvodni zbirni komori.

OBRATOVANJE

Polnjenje toplotnega izmenjevalca z vodo ali oljem se vrši od spodaj, da je možno odzračevanje. Odzračevanje je potrebno po vsakem praznjenju in ponovnem polnjenju instalacije.

Pri polnjenju izmenjevalca s paro je to potrebno odpirati postopno. Toplotne izmenjevalce, ki niso v obratovanju in so v stiku z zunanjo atmosfero je treba izprazniti, zaradi nevarnosti pokanja cevi. Praznjenje in odzračevanje se vrši preko glavnih priključkov. Za toplotne izmenjevalce, ki ogrevajo sveži zrak se priporoča:

- ustavitev zračnega pretoka v primeru, da grelni medij ne kroži.

V primeru umazanega lamelnega paketa je tega potrebno občasno očistiti s stisnjenim zrakom ali nasičeno vodno paro.

DESCRIPTION:

Heat exchangers are made of hot galvanized lamell package (except stainless steel type), steel frame and steel collecting chambers. Hot galvanization enables the optimal connection between lamell and pipe. Pipes of the lamell packages are connected together in pipe paths, that are defined separately for each heat exchanger and enable its optimal operation. Connections for medium entry and exit are welded on collecting chambers. Heat exchanger frame enables mounting on specific device. At large dimensions and high work temperatures of heat exchangers, the material heat extension appears, so the frames are made in a way, that one collecting chamber is movable. Steel frame and collecting chambers have anticorrosion protection with high temperature resistant paint. Every heat exchanger is tested with water test pressure to ensure the water tightness of the heat exchanger.

ASSEMBLY AND OPERATION INSTRUCTIONS:

ASSEMBLY

Heat exchanger is screwed over the holes on the frame or flange to the flange on the air duct. Use of washer between the flanges is recommended, to reduce air leakage.

Connection pipes for medium must enable free expansion and contraction of the heat exchanger.

Also vibrations must not be passed over the connection pipes to the collecting chamber on the intake or exit.

OPERATION

Filling the heat exchanger with water or oil is preformed on the bottom, so that deairing can be achieved. Deairing is also needed after every installation filling or refilling.

Filling the heat exchanger with steam must be done gradually.

Heat exchangers that are not in operation and are exposed to outer atmosphere, must be emptied, because of the risk that the pipes might crack. Filling and deairing is accomplished through the main connections. For heat exchangers that are warming fresh air it is recommended:

- stopping air flow in case that the heating medium doesn't circulate.

In case of dirty lamell package the cleaning it with compressed air or water steam is recommended.



TIPI TOPLOTNIH IZMENJEVALCEV

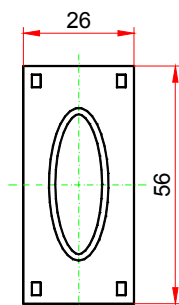
TOPLOTNI IZMENJEVALCI Z OVALNIMI CEVMI – KG

Izdelujemo jih kot lamelne izmenjevalce. Cevi in lamele so jeklene, ter površinsko zaščitene z vročim cinkanjem na zunanji strani, kar zagotavlja optimalen spoj med lamelo in cevjo. Zbirni komori in okvir so barvani. Priključki so gladki, prirobnični ali navojni.

Max. obratovalni tlak standardnih izmenjevalcev je do 10 bar za vodo in olje, ter 6 bar za nasičeno vodno paro.

Meritve osnovnih modelov toplotnih izmenjevalcev KG je ob upoštevanju standardov ISO, BS in ASHRAE izvedla Fakulteta za strojništvo Univerze v Ljubljani.

Standardne dimenzije cevi



HEAT EXCHANGERS TYPES

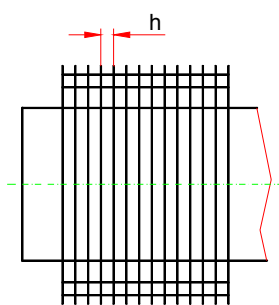
OVAL TUBBING HEAT EXCHANGES – KG

They're made like lamell heat exchangers. Pipes and lamells are made of steel and are protected with hot galvanization on the outer side, which enables the optimal connection between pipe and lamell. Collecting chambers and frame are painted. Connections are smooth, with flanges or with threads.

Max. operation pressure of standard heat exchangers is up to 10 bar for water or oil and 6 bar for water steam.

Measurements of basic KG types of the heat exchangers was performed by the University of Ljubljana according to the ISO, BS and ASHRAE standards.

Standard pipe dimensions



Standardne dimenzije izmenjevalca

Z – število vrst Z – number of rows	1	2	3	4	5
C – z okvirjem C – with frame	137	204	271	358	425
C – brez okvirja C – without frame	87	154	221	308	375
H – višina komore H – chamber height	45	70	100	135	170

Standard heat exchanger dimensions

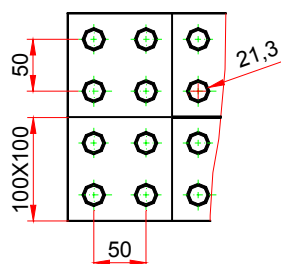
B = 27 x R (mm)
L = A + 80 (mm)
L = A + 2h (mm)
H = B + 80 (mm)

LAMELNI TOPLOTNI IZMENJEVALCI – NL

Izdelujemo jih v eni dimenziji cevi in lamel z medlamelnimi razdaljami 3,5; 5; in 10 mm. Cevi in lamele so jeklene, ter površinsko zaščitene z vročim cinkanjem z zunanje strani. Zbirni komori in okvir so barvani. Zaradi robustne izvedbe so primerni za težje obratovalne pogoje, kjer je potrebno veliko čiščenja. Priključki so gladki, prirobnični ali navojni.

Max. obratovalni tlak standardnih izmenjevalcev je do 10 bar za vodo, olje in paro. Po posebnem naročilu pa do 20 bar.

Standardne dimenzije cevi

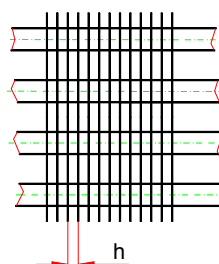


LAMELL HEAT EXCHANGERS – NL

They're made in one dimension of pipes and lamells with between lamell distance of 3,5; 5 and 10 mm. Pipes and lamells are made of steel and are hot galvanized on the outer side. Because of their robust design they're suitable for tougher operation environments that require a lot of cleaning. Connections are smooth, with flanges or with threads.

Max. operation pressure of standard heat exchangers is up to 10 bar for water, oil and steam. By special order it can be up to 20 bar.

Standard pipe dimensions



h = 3,5
h = 5
h = 10

Standardne dimenzije izmenjevalca

$B = R \times 50 \text{ (mm)}$
$C = Z \times 50 \text{ mm} + 70 \text{ (mm)}$
$L = A + 80 \text{ (mm)}$
$H = B + 80 \text{ (mm)}$

Standard heat exchanger dimensions

SPIRALNI TOPLOTNI IZMENJEVALCI – RC, HC

Izdelujemo jih v osnovni izvedbi kot navite cevi, z normalno lamelo RC ali visoko lamelo HC. Posebna izvedba so toplotni izmenjevalci z golimi cevmi RC-00. Cevi in lamele so jeklene, ter površinsko zaščitene z vročim cinkanjem z zunanje strani. Zbirni komori in okvir so barvani. Priključki so gladki, prirobnični ali navojni.

Standardno izdelujemo izmenjevalce s premerom cevi $\phi 17,2 \text{ mm}$ do $\phi 48,3 \text{ mm}$ in korakom navitja $h = 4 - 10 \text{ mm}$. Max. obratovalni tlak standardnih izmenjevalcev je do 10 bar. za vodo, olje in paro. Po posebnem naročilu pa do 20 bar.

Meritve osnovnih modelov toplotnih izmenjevalcev RC je ob upoštevanju standardov ISO, BS in ASHRAE izvedla Fakulteta za strojništvo Univerze v Ljubljani.

Po naročilu izdelujemo posebne izvedbe:

- gole cevi RC-00 – rekuperatorji zraka
- cevi povezane s koleni – ogrevanci napajalne vode
- notranja površina cevi pocinkana
- dobava samo navitih cevi do premera 60,3 mm, dolžine 2,8 m in s prekinitvijo navitja do 5,6 m.
- cevi in trak iz nerjavnega jekla dogovorjene kvalitete

SPIRAL HEAT EXCHANGERS – RC, HC

They're made the same as threaded pipes, with normal lamell RC or high lamell HC. Special design are heat exchangers with bare pipes RC-00. Pipes and lamells are made of steel and are hot galvanized from the outer side. Collecting chambers and frame are painted. Connections are smooth, with flanges or with threads.

Standard heat exchangers are made with pipe diameter of $\phi 17,2 \text{ mm}$ up to $\phi 48,3 \text{ mm}$ with thread stepping $h = 4 - 10 \text{ mm}$.

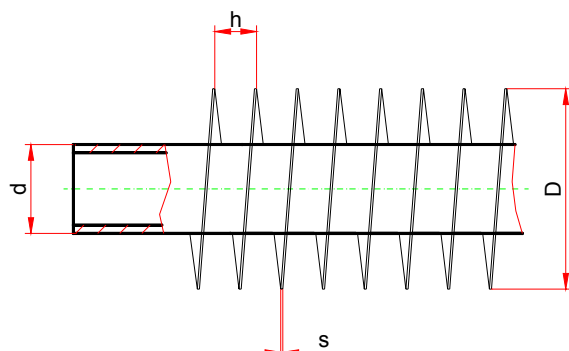
Max. operation pressure of standard heat exchangers is up to 10 bar for water, oil and steam. By special order it can be up to 20 bar.

Measurements of basic RC types of the heat exchangers was performed by the University of Ljubljana according to the ISO, BS and ASHRAE standards.

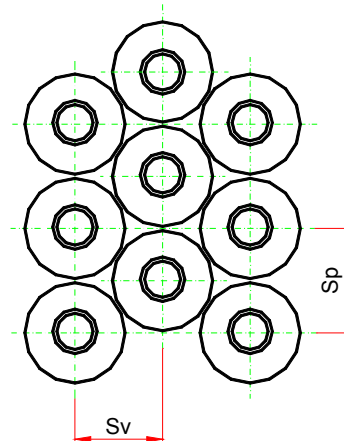
Special types of heat exchangers can be made by order:

- heat exchanger with bare pipes RC-00 – air recuperator
- pipes connected with knees – water heaters
- hot galvanized inner side of tubes
- supply of threaded pipes with diameter up to 60,3 mm, length 2,8 m and up to 5,6 m with thread break.
- pipes and ribbon made of stainless steel with agreed quality.

Standardne dimenzije cevi



Standard pipe dimensions



Standardne dimenzije izmenjevalca

	d	D	s	h min.	h max.	Sp	Sv
RC-3/8"	17,2	37	0,5	4	6	38	32
RC-1/2"	21,3	48	0,5	4,5	10	50	42
RC-3/4"	26,9	58	0,5	5	10	60	52
HC-3/4"	26,9	68	0,5	6	10	70	62
RC-1"	33,7	78	0,5	10	10	80	68
RC-5/4"	42,4	87	0,5	10	10	89	76
RC-6/4"	48,3	93	0,5	10	10	95	80

Standard heat exchanger dimensions

$B = R \times Sp \text{ mm (ali)}$
$B = (R + 0,5) \times Sp \text{ mm}$
$C = Z \times Sv + 70 \text{ mm}$
$L = A + 80 \text{ mm}$
$H = B + 80 \text{ mm}$

POSEBNE IZVEDBE TOPLOTNIH IZMENJEVALCEV

OGREVALCI NAPAVALNE VODE

Namenjeni so dogrevanju napajalne vode, predvidene za napajanje kotla, z dimnimi plini. Izdelujemo jih kot samostojne enote (samo ogrevalci napajalne vode), ali pa v kompletu s komoro.

Lamelni paket je izdelan iz jeklenih navitih cevi $\phi 21,3 \times 2,3$ mm in koraka navitja $h = 4 - 10$ mm. Cevi in navitje – lamele so površinsko zaščitene z vročim cinkanjem. Cevi paketa so medseboj povezane s koleni v cevne poti, ki se določijo za vsak izmenjevalec posebej in omogočajo njegovo optimalno delovanje. Kvaliteta vgrajenih cevi je St 35-8 W.N.1.0305. Ogrevalec napajalne vode se lahko izdelata tudi iz nerjavnega jekla.

Dimenzioniranje se vrši s pomočjo računalniškega programa. Pri dimenzioniranju se prilagajamo željam kupca po moči, padcu tlaka na dimni strani, dimenzijah in podobno.

SPECIAL TYPES OF HEAT EXCHANGERS

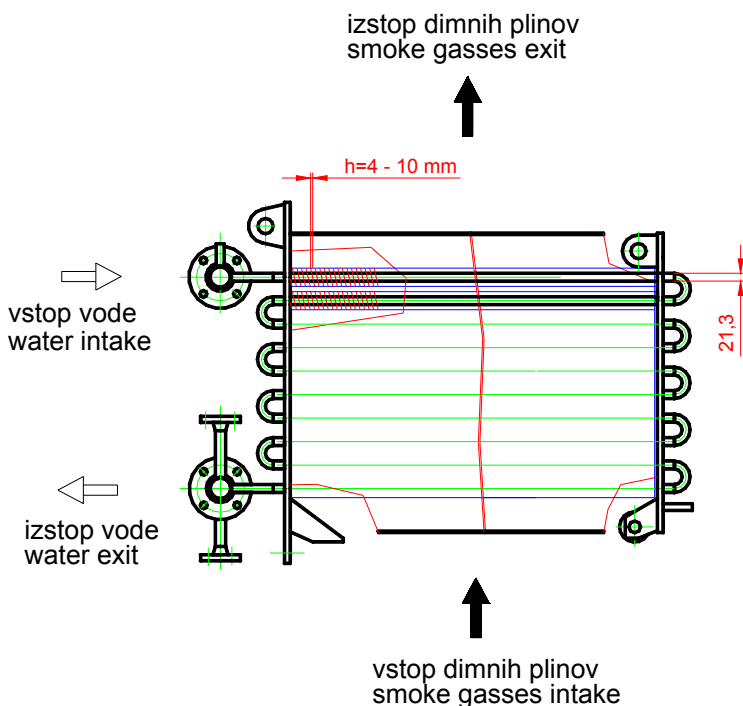
FEEDING WATER HEATERS

They're intended for warming the water, intended for feeding the boiler, with smoke gasses. They're made as independent units (only feeding water heater), or complete with chamber.

Lamell package is made of steel threaded pipes $\phi 21,3 \times 2,3$ mm and thread stepping $h = 4 - 10$ mm. Pipes with threading are hot galvanized. Pipes in the package are connected with knees in pipe ways, which are defined specially for each heat exchanger to enable optimal operation. Quality of the heat exchanger pipes is St 35-8 W.N.1.0305. Feeding water heater can also be made of stainless steel.

Dimensioning is done with help of computer programme. At heat exchanger designing the customer wishes are considered, like pressure drop on smoke side, dimensions and similar.

Ogrevalec napajalne vode
Feeding water heater



Ogrevalec napajalne vode s komoro
Feeding water heater with chamber



HLADILCI KOMPRESORSKEGA ZRAKA

Namenjeni so hlajenju komprimiranega zraka z vodo v kompresorskih postajah. Uporabljajo se predvsem v farmacevtski in kemični industriji. Izdelani so iz nerjavnega jekla ustrežne kvalitete. Lamelni paket je izdelan iz jeklenih navitih cevi $\phi 21,3 \times 2,3$ mm in koraka navitja $h = 4 - 10$ mm. Cevi paketa so medseboj povezane v cevne poti, ki se določijo za vsak izmenjevalec posebej in omogočajo njegovo optimalno delovanje.

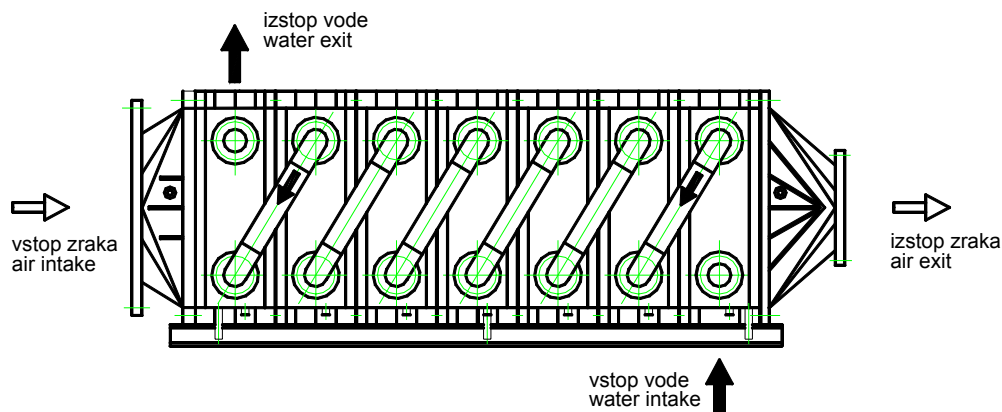
Dimenzioniranje se vrši s pomočjo računalniškega programa. Pri dimenzioniranju se prilagajamo željam kupca po moči, padcu tlaka na dimni strani, dimenzijah in podobno.

COMPRESSOR AIR COOLER

They're designed for cooling compressed air with water in compression stations. They're used mainly in pharmaceuticals and chemical industry. They're made of suitable quality stainless steel. Lamell package is made of steel threaded pipes $\phi 21,3 \times 2,3$ mm and thread stepping $h = 4 - 10$ mm. Lamell package is made of steel threaded pipes $\phi 21,3 \times 2,3$ mm and thread stepping $h = 4 - 10$ mm. Pipes in the package are connected with knees in pipe ways, which are defined specially for each heat exchanger to enable optimal operation.

Dimensioning is done with help of computer programme. At heat exchanger designing the customer wishes are considered, like pressure drop on smoke side, dimensions and similar.

Hladilec kompresorskega zraka Compressor air cooler



REGENERATIVNI MENJALNIKI TOPLOTE

Namenjeni so vračanju toplote odpadnega ali zavrženega zraka. Izdelujemo jih kot individualne optimirane enote prirejene vsakokratnim zahtevam. Predvsem se uporabljajo v livarnah, sušilnicah, cementarnah... Prednosti so robustna izvedba, kompaktnost, možnost čiščenja, ni obrabe...

Izdelani so iz jeklenih cevi do max. premera ϕ 114,3 mm in ohišja. Cevi so gladke in barvane. Lahko se izdelajo tudi iz nerjavnega jekla ustrezne kvalitete.

Dimenzioniranje se vrši s pomočjo računalniškega programa. Pri dimenzioniranju se prilagajamo željam kupca po moči, padcu tlaka na zračni in dimni strani, dimenzijah in podobno.

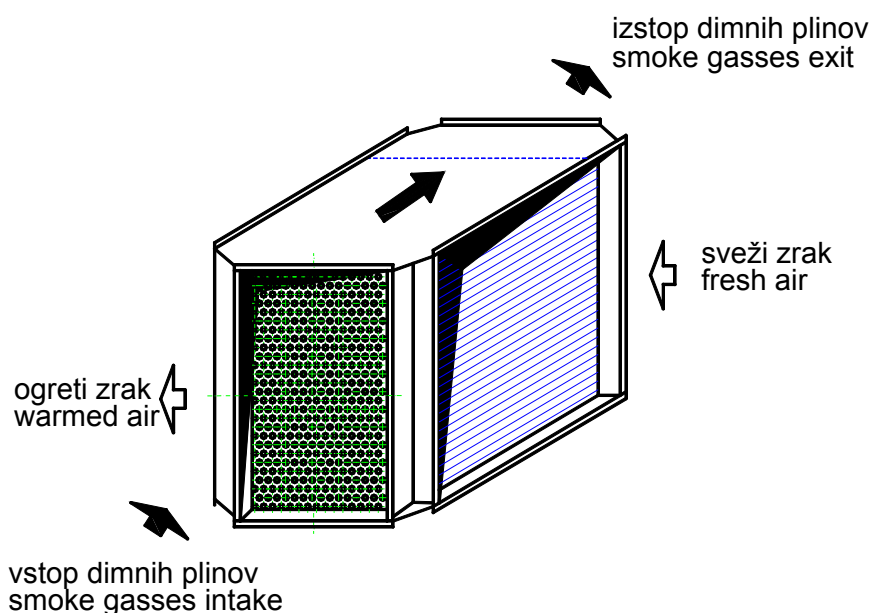
REGENERATIVE HEAT EXCHANGERS

They're designed to return heat from waste or rejected air. They're made as individual optimised units designed for every time needs. Mainly they're used in foundries, drying plants, cement industry, ... Main advantages are robust design, compactness, cleaning capability, no wear...

They're made of steel pipes with diameter up to ϕ 114,3 mm and casing. Pipes are smooth and painted. They can be also made of stainless steel with suitable quality.

Dimensioning is done with help of computer programme. At heat exchanger designing the customer wishes are considered, like pressure drop on smoke side, dimensions and similar

Regenerator dimni plini – zrak Smoke gasses – air regenerator



TOPLITNI IZMENJEVALCI Cu/Al

Izdelani so iz lamelnega paketa, pocinkanega jeklenega okvirja in jeklenih zbiralnih cevi. Lamelni paket tvorijo bakrene cevi in Al lamele. Cevi paketa so medsebojno povezane preko cevnih kolen v cevne poti, ki zagotavljajo njegovo optimalno delovanje. Naloga pocinkanega okvirja je, da ščiti cevna kolena, ter omogoča pritrditev izmenjevalca v napravo.

Vsak toplotni izmenjevalec se preizkusi na tesnost z preizkusnim vodnim tlakom.

Največ se uporabljajo kot vodni grelniki ali hladilniki zraka v klimatizaciji in industriji. Vgrajujejo se v zračne kanale ali klimatske naprave. Delovni medij je hladna, topla ali vroča voda in mešanica voda – protizmrazovalno sredstvo.

Dimenzioniranje poteka s pomočjo računalniškega programa na osnovi kupčevih zahtev.

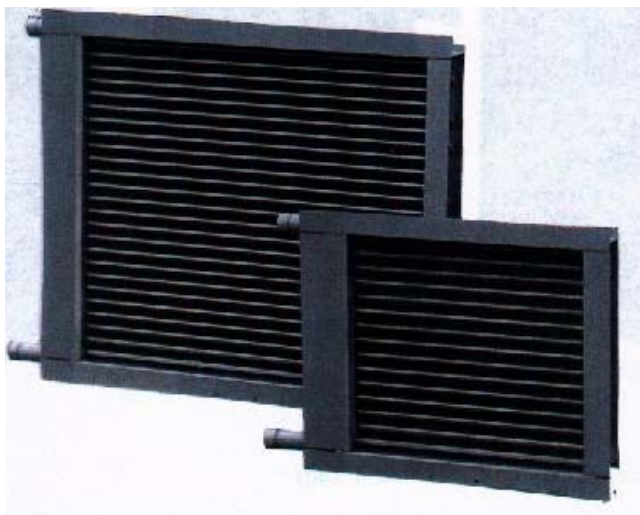
Cu/Al HEAT EXCHANGERS

They're made of lamell package, galvanized steel frame and steel collecting pipes. Lamell package is made of copper pipes with aluminous lamells. Pipes in the package are connected with knees in pipe ways, which assure optimal heat exchanger operation. Task of the galvanized frame is to protect pipe knees and enables heat exchanger assembly to the device.

Every heat exchanger is tested on tightness with test water pressure.

They're mainly used as water heaters or air coolers in air-conditioning and industry. They're build in air ducts or in air-conditioning devices. Work medium is cold, warm or hot water and water-antifreeze mix.

Dimensioning is done with help of computer programme based upon customer's demands.





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