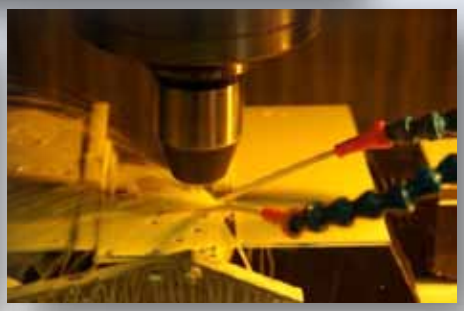
GAMA alumínium
Hliníkové Chladiče - Aluminium heatsinks
ISO-9001, 14001, 18001 Certified

GAMA aluminium



Marian Gahír / CEO

Vážení obchodní partneri,

Dostáva sa Vám do rúk nove vydanie katalógu **Gamaaluminium – hliníkové chladiče na rok 2013**. V tomto katalógu nájdete rozšírenú ponuku o ďalšie nové chladiče, ale aj naše chladiče navrhnuté a určené pre moderné LED aplikácie. To dokazuje, že **GAMAalumínium** je na trhu s hliníkovými chladičmi dlhodobo stabilná a silná spoločnosť s neustále rozširujúcim sortimentom chladičov a hliníkových profilov .

Pre Vás, ktorí ste nás objavili len dnes, je venovaných pár riadkov.

Gamaaluminium v snahe skvalitniť svoje služby sa neustále rozvíja a rastie či už v oblasti technického rozvoja v oblasti personálnej, ako aj v oblasti zlepšovania kvality poskytovaných služieb čo dokazuje aj získanie a udržiavanie systému kvality. Sme držiteľmi certifikátov ISO 9001:2008, ISO 14001:2004, ISO 18001:2007. Najnovšie sme získali Certifikát o spracovaní odpadu z obalov. Nakoľko pracujeme z nebezpečnými látkami ochrana životného prostredia patrí medzi naše priority. Sme výrobno-obchodná spoločnosť zameraná na opracovanie a predaj hliníkových chladičov a profilov, ktoré nájdu uplatnenie prevažne v elektrotechnickom odvetví.

Od roku 2004 sa prevádzka firmy nachádza vo vlastných priestoroch, ktoré neustále prispôsobujeme potrebám výroby. Firma je vybavená modernými CNC strojmi značky DOOSAN, HURCO a FLOTT. V rámci nových investicií sme v roku 2012 vybudovali nové pracovisko pre CNC stroje. Investovali sme aj do nových technológii. Zakúpili sme dve nové obrábacie centrá HURCO a DOSAN. Celkom máme na opracovanie chladičov sedem CNC obrábacích centier.. Na delenie materiálu používame tri kotúčové píly z toho jednu automatickú jednokotúčovú pílu a jednu dvojkotúčovú automatickú pílu.

V poslednom čase rastie dopyt po veľkých chladičoch, ktoré sa nedajú vyrobiť klasickou technológiou a preto jediným z riešení je takýto chladič zvariť z viacerých kusov. Aj v tejto oblasti vieme pre zákazníka takýto chladič vyrobiť. Pre tento účel máme robotizované pracovisko, ktoré je osadené zváracím robotom OTC DAIHEN. Aby sme mohli pre zákazníkov dodávať chladiče podľa jeho požiadaviek , nielen opracované na CNC strojoch, ale aj s povrchovou úpravou, máme vlastnú linku na anodickú oxidáciu – eloxovanie. Štandardne robíme prírodný a čierny elox. V prípade požiadavky zákazníka vieme urobiť aj elox modrý, zlatý a červený. To upevňuje postavenie firmy na trhu s hliníkovými chladičmi a ich opracovaním. Naša flexibilita v oblasti obchodu a výroby z nás robí výborného partnera pre realizáciu Vašich zákaziek.

Minulosť, prítomnosť, budúcnosť ...

Za začiatok novodobej histórie výroby a predaja hliníkových chladičov, ktoré firma GAMAalumínium dnes ponúka považujeme rok 2002 keď sme sa presťahovali do nových priestorov. Počas tohto obdobia sa firma vyprofilovala a má dominantné postavenie už nie len na Slovensku. V spolupráci s našimi obchodnými zástupcami sa náš sortiment predáva v Českej republike, v Poľsku, v Maďarsku, v Nemecku a v Rumunsku. Okrem toho máme zákazníkov v Anglicku, vo Švédsku, vo Francúzku, v Belgicku, v Rakúsku a v Taliansku.

Neustále zabezpečujeme kontinuálny rast výroby a predaja podľa špecifických požiadaviek zákazníka, čo potvrdzuje aj neustále pribúdanie nových zákazníkov. Získavaniu nových zákazníkov prispieva aj účasť na domácich a zahraničných výstavách.

V roku 2012 to boli výstavy AMPÉR Brno, ELOSYS Trenčín a MIDEST Paríž. Naše chladiče sa presadzujú na európskom trhu a je perspektíva na ich aplikáciu aj do budúcnosti. Dokladuje to aj množstvo ktoré každoročne rastie. V roku 2011 sme spracovali cca 200 ton chladiacich profilov a v roku 2012 to už bolo viac ako 250 ton. Aj v tomto roku je naším hlavným cieľom kvalita, rozšírenie sortimentu podľa požiadaviek zákazníkov a rozširovanie výrobných priestorov a modernizácia technologických zariadení. Značnú pozornosť venujeme chladičom určených pre LED aplikácie, kde chceme ponúknuť okrem samotných chladičov aj komplexné riešenia a príslušenstvo.

Hlavný výrobný program firmy tvoria:

- Hliníkové chladiče pre elektrotechnický priemysel
- Hliníkové profily pre LED svetlá
- Zákaznícke profily
- Výroba a predaj hliníkových profilov
- Delenie hliníka na automatických pílach
- Opracovanie hliníka na CNC strojoch
- Zváranie hliníka v ochrannej atmosfére
- Eloxovanie a titanovanie

Povrchová úprava hliníka ...

Je dôležitou súčasťou finálnych výrobkov. Zabráni prirodzenému oxidovaniu hliníka vplyvom atmosférického kyslíka na hliník, ktorá je závislá od vplyvu prostredia, v ktorom sa výrobok nachádza. Podľa toho sa vplyvom prostredia a času mení aj vrstva oxidu a vzhľad hliníkového materiálu. Tým sa mení aj tepelná vodivosť hliníkových materiálov a farebná stálosť. Okrem funkčnej stránky spĺňa aj estetické požiadavky po aplikácií vhodnej povrchovej úpravy. Realizujeme povrchovú úpravu v odtieňoch prírodná, čierna, zlatá, modrá, červená ...

Hliníkové chladiče ...

Využitie hliníkových chladičov v praxi nachádza široké uplatnenie všade tam, kde je kladená potreba odvádzať nadbytočné teplo z elektronických súčiastok. Z toho vyplýva nezastupiteľná potreba hliníkových chladičov pre dosiahnutie požadovanej funkčnosti a spoľahlivosti elektrotechnických výrobkov a zariadení. V súčasnosti vám ponúkame viac ako 130 chladičových profilov a tento sortiment neustále rozširujeme. Nové chladiče aktuálne zverejňujeme na našej webovej stránke **www.gamaaluminium.sk** V poslednom období sme sortiment rozšírili o chladiče vhodné pre LED svetlá. Spolupracujeme zo zákazníkmi pri návrhu vlastných chladičov, tzv. zákazníckych. Tento sortiment z pochopiteľných dôvodov v tomto katalógu neuvádzame. Takýchto profilov máme viac ako 80 druhov. A nie sú to len chladiče .

Naše motto:

"Kvalita je, keď sa vracia zákazník a nie tovar."

Marian Gahír / CEO

Dear business partners,

The new issue of the catalogue Gamaalumínium – Aluminum coolers 2013 is now available. In the catalogue, you can find the offer extended with further new coolers as well as our coolers proposed and intended to advanced LED applications. This proves that the company GAMAalumínium has a long-term stable and strong position on the market with Aluminum coolers with continuously developing assortment of coolers and Al-profiles.

A few words to you who have discovered our company just now.

In sake of improving its services quality, company Gamaalumínium has continuously developed and grew in many areas – technical development, personnel, improvement of provided services quality – as proven by acquired ad maintained quality management system certificates pursuant to standards ISO 9001:2008, ISO 14001:2004 and ISO 18001:2007. Lately, we acquired the Packing Waste Processing Certificate. Since we work with hazardous substances, environmental protection belongs to our priorities.

We are a production-business company focused on machining and sale of Al-coolers and profiles that find their application mainly in electric-technical industrial sector.

Since 2004, the company operations have been located on the own premises that have been continuously adapted to operating and customers´ needs. The company is equipped with the advanced CNC machines of brands DOOSAN, HURCO and FLOTT. Within new investments, we built a new workplace in 2012 for CNC machines. We invested also in new technologies, buying two new machining centers HURCO and DOSAN. WE have in total 7 CNC centers for coolers machining. We use three disc saws for material cutting, thereof one automatic single-disc saw and one double-disc automatic saw.

Lately there has been increased demand for large coolers that cannot be produced through classical technology but welded together from a few pieces. We are able to produce also such large cooler upon customer request. For this purpose, we have a robot-controlled shop equipped with welding robot OTC DAIHEN. To be able to supply coolers to the customers according to their requirements, both CNC machined and with surface treatment, we operate our own anodic oxidation and titanium treatment line. Generally, we provide natural and black Eloxal coat. Upon customer request we are able to make blue, golden and red Eloxal coat. This has strengthened the company position on the market with Al-coolers and their treatment. Our flexibility in the area of sales and production makes us an excellent partner for fulfillment of your orders.

Past, presence, future ...

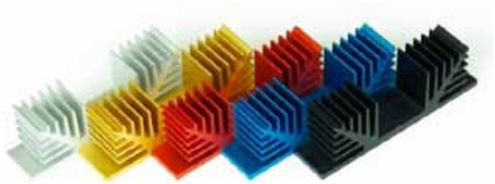
Year 2002 when we moved to the new premises is considered by company GAMAalumínium the beginning of the modern history of Al-coolers production and sale. Since then, the company has profiled itself and assumed a dominant position not only in Slovakia. In cooperation with our sales representatives, our product mix has been sold in the Czech Republic, Poland, Hungary, Germany and Romania. Moreover, we have customers in UK, Sweden, France, Belgium, Austria and Italy.

WE have provided for continuous production and sale increase according to customer specific needs, as proven by permanently acquiring new customers also thanks to our participation on domestic and foreign exhibitions. In 2012, they were exhibitions AMPER Brno, ELOSYS Trenčín and MIDEST Paris. Our coolers have been promoted on the European market with future application, as proven by year-by-year increasing quantity of ordered coolers. In 2011, we produced more than 200 ton of cooling profiles vs 250 ton in 2012. In this year, our main goals again refer to quality, product mix expansion based on customers´ requirements, expansion of production premises and modernization of technology equipment. We pay significant attention to the coolers intended to LED applications where we would like to offer complex solutions along with the coolers.

Main company production program consists of:
- Al-coolers for electric-technical industry
- Al-profiles for LED lights
- customer profiles
- production and sale of Al-profiles
- Al-cutting in automatic saws
- Al- machining on CNC machines
- Al-welding in protection atmosphere
- Anodizing and Titanium treatment

Aluminum surface treatment ...

This procedure is an important part of finished products, eliminating natural oxidation of Aluminum caused by atmospheric Al, depending on the product ambiance. Oxide layer and Al-material image changes with time upon environmental effects, causing change also to thermal conductivity and color stability of Al-materials. Along with functional aspect, Al-treatment meets also esthetic requirements after application of suitable surface treatment. We usually provide for natural and black surface treatment but also golden, blue or red, based on customer needs.



Aluminum coolers ...

Aluminum coolers are widely used in applications requiring removal of excessive heat from electronic parts. This results in irreplaceable need for Al-coolers aimed to reach the required functionality and reliability of electric-technical products and equipment. Currently we offer more than 130 cooler profiles and the product mix has been continuously expanded. The new coolers are enlisted on our website www.gamaaluminium.sk on regular basis. Lately we have expanded our product mix with the coolers suitable to LED lights. We cooperate with our customers on design of so called customer coolers (custom-tailored coolers). Of course, such assortment is not included in the catalogue. WE have more than 80 types of such profiles, also other than coolers.

Our motto:

"Quality refers to returning customer instead of returned goods."

Všeobecný popis

Hliníkové chladiče

sa vyrábajú z lisovaných profilov, ktoré nakupujeme od rôznych domácich a zahraničných výrobcov. Profily nakupujeme a skladujeme v dĺžkach 2000 – 4000 mm.

Niektoré typy chladičov v aktuálnej ponuke sa môžu mierne líšiť od profilu uvedeného v katalógu, jedná sa hlavne o tvar rebier, môžu byť rovné alebo mierne zvlnené, hrúbka rebier a pod. Túto skutočnosť zo zákazníkom konzultujeme pred dodávkou.

Špecifická hmotnosť hliníka je 2,7 kg/dm^3

Dodávané profily sú v súlade so smernicou RoHS

Normy

Hliníkové profily sú lisované podľa noriem EN 755-5 až 9. Tieto normy hovoria o prípustných odchýlkach skutočných profilov od menovitých hodnôt.

Materiál použitý na chladiče je AW6060 (Al Mg 0,7 Si) (ZH profily), príp. AW6063 (Al Mg Si) (ostatné profily),ktorých chemické zloženie zodpovedá hodnotám stanovených v norme EN 573-3.

Povrch profilov je podľa normy EN 755-1.

Pri opracovaní, pokiaľ nie sú vo výkresovej dokumentácii uvedené tolerancie a iné požiadavky, sa riadime všeobecnými toleranciami STN ISO 2768-1 triedy m, ktoré sa týkajú dĺžok , uhlov , rovinnosti ,zrazení hrán , povrchu a pod.

Ponúkame ...

Profily dodávame napíllené na požadované dĺžky, môžeme ich opracovať na CNC strojoch podľa dodanej dokumentácie, chladiče v prípade potreby zvárame na robotizovanom pracovisku a ponúkame aj povrchovú úpravu eloxovaním (elox prírodný, čierny, žltý, červený, modrý) alebo titanovaním .
Na požiadanie vieme zabezpečiť v spolupráci so SAV Bratislava meranie tepelného odporu pre konkrétny chladič.

V prípade že si z našej ponuky nevyberiete žiadny chladič, vieme zabezpečiť výrobu nového profilu podľa vašej požiadavky, prípadne zabezpečiť Vám profil od iných dodávateľov.

General description

Aluminium Heatsinks

are manufacturing from pressed profiles, which we buy from various domestic and foreign producers. The profiles we buy and store in lenghts 2000 – 4000 mm.

Some types of heatsinks in the current offer may be slightly different from the profile specified in the catalog, mostly on the shape of the ribs - may be straight or slightly wavy, the thickness of the ribs and etc. This fact we consult with the customer before delivery.

A specific weight of aluminium is 2,7 kg/dm^3

Supplied profiles are in accordance with the RoHS Directive

Standards

AL profiles are pressed according to a standard EN755-5 to 9. These standards speak about a tolerance of the actual profiles from the nominal values.

A material used for heatsinks is AW6060 (Al Mg 0,7 Si) (ZH profiles) or AW6060 (Al Mg Si) (other profiles) whose chemical composition corresponds to the values set down in standard EN 573-3.

A surface of the profiles is according to a standard EN 755-1.

Regarding to a machining, if the tolerance and other requirements are not mentioned in drawing documentation we follow the general tolerances STN ISO 2768 – 1 class m, concerning to a lengths, angles, flatness, deducting the edge, surface and etc.

We offered ...

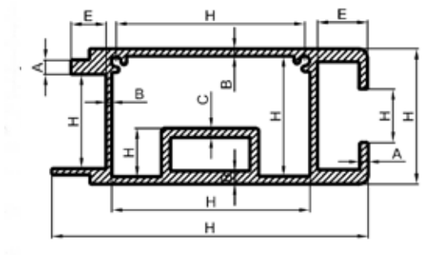
We deliver a profiles cutted with required lenghts, they can be machined by CNC machines according to a received documentation, in case of need we weld a heatsink at welding robotic workstation and we offer the surface treatment as well (natural, black, yellow, red, blue) or titan.

On request we provide in cooperation with SAS Bratislava measurement of thermal resistance for a particular heatsinks.

In case you do not choose any heatsink from our offer, we are able to provide a produce of new profile according to your requirements or provide a profile from another suppliers.

Výpis z normy EN 755-9 – Profily, odchýlky rozmerov a tvaru
Extract of EN 755-9 – Profiles, tolerances of dimensions and shape

Odchýlky rozmerov / Allowance of dimensions

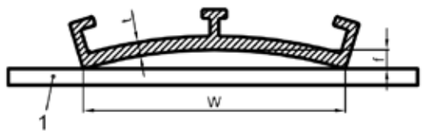


H – všetky rozmery okrem hrúbky steny
H – all dimensions except of the wall thickness

Rozmery v mm / Dimensions in mm

Rozmer H / Dimension H		Odchýlky H pre opísanú kružnicu CD / Allowance H for described circle CD				
nad over	do a vrátane to and inclusive	CD ≤ 100	100 < CD ≤ 200	200 < CD ≤ 300	300 < CD ≤ 500	500 < CD ≤ 800
-	10	± 0,25	± 0,30	± 0,35	± 0,40	± 0,50
10	25	± 0,30	± 0,40	± 0,50	± 0,60	± 0,70
25	50	± 0,50	± 0,60	± 0,80	± 0,90	± 1,0
50	100	± 0,70	± 0,90	± 1,1	± 1,3	± 1,5
100	150	-	± 1,1	± 1,3	± 1,5	± 1,7
150	200	-	± 1,3	± 1,5	± 1,8	± 2,0
200	300	-	-	± 1,7	± 2,1	± 2,4
300	450	-	-	-	± 2,8	± 3,0
450	600	-	-	-	± 3,8	± 4,2
600	800	-	-	-	-	± 5,0

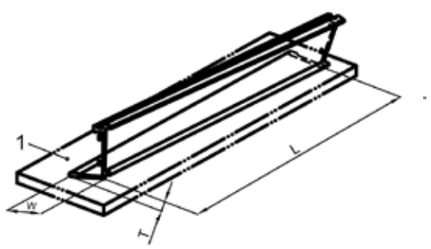
Odchýlky vypuklosti – vydutosti / Allowance of convexity



Rozmery v mm / Dimensions in mm

Šírka W / Width W		Odchýlka f / Offset f		
		duté profily / tubular profiles		Plné profily / Full profiles
nad over	do a vrátane to and inclusive	Hrúbka steny t ≤ 5 / Wall thickness t ≤ 5	Hrúbka steny t > 5 / Wall thickness t > 5	
-	30	0,30	0,20	0,20
30	60	0,40	0,30	0,30
60	100	0,60	0,40	0,40
100	150	0,90	0,60	0,60
150	200	1,20	0,80	0,80
200	300	1,80	1,20	1,20
300	400	2,40	1,60	1,60
400	500	3,00	2,00	2,00
500	600	3,60	2,40	2,40
600	800	4,00	3,00	3,00

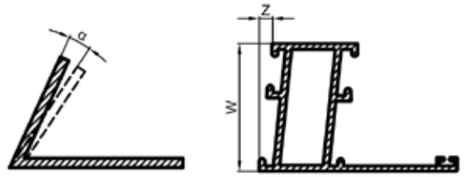
Odchýlky skrútenia / Allowance of twist



Rozmery v mm / Dimensions in mm

Šírka W / Width W		Odchýlka f / Offset f		
		na 1 000 z dĺžky / for 1000 of lenght	Na celkovej dĺžke L profilu / Of total lenght L of profile	
nad over	do a vrátane to and inclusive		nad 1000 a vrátane 6000 / over 1000 and inclusive 6000	nad 6000 / over 6000
-	30	1,2	2,5	3,0
30	50	1,5	3,0	4,0
50	100	2,0	3,5	5,0
100	200	2,5	5,0	7,0
200	300	2,5	6,0	8,0
300	450	3,0	8,0	1,5 x L (L v metroch / in meter)
450	600	3,5	9,5	
600	800	4,5	10,0	

Odchýlky kolmosti / Allowance of perpendicularity



allowance at an angle α other than the right is ± 1°

Rozmery v mm / Dimensions in mm

Šírka W / Width W		Maximálna povolená odchýlka Z od pravého uhla / Maximum allowable deviation Z from the right angle
nad over	do a vrátane to and inclusive	
-	30	0,4
30	50	0,7
50	80	1,0
80	120	1,4
120	180	2,0
180	240	2,6
240	300	3,1
300	400	3,5

Meranie tepelného odporu chladičov (R_{th})

Tepelný odpor chladičov elektronických súčiastok je dôležitý údaj pre konštruktérov elektronických zariadení, ktorý umožňuje optimálne navrhnúť odvod stratového tepla súčiastky pri dodržaní jej maximálnej dovolenej pracovnej teploty a to pri minimalizácii rozmerov chladiča. Pri jednoduchších geometrických tvaroch je možné stanoviť tepelný odpor chladiča s dostatočnou presnosťou aj výpočtom, no pre komplexnejšie tvary so zložitým obtekaním vzduchu okolo chladiča je často potrebné uskutočniť meranie tepelného odporu.

Definícia tepelného odporu

Tepelný odpor chladiča R_{th} je definovaný ako podiel rozdielu maximálnej teploty chladiča T_{ch} a teploty okolitého vzduchu T_v k tepelnému výkonu P rozptyľovaného chladičom do okolia v rovnovážnom stave:

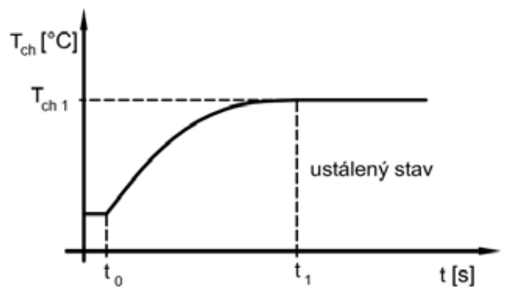
$$R_{th} = \frac{T_{ch} - T_v}{P}$$

Rovnovážny stav je stav, kedy dodávaný výkon do chladiča je rovný tepelnému výkonu rozptyľovaného chladičom do okolia. Z toho tiež vyplýva, že pri konštantnej teplote okolitého vzduchu sa teplota chladiča v rovnovážnom stave nemení. Ak tepelný výkon dodávaný chladiču je generovaný ako Joule-Lenzovo teplo vznikajúce ako tepelná strata na odpore R výhrevného telesa, ktorým preteká jednosmerný prúd I a vzniká na ňom úbytok napätia U, potom tepelný výkon dodávaný chladiču je rovný elektrickému výkonu dodávaného do výhrevného telesa:

$$P = U.I$$

Metóda merania

Do chladiča je pomocou elektrického výhrevného telesa počínajúc časom t_0 dodávaný zvolený elektrický výkon, ktorý je so 100% účinnosťou transformovaný ako Joule-Lenzovo teplo na tepelný výkon. Teplota chladiča postupne narastá až dosiahne plató, ktoré signalizuje dosiahnutie rovnovážneho stavu.



Grafické znázornenie priebehu nárastu teploty chladiča v čase

Za tohto stavu je dodávaný elektrický výkon do výhrevného telesa rovný tepelnému výkonu, ktorý je rozptyľovaný chladičom do okolia. Za ustáleného stavu sú odmerané všetky veličiny potrebné pre výpočet tepelného odporu a následne je tepelný odpor chladiča vypočítaný podľa vzorca:

$$R_{th} = \frac{T_{ch} - T_v}{U.I}$$

Pre jednoduchosť sa často v katalógoch s chladičmi udáva len jedna hodnota tepelného odporu *Rth*, zmeraná pri takom stratovom výkone, pri ktorom teplota chladiča za danej teploty okolitého vzduchu 20 °C dosiahne zvolenú hodnotu. Ak je chladič určený na chladenie bežných elektronických súčiastok, zvolenou hodnotou teploty býva najčastejšie teplota 75 °C.

Podmienky merania

- teplota chladiča 75 °C
- teplota okolitého vzduchu v rozsahu 20 až 22 °C
- tlak vzduchu v rozsahu 980 až 1020 hPa
- relatívna vlhkosť vzduchu 20 až 80 %
- normálne zloženie vzduchu (D 78%, O 21%, Ar 0,9%, CO_2 0,03%)
- meranie R_{th} bolo uskutočnené bez umelej akcelerácie prúdenia vzduchu v okolí chladiča
- teplota vzduchu bola meraná vo vzdialenosti 50 mm pod spodným okrajom chladiča
- pri meraní tepelného odporu boli chladiče umiestnené tak aby bolo zabezpečené maximálne samovoľné prúdenie zohriateho vzduchu

Namerané výsledky tepelného odporu sú platné za spomenutých podmienok merania !!!

Tepelné odpory uvádzané v katalógu sú len informatívne.

Merania tepelného odporu boli uskutočnené na zariadení vyvinutom v Ústave merania SAV Bratislava.

Measurement of heatsinks thermal resistance (R_{th})

Thermal resistance of electronic parts heatsinks represents important information for electronic equipment constructors that allows for optimum design of the part thermal loss outlet upon maintaining the maximum working temperature limit of the part and minimized heatsink dimensions. In case of simpler geometric dimensions, it is possible to determine the heatsink thermal resistance with accurate calculation but it is often required to measure thermal resistance in case of more complex shapes with complicated air flow around the heatsink.

Definition of thermal resistance

Thermal resistance of heatsink R_{th} is defined as a proportion of difference of maximum heatsink temperature T_{ch} and ambient temperature T_v to thermal output P dispersed by the heatsink to surrounding area in the state of equilibrium:

$$R_{th} = \frac{T_{ch} - T_v}{P}$$

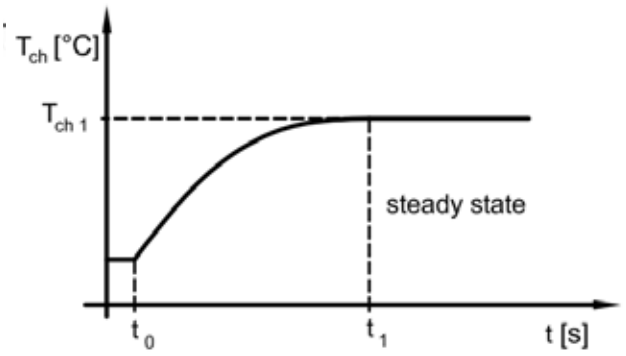
The state of equilibrium is a condition when power input in the heatsink equals to thermal output dispersed by the heatsink in surrounding area. Accordingly, heatsink temperature in the equilibrium status doesn't change at constant ambient temperature.
If thermal output supplied to the heatsink is generated as the Joule-Lenz heat generated as a thermal loss of heating body resistance R that DC current passes through/ voltage drop U occurs thereon, then thermal output supplied to the heatsink equals to electric output supplied to the heating body:

$$P = U.I$$

Measurement method

Selected electric output is supplied to the heatsink beginning at the time t_0, that is transformed as a Joule-Lenz heat to thermal output with 100% efficiency. The heatsink temperature gradually increases up to the level that signalizes reached equilibrium status..

In this condition, electric output supplied to heating body equals thermal output dispersed by the heatsink to the surrounding area. All parameters required to calculation of thermal resistance are measured at the status of equilibrium and subsequently, the heatsink thermal resistance is calculated according to the following formula:



Graphical illustration of heatsink temperature increase in real time.

$$R_{th} = \frac{T_{ch} - T_v}{U.I}$$

For simplification purposes, the catalogue with heatsink often specify only one value of thermal resistance *Rth*, measured at such output loss when the heatsink temperature at ambient temperature 20 °C reaches the selected value. If a heatsink is intended to cool down common electronic parts, chosen temperature usually refers to 75 °C.

Measurement terms

- Heatsink temperature 75 °C
- Ambient temperature variance within 20 - 22 °C
- Air pressure within 980 - 1020 hPa
- Relative air humidity within 20 - 80 %
- Standard air composition (D 78%, O 21%, Ar 0,9%, CO_2 0,03%)
- Measurement of R_{th} was conducted without artificial air flow acceleration around the heatsink
- Air temperature was measured at distance 50 mm under the bottom heatsink edge
- During thermal resistance measurement, the heatsinks were located so as maximum self-flowing of heated air was ensured.

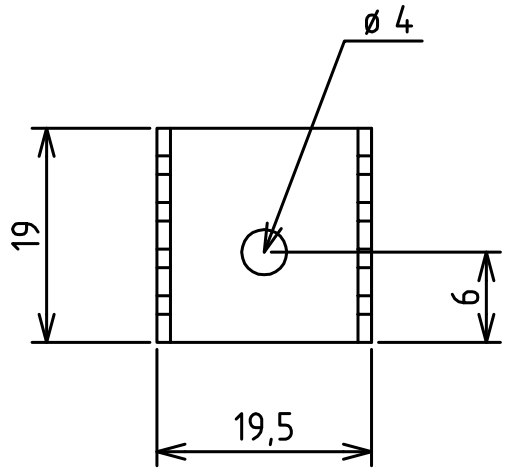
Measured values of thermal resistance are valid upon the above-mentioned measurement conditions.

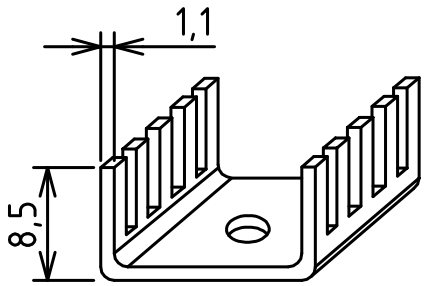
Thermal resistance values stated in the catalogue are only of information nature.
Currently, new measurements are conducted and the measurement values will be gradually completed.

Thermal resistance measurements were conducted with the equipment developed by the Measurement Institution, the Slovak Academy of Sciences in Bratislava

ST-TE19

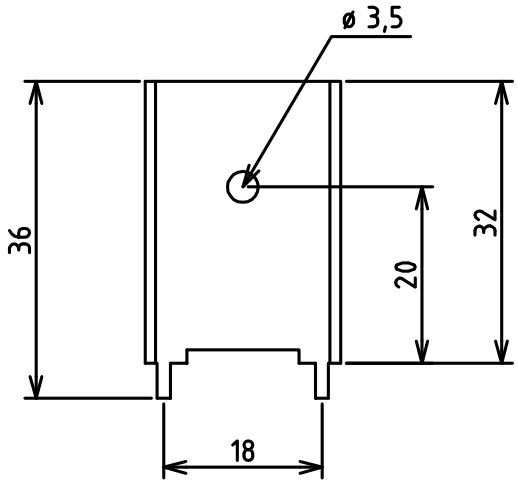
Povrchová úprava / Surface treatment : **čierny / black elox** Rth: 55,0 °C/W

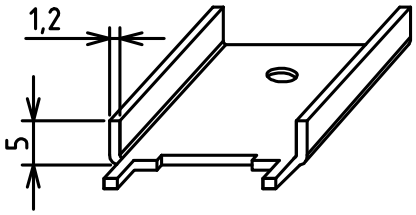




ST-T22

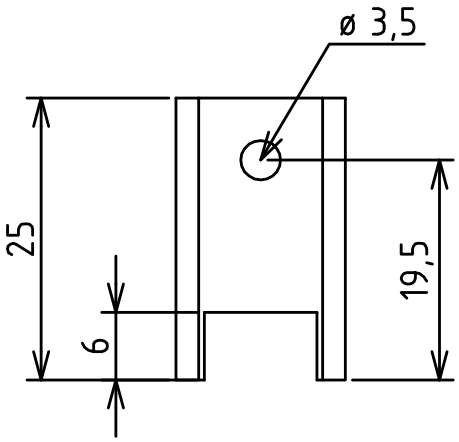
Povrchová úprava / Surface treatment : **čierny / black elox** Rth: 22,0 °C/W

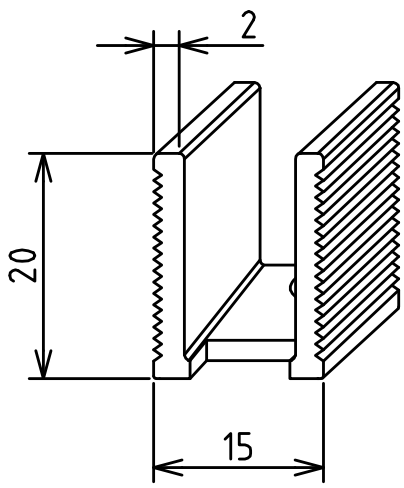




ST-T25A

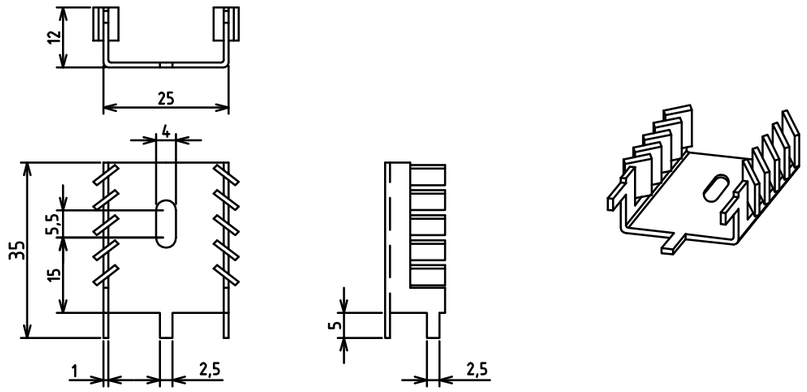
Povrchová úprava / Surface treatment : **čierny / black elox** Rth: 18,0 °C/W





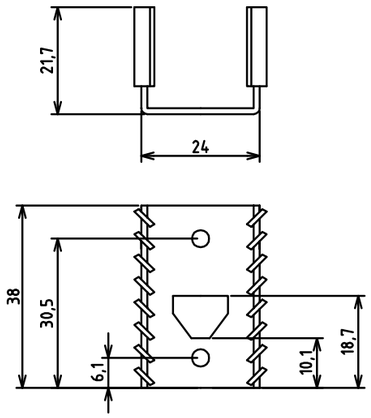
ST-TE28

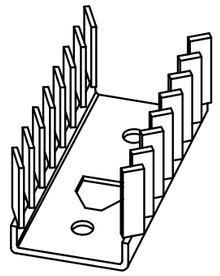
Povrchová úprava / Surface treatment : **čierny / black elox** Rth: 14,0 °C/W



ST-TEA28

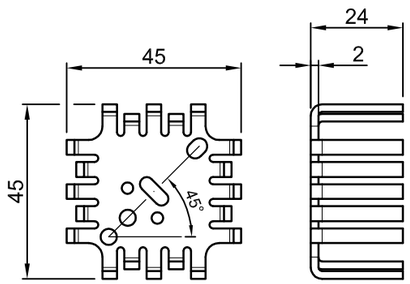
Povrchová úprava / Surface treatment : **čierny / black elox** Rth: 15,0 °C/W

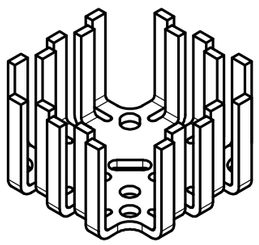




ST- 45MF

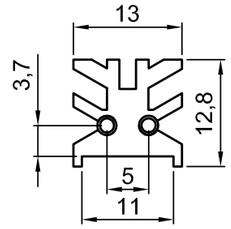
Povrchová úprava / Surface treatment : **čierny / black elox** Rth: 7,7 °C/W

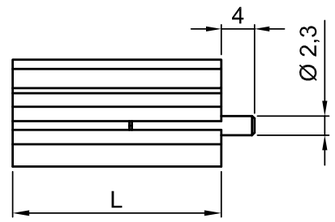


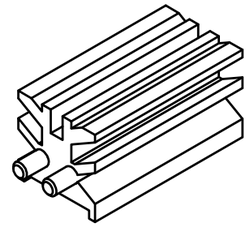


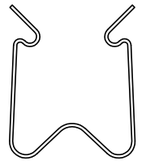
ST-T13/typ

Povrchová úprava / Surface treatment : **čierny / black elox** Rth: 8,2 °C/W







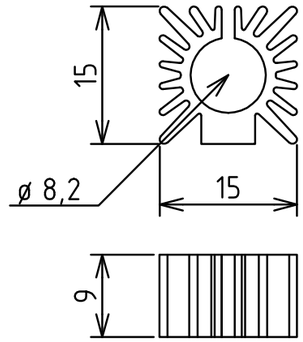


MOLLA T13

typ	L
25N	25
32N	32

ST-T19

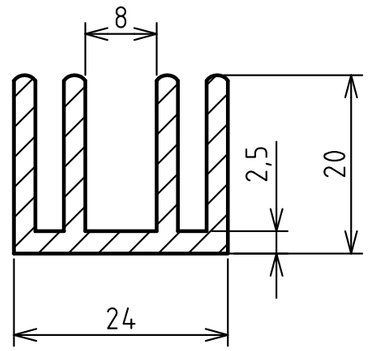
Povrchová úprava / Surface treatment : **čierny / black elox** Rth: 55,0 °C/W

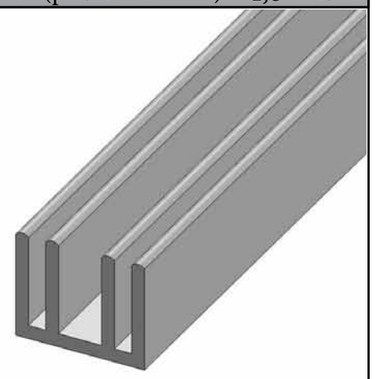


Povrchová úprava / Surface treatment : **čierny / black elox** Rth: °C/W

HY 25417

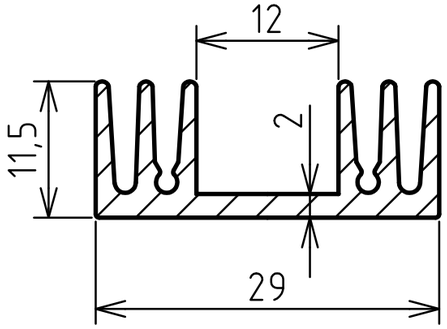
hmotnosť / weight: 0,54 kg/m obvod / perimeter: 190 mm Rth (pre/for 100 mm): 4,8 °C/W

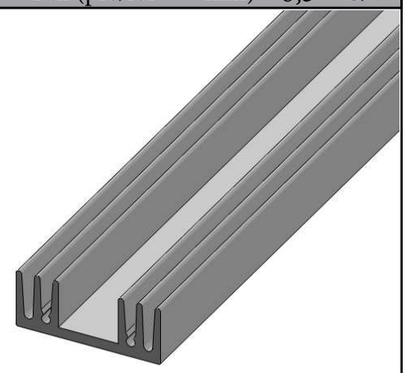




ZH 9025

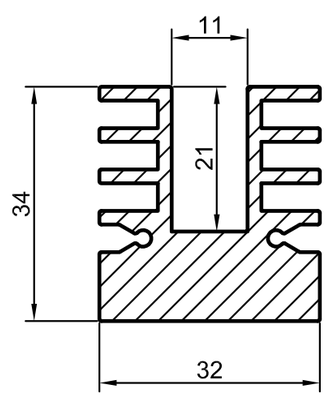
hmotnosť / weight: 0,38 kg/m obvod / perimeter: 167 mm Rth (pre/for 100 mm): 6,3 °C/W

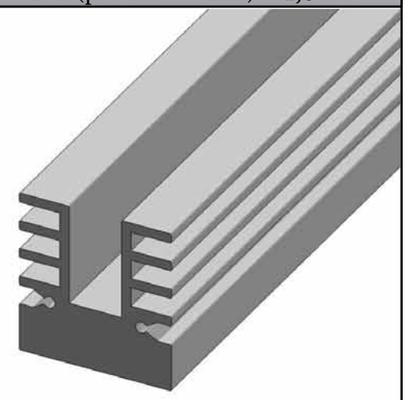




ZH 7503

hmotnosť / weight: 1,65 kg/m obvod / perimeter: 300 mm Rth (pre/for 100 mm): 4,0 °C/W

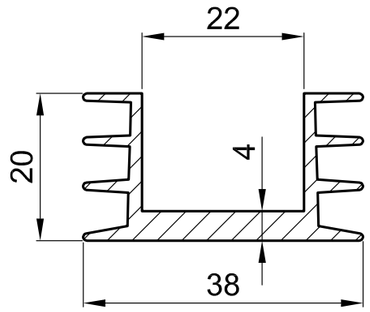


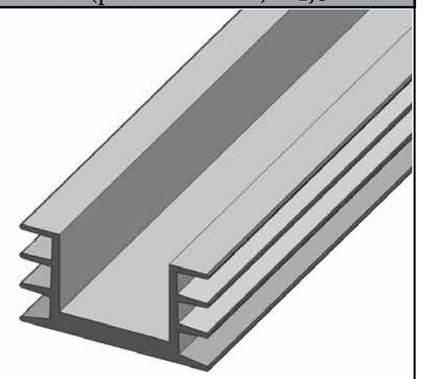


T 38

hmotnosť / weight: 0,62 kg/m obvod / perimeter: 216 mm Rth (pre/for 100 mm): 4,6 °C/W

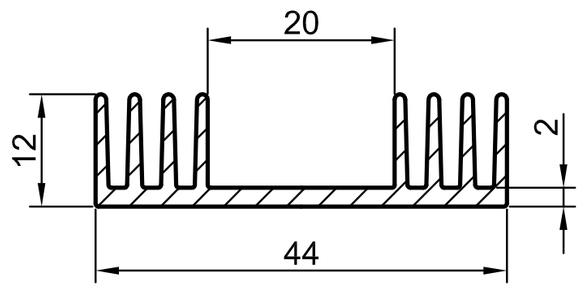
*

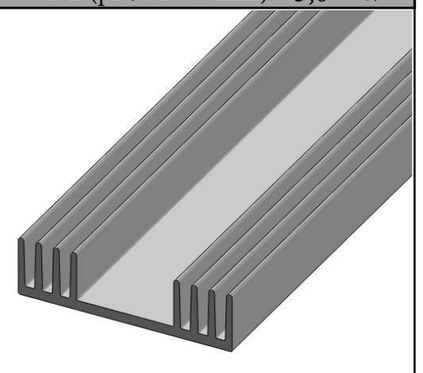




ZH 8662

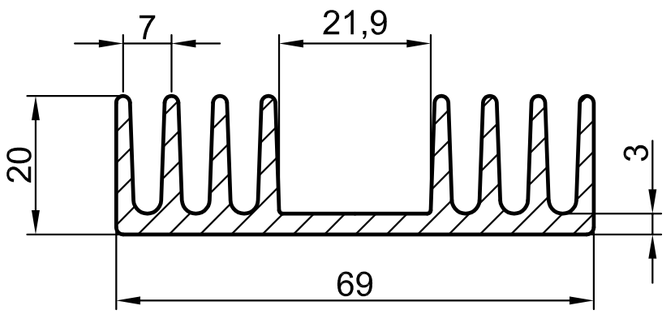
hmotnosť / weight: 0,52 kg/m obvod / perimeter: 243 mm Rth (pre/for 100 mm): 5,0 °C/W

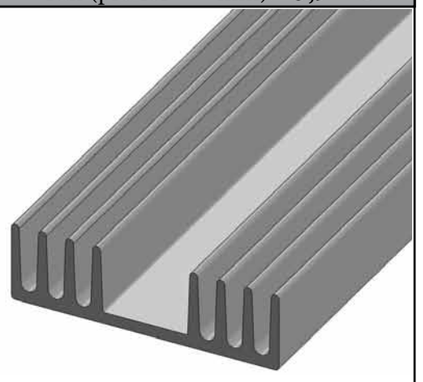




ZH 1136

hmotnosť / weight: 1,49 kg/m obvod / perimeter: 389 mm Rth (pre/for 100 mm): 3,9 °C/W

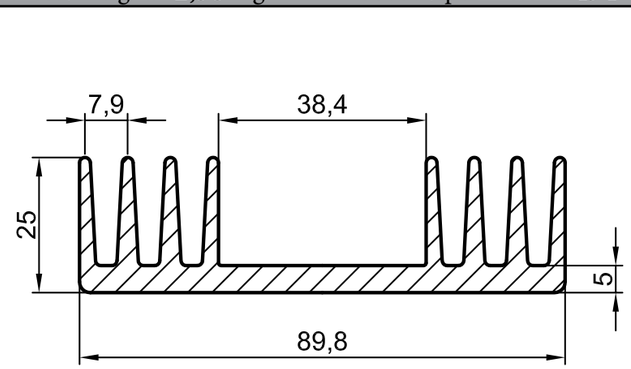


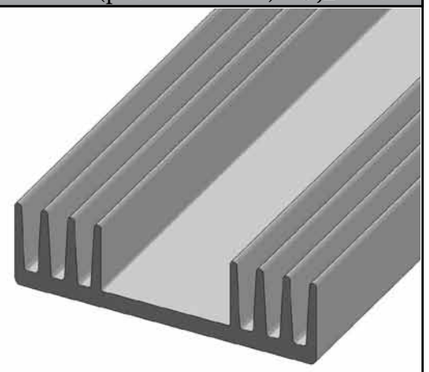


* Profily môžu mať iný vzhľad rebier, rozostupy rebier, prípadne hrúbku základne. Informujte sa prosím o aktuálnom stave pred objednaním.
The profiles can have a different visage of ribs, spacing of the ribs or thickness of the base. Please, inquire about the current state before ordering.

ZH 1910

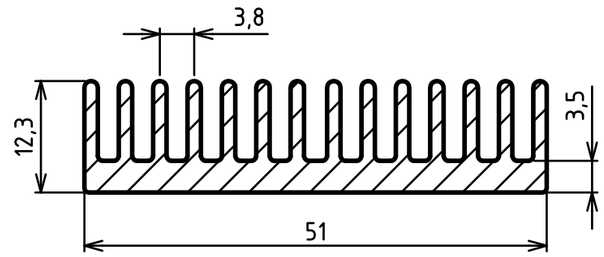
hmotnosť / weight: 2,38 kg/m obvod / perimeter: 494 mm Rth (pre/for 100 mm): 3,2 °C/W

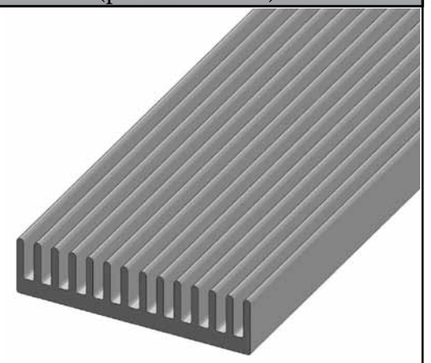




ZH 9152

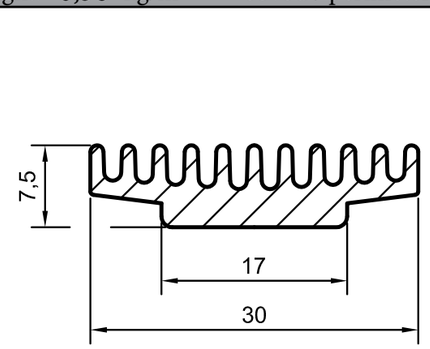
hmotnosť / weight: 0,98 kg/m obvod / perimeter: 340 mm Rth (pre/for 100 mm): -- °C/W

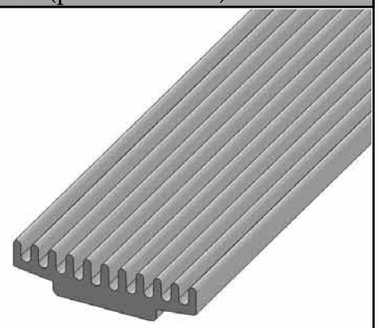




ZH 6681

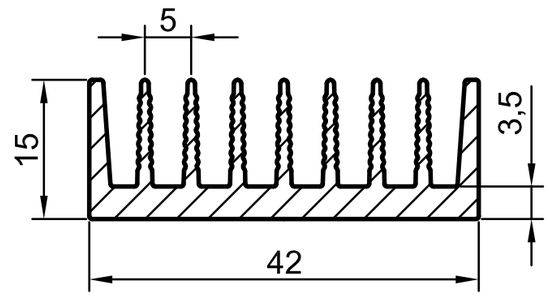
hmotnosť / weight: 0,36 kg/m obvod / perimeter: 129 mm Rth (pre/for 100 mm): -- °C/W

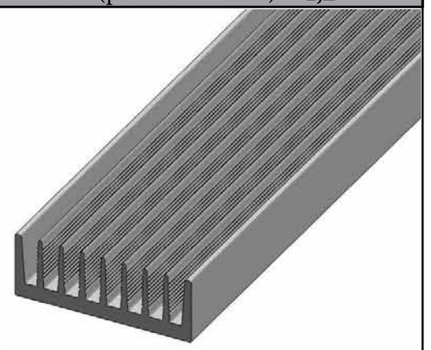




ZH 8624

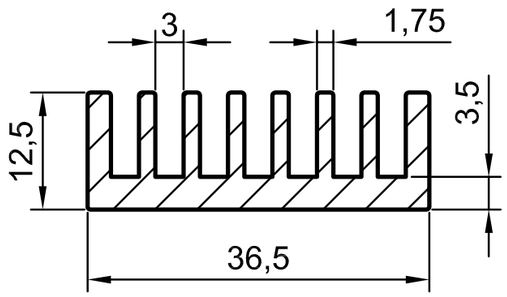
hmotnosť / weight: 0,79 kg/m obvod / perimeter: 298 mm Rth (pre/for 100 mm): 4,2 °C/W

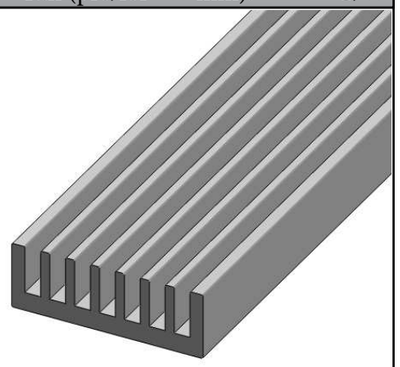




ZH 8889

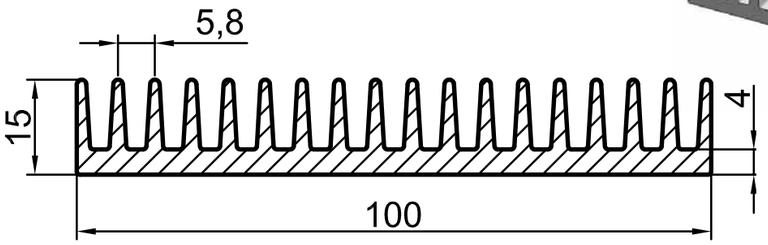
hmotnosť / weight: 0,72 kg/m obvod / perimeter: 222 mm Rth (pre/for 100 mm): -- °C/W

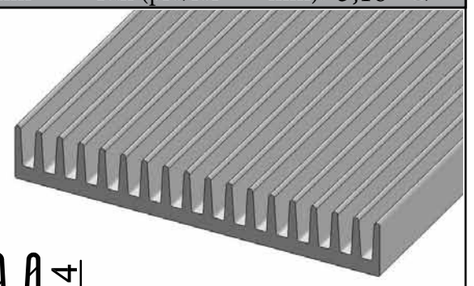




ZH 8501

hmotnosť / weight: 2,17 kg/m obvod / perimeter: 566 mm Rth (pre/for 100 mm): 3,16 °C/W

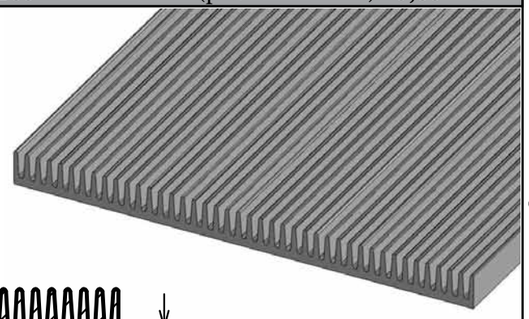


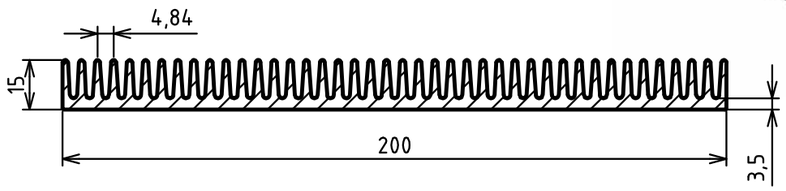


KK 200

hmotnosť / weight: 4,73 kg/m obvod / perimeter: 1 265 mm Rth (pre/for 150 mm): 0,85 °C/W

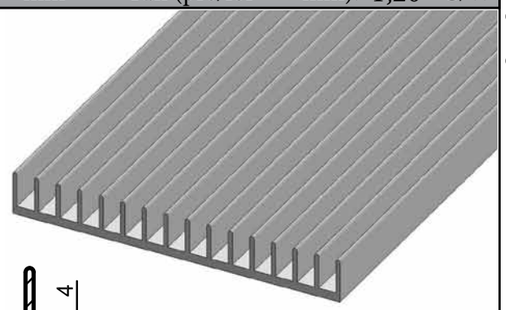
*

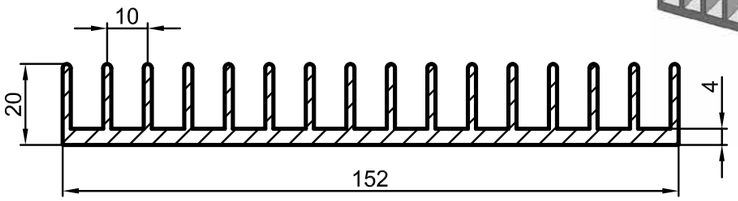




ZH 6465

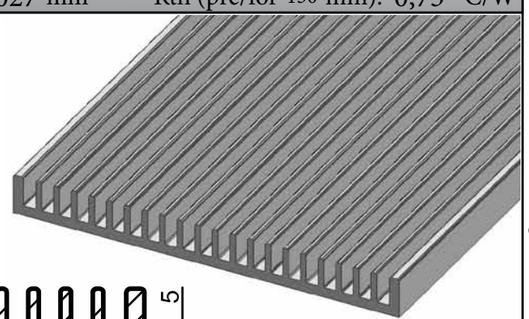
hmotnosť / weight: 3,01 kg/m obvod / perimeter: 809 mm Rth (pre/for 100 mm): 1,20 °C/W

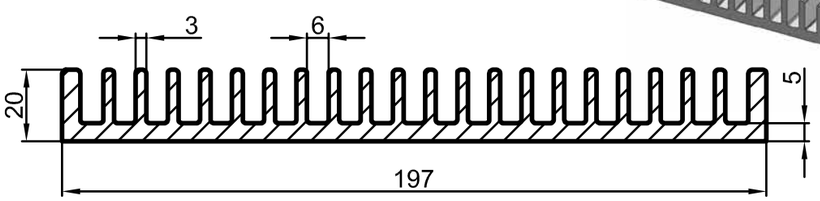




K 197

hmotnosť / weight: 5,80 kg/m obvod / perimeter: 1 027 mm Rth (pre/for 150 mm): 0,75 °C/W

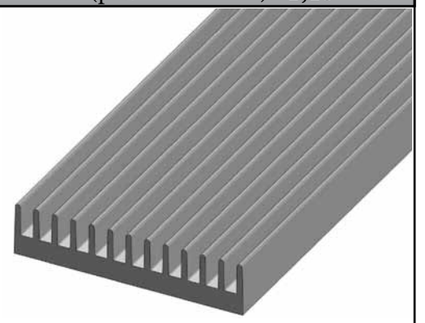


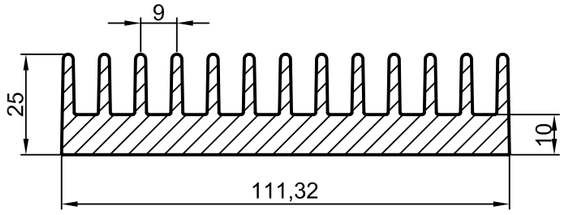


* Profily môžu mať iný vzhľad rebier, rozostupy rebier, prípadne hrúbku základne. Informujte sa prosím o aktuálnom stave pred objednaním.
The profiles can have a different visage of ribs, spacing of the ribs or thickness of the base. Please, inquire about the current state before ordering.

ZH 0610

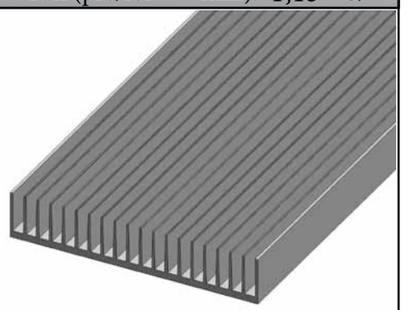
hmotnosť / weight: 4,43 kg/m obvod / perimeter: 607 mm Rth (pre/for 100 mm): 1,15 °C/W

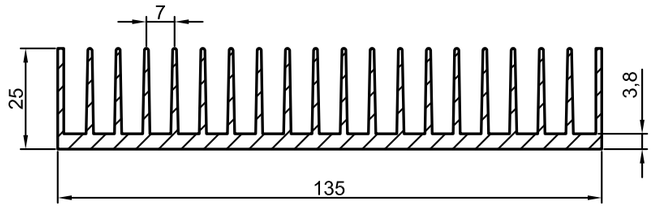




K 135

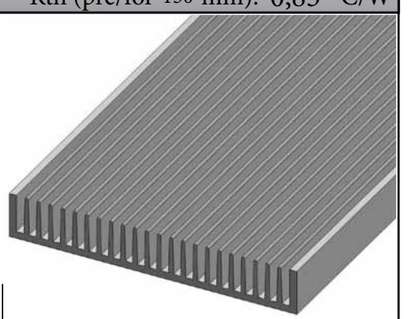
hmotnosť / weight: 3,10 kg/m obvod / perimeter: 1 104 mm Rth (pre/for 100 mm): 1,15 °C/W

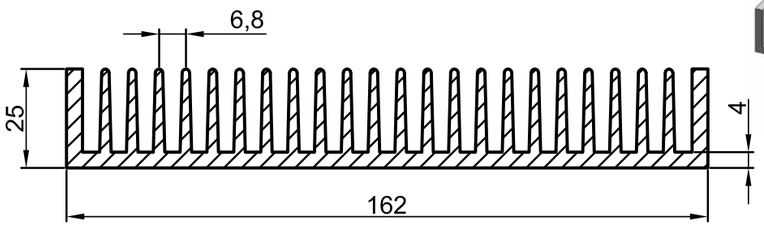




K 163

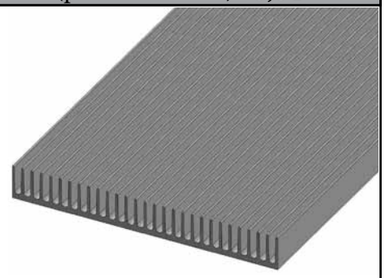
hmotnosť / weight: 5,20 kg/m obvod / perimeter: 1 300 mm Rth (pre/for 150 mm): 0,85 °C/W

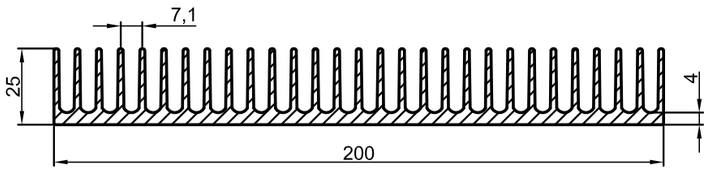




KEAH 200

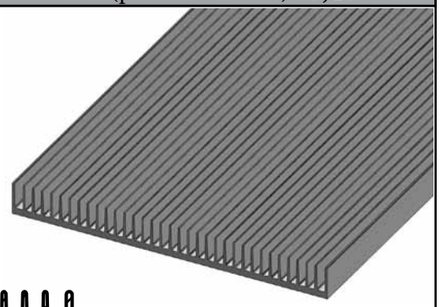
hmotnosť / weight: 5,50 kg/m obvod / perimeter: 1 542 mm Rth (pre/for 150 mm): 0,64 °C/W

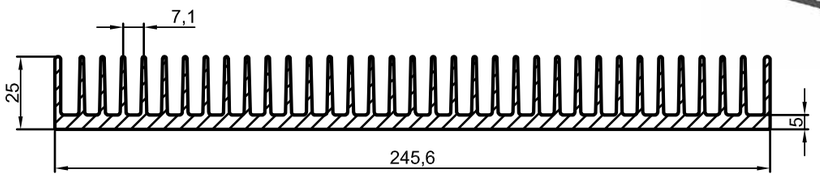




K 245

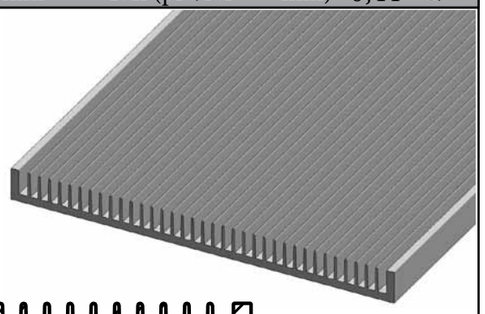
hmotnosť / weight: 6,60 kg/m obvod / perimeter: 1 831 mm Rth (pre/for 150 mm): 0,43 °C/W

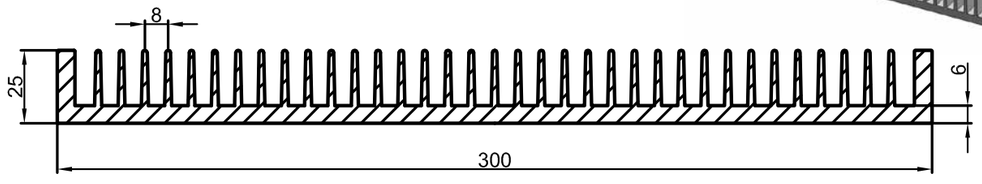




KEA 300

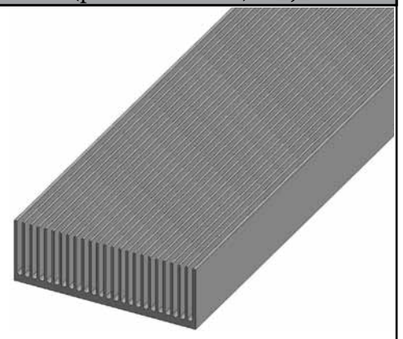
hmotnosť / weight: 9,10 kg/m obvod / perimeter: 1 968 mm Rth (pre/for 150 mm): 0,44 °C/W

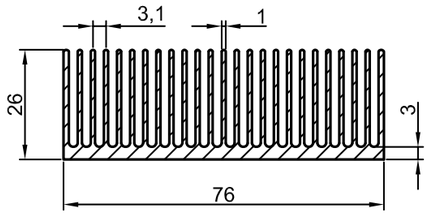




K 76

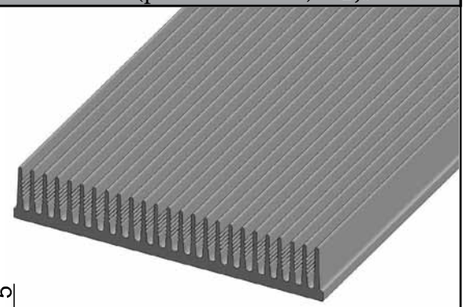
hmotnosť / weight: 2,23 kg/m obvod / perimeter: 1 277 mm Rth (pre/for 100 mm): 2,2 °C/W

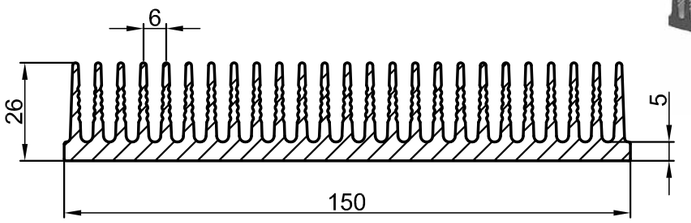




ZH 8001

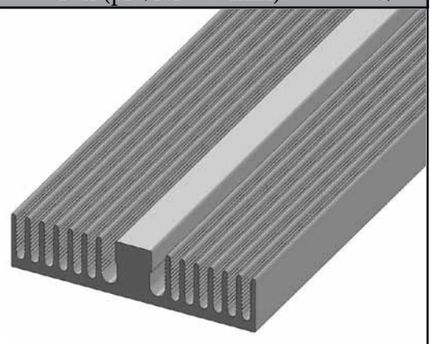
hmotnosť / weight: 4,96 kg/m obvod / perimeter: 1 328 mm Rth (pre/for 100 mm): 1,3 °C/W

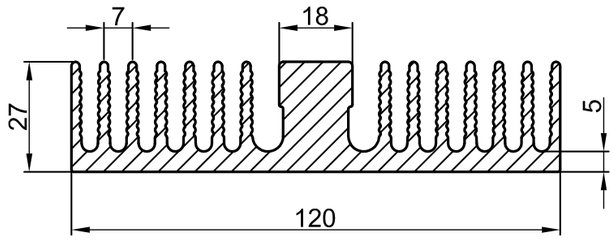




ZH 7771

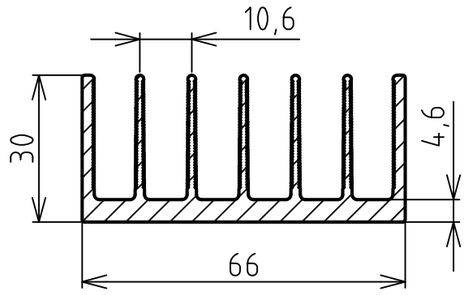
hmotnosť / weight: 4,81 kg/m obvod / perimeter: 953 mm Rth (pre/for 100 mm): -- °C/W

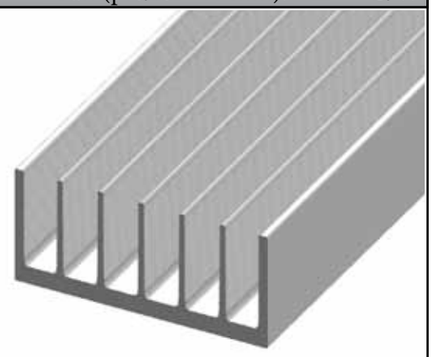




ZH 9250

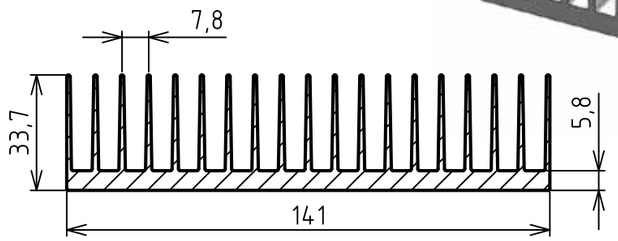
hmotnosť / weight: 1,70 kg/m obvod / perimeter: 629 mm Rth (pre/for 100 mm): -- °C/W

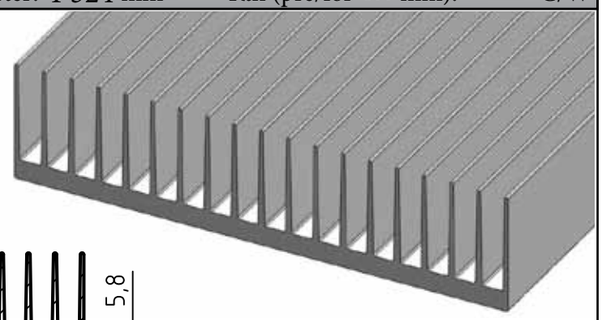




ZH 9481

hmotnosť / weight: 4,17 kg/m obvod / perimeter: 1 324 mm Rth (pre/for 100 mm): -- °C/W



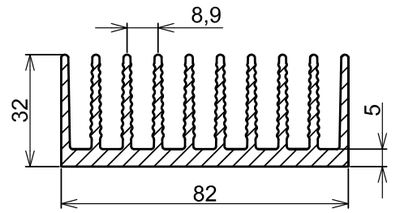


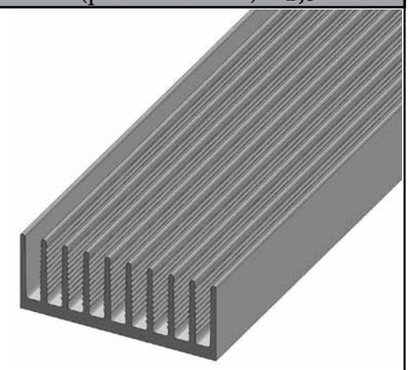
hmotnosť / weight: kg/m obvod / perimeter: mm Rth (pre/for mm): °C/W

HY 25346

hmotnosť / weight: 2,87 kg/m obvod / perimeter: 806 mm Rth (pre/for 100 mm): 1,5 °C/W

*



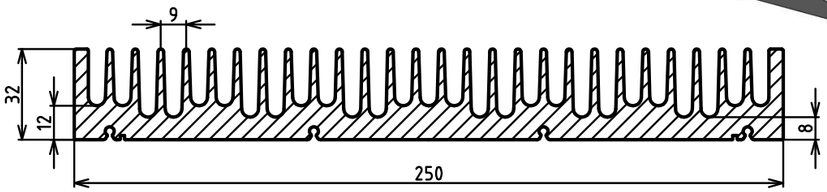


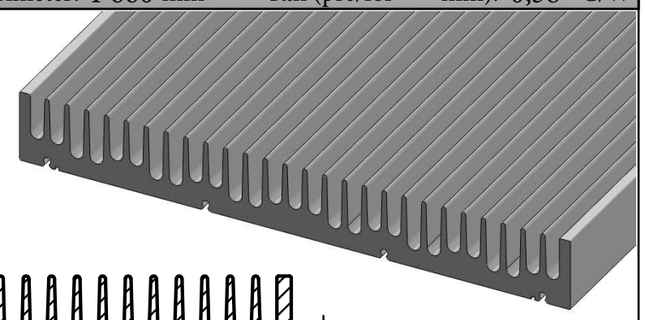
Profily môžu mať iný vzhľad rebier, rozostupy rebier, prípadne hrúbku základne. Informujte sa prosím o aktuálnom stave pred objednaním.
The profiles can have a different visage of ribs, spacing of the ribs or thickness of the base. Please, inquire about the current state before ordering.

*

ZH 4185

hmotnosť / weight: 11,53 kg/m obvod / perimeter: 1 660 mm Rth (pre/for 100 mm): 0,58 °C/W

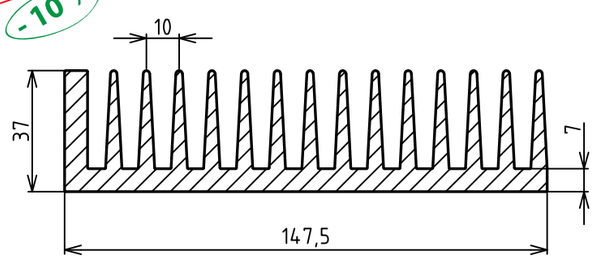


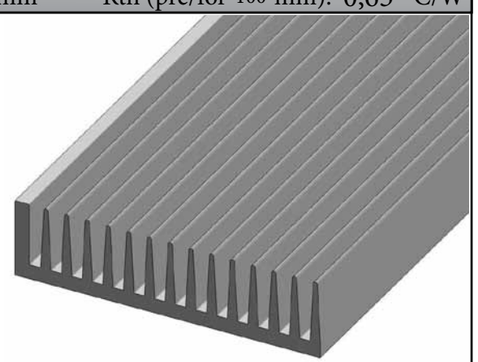


ZH 5073

hmotnosť / weight: 7,28 kg/m obvod / perimeter: 1 152 mm Rth (pre/for 100 mm): 0,65 °C/W

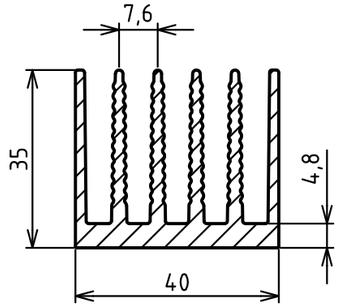
Dopredaj
Bargain Sale
- 10 %

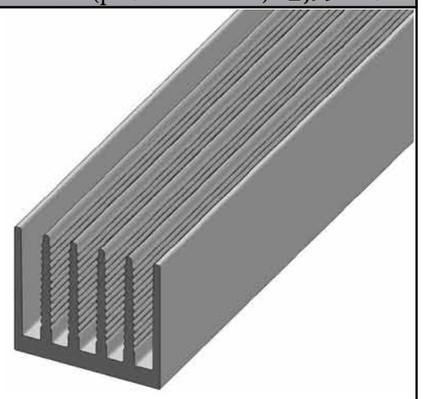




ZH 7485

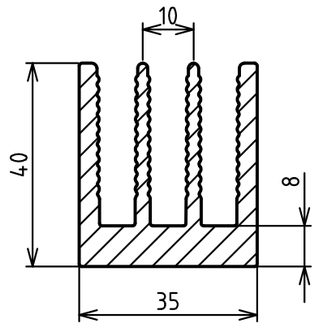
hmotnosť / weight: 1,59 kg/m obvod / perimeter: 458 mm Rth (pre/for 100 mm): 2,79 °C/W

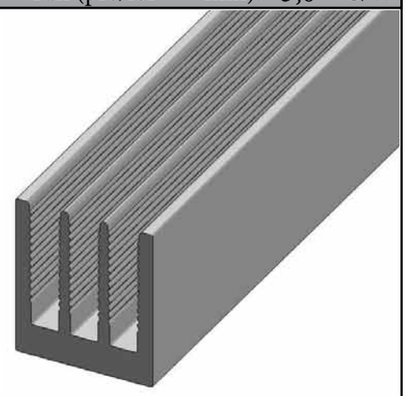




ZH 7770

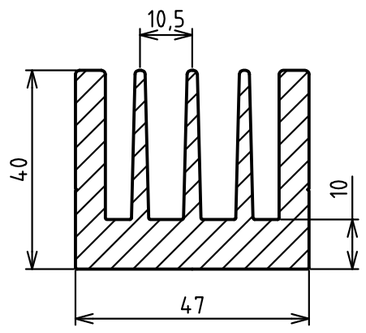
hmotnosť / weight: 1,85 kg/m obvod / perimeter: 352 mm Rth (pre/for 100 mm): 3,0 °C/W

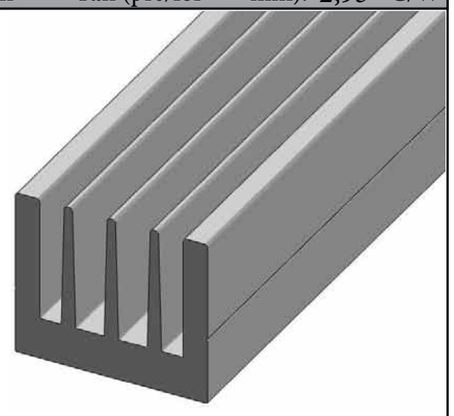




ZH 6789

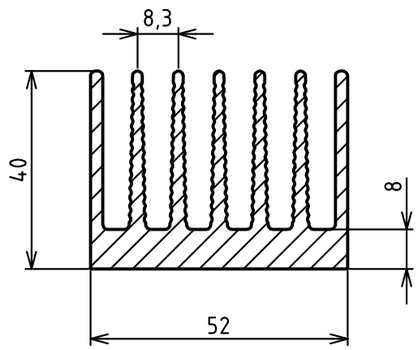
hmotnosť / weight: 2,91 kg/m obvod / perimeter: 405 mm Rth (pre/for 100 mm): 2,93 °C/W

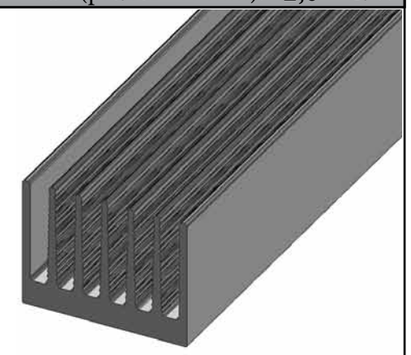




HY 25345

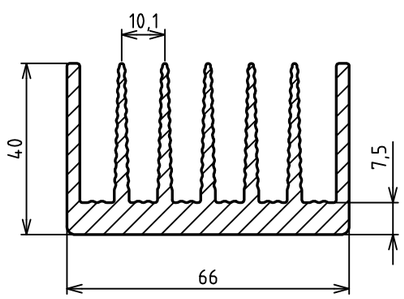
hmotnosť / weight: 2,50 kg/m obvod / perimeter: 571 mm Rth (pre/for 100 mm): 2,0 °C/W

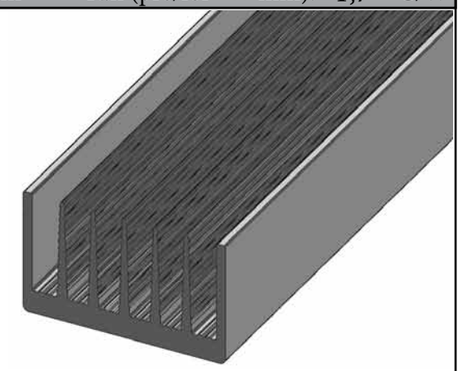




K 66

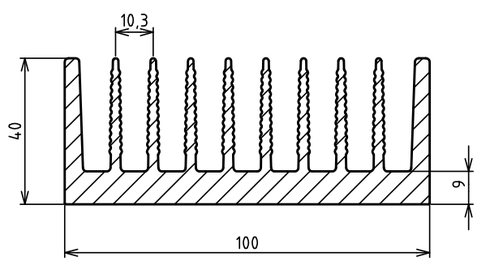
hmotnosť / weight: 2,95 kg/m obvod / perimeter: 597 mm Rth (pre/for 100 mm): 1,7 °C/W

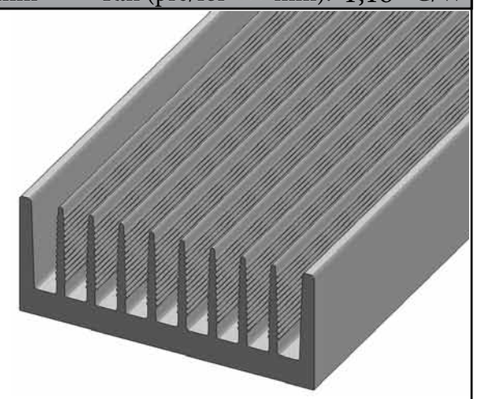




ZH 7484

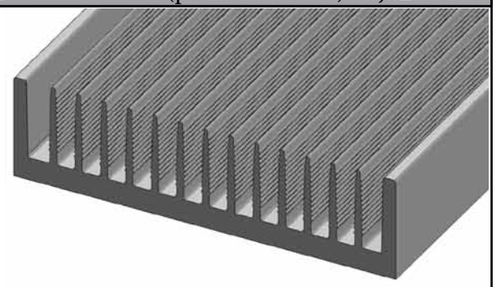
hmotnosť / weight: 4,86 kg/m obvod / perimeter: 846 mm Rth (pre/for 100 mm): 1,18 °C/W

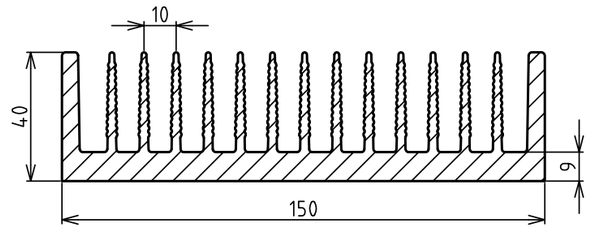




IT 5498

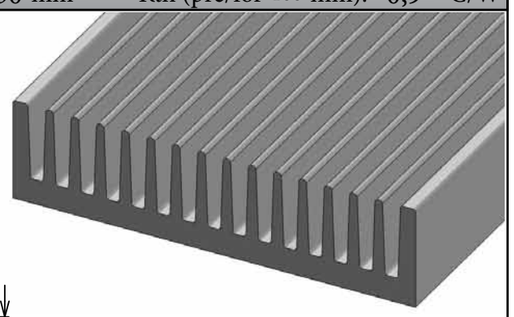
hmotnosť / weight: 7,85 kg/m obvod / perimeter: 1 261 mm Rth (pre/for 150 mm): 0,62 °C/W

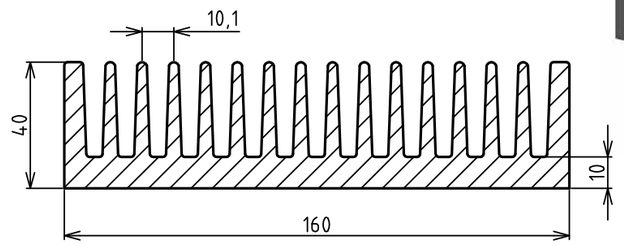




IT 5303

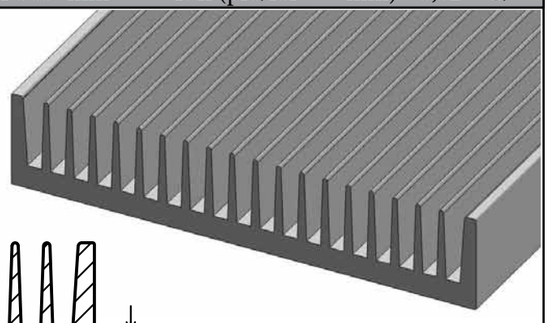
hmotnosť / weight: 9,32 kg/m obvod / perimeter: 1 250 mm Rth (pre/for 100 mm): 0,9 °C/W

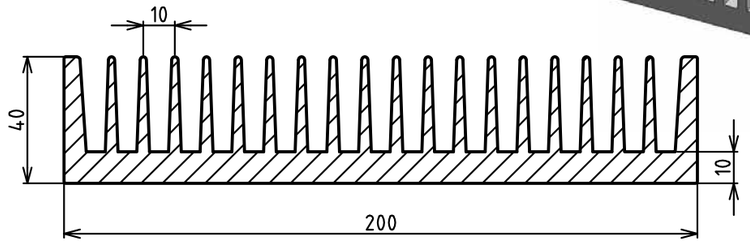




K 200

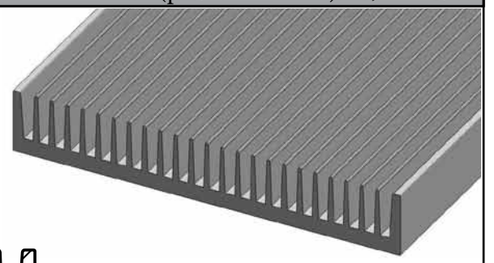
hmotnosť / weight: 10,68 kg/m obvod / perimeter: 1 565 mm Rth (pre/for 150 mm): 0,52 °C/W

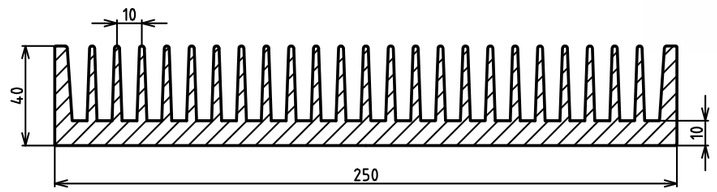




K 250

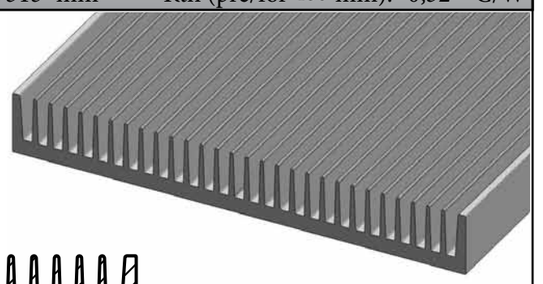
hmotnosť / weight: 13,23 kg/m obvod / perimeter: 1 951 mm Rth (pre/for 150 mm): 0,41 °C/W

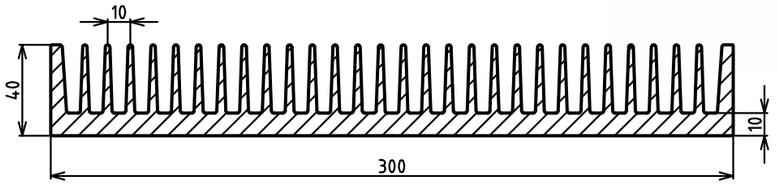




K 300

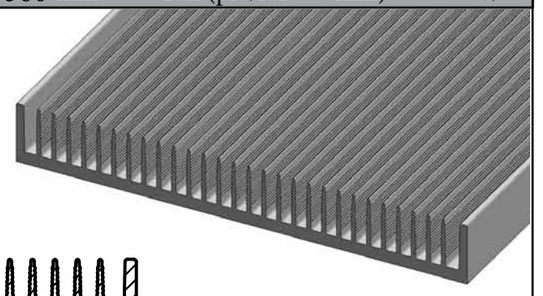
hmotnosť / weight: 15,73 kg/m obvod / perimeter: 2 315 mm Rth (pre/for 150 mm): 0,32 °C/W

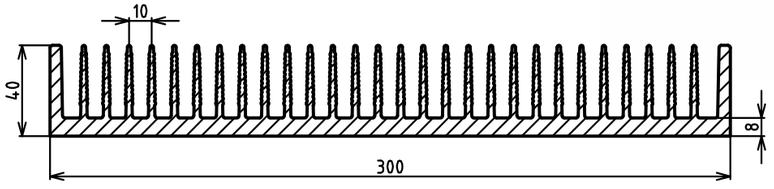




IT 4377

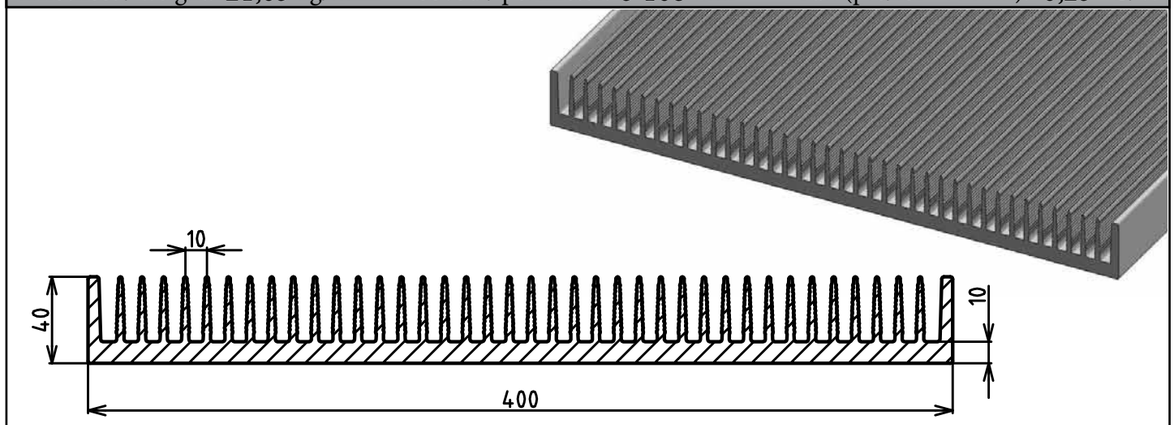
hmotnosť / weight: 14,60 kg/m obvod / perimeter: 2 560 mm Rth (pre/for 100 mm): -- °C/W





K 400

hmotnosť / weight: 21,03 kg/m obvod / perimeter: 3 108 mm Rth (pre/for 150 mm): 0,25 °C/W

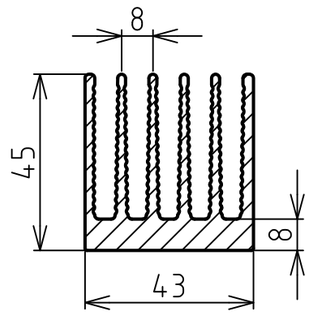


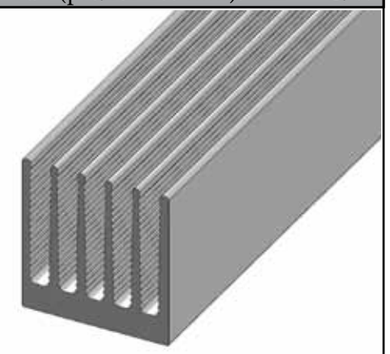
hmotnosť / weight: kg/m obvod / perimeter: mm Rth (pre/for mm): °C/W

hmotnosť / weight: kg/m obvod / perimeter: mm Rth (pre/for mm): °C/W

ZH 9238

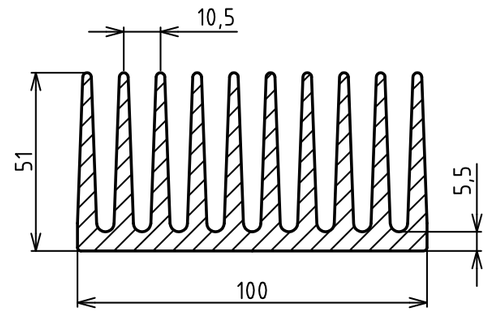
hmotnosť / weight: 2,34 kg/m obvod / perimeter: 566 mm Rth (pre/for 100 mm): -- °C/W

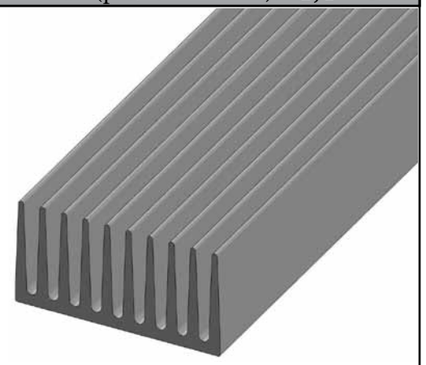




ZH 2533

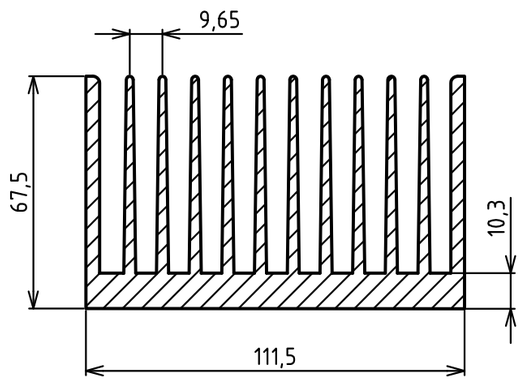
hmotnosť / weight: 6,52 kg/m obvod / perimeter: 1 060 mm Rth (pre/for 100 mm): 1,4 °C/W

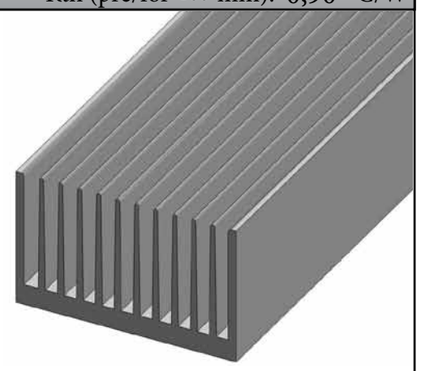




K 112

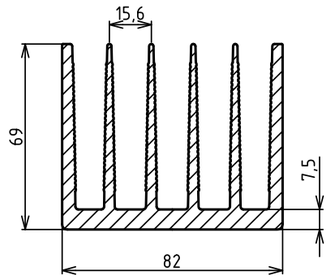
hmotnosť / weight: 8,70 kg/m obvod / perimeter: 1 588 mm Rth (pre/for 100 mm): 0,90 °C/W

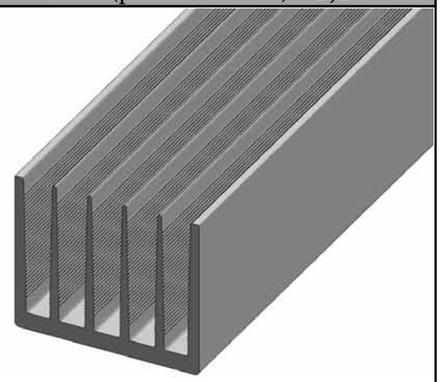




ZH 8708

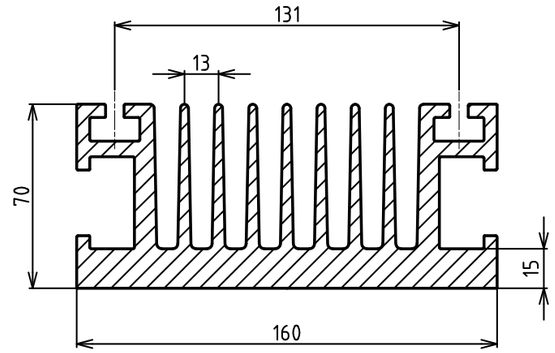
hmotnosť / weight: 5,20 kg/m obvod / perimeter: 937 mm Rth (pre/for 100 mm): 1,1 °C/W

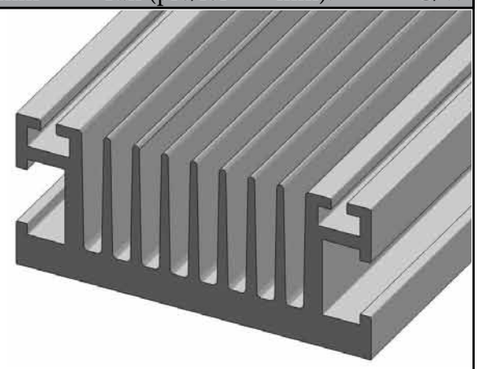




ZH 3197

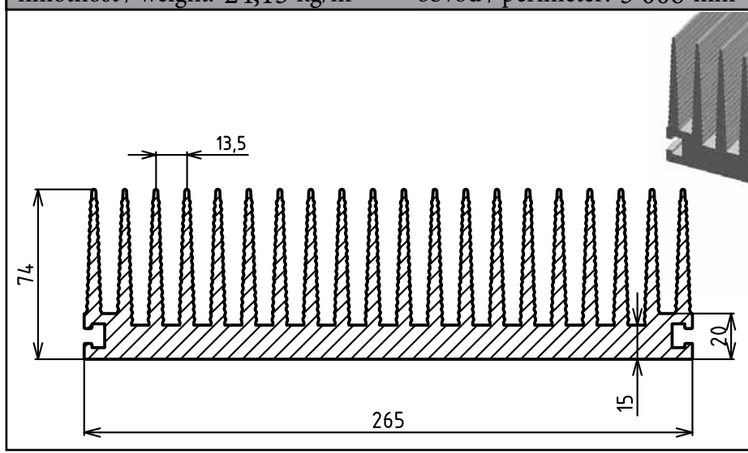
hmotnosť / weight: 14,59 kg/m obvod / perimeter: 1 526 mm Rth (pre/for 100 mm): -- °C/W

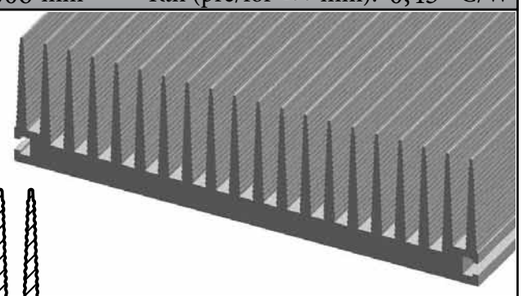




IT 0265

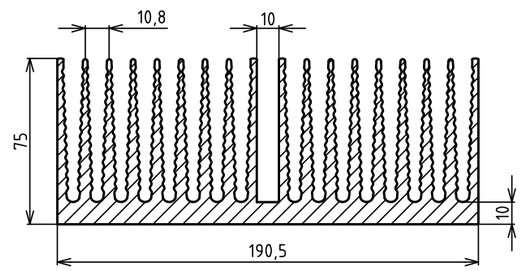
hmotnosť / weight: 24,13 kg/m obvod / perimeter: 3 006 mm Rth (pre/for 150 mm): 0,45 °C/W

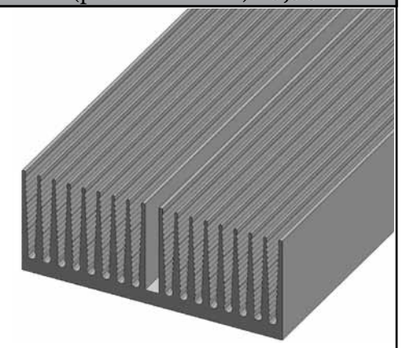




KE 190

hmotnosť / weight: 16,50 kg/m obvod / perimeter: 2 887 mm Rth (pre/for 150 mm): 0,36 °C/W

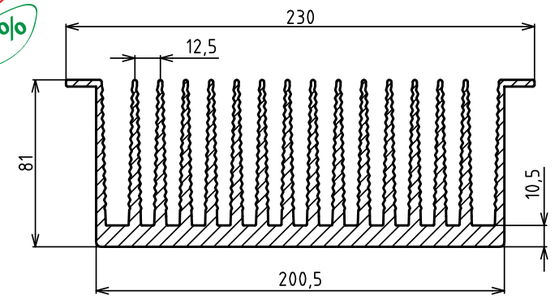


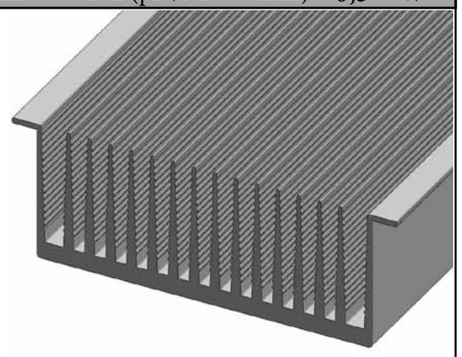


K 230

hmotnosť / weight: 17,50 kg/m obvod / perimeter: 2 895 mm Rth (pre/for 150 mm): 0,3 °C/W

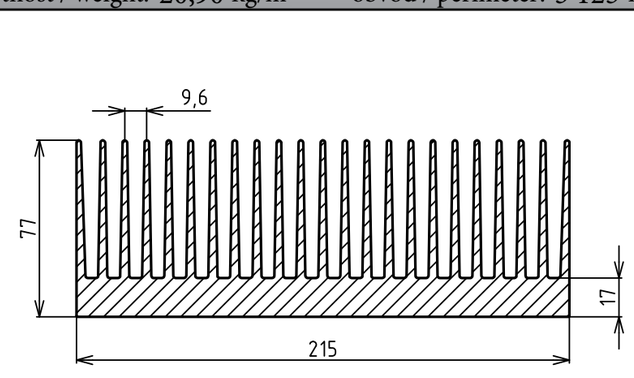
Dopredaj
Bargain Sale
-10 %

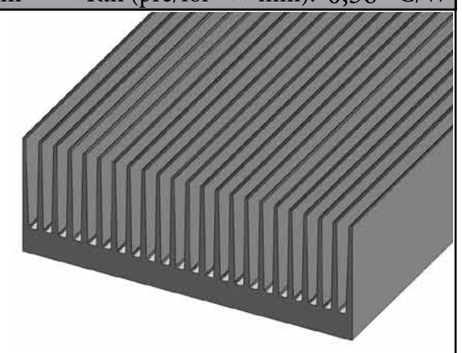




KE 215

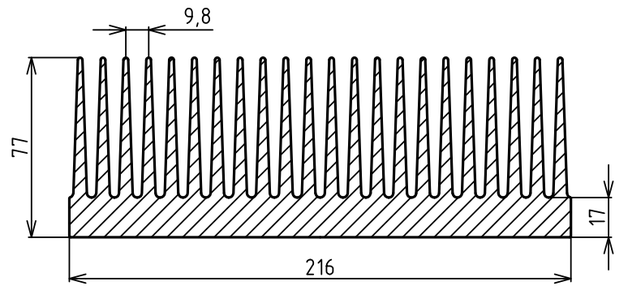
hmotnosť / weight: 20,90 kg/m obvod / perimeter: 3 125 mm Rth (pre/for 150 mm): 0,36 °C/W

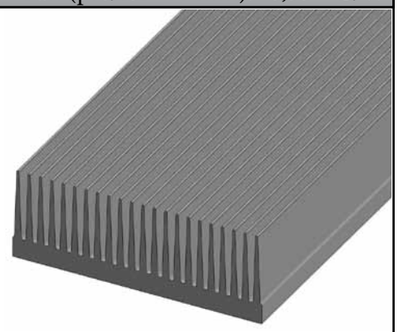




K 216

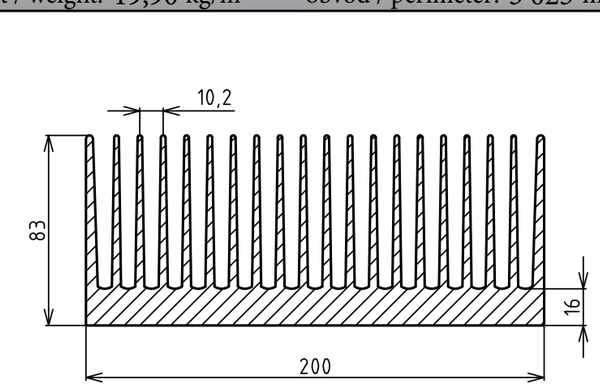
hmotnosť / weight: 24,00 kg/m obvod / perimeter: 2 966 mm Rth (pre/for 150 mm): 0,35 °C/W

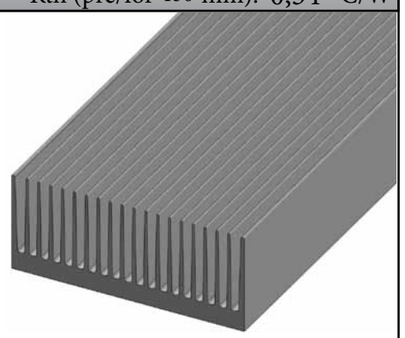




KA 200

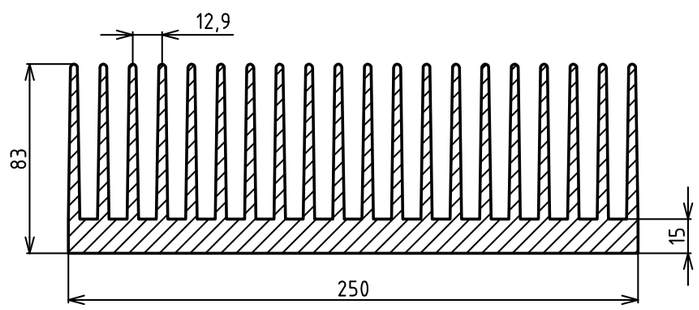
hmotnosť / weight: 19,90 kg/m obvod / perimeter: 3 025 mm Rth (pre/for 150 mm): 0,34 °C/W

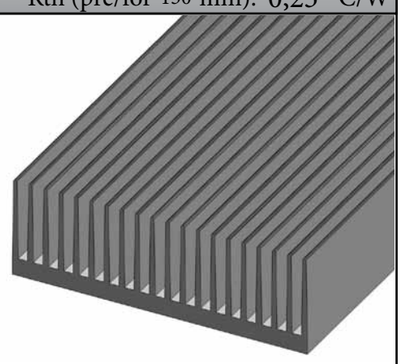




KX 250

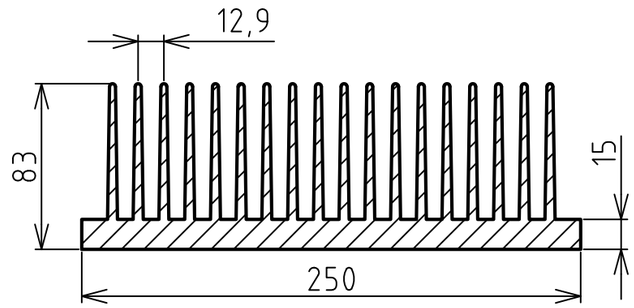
hmotnosť / weight: 25,10 kg/m obvod / perimeter: 3 186 mm Rth (pre/for 150 mm): 0,23 °C/W

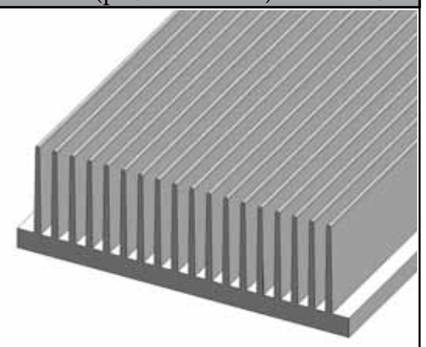




KY 250

hmotnosť / weight: 23,23 kg/m obvod / perimeter: 2 919 mm Rth (pre/for 150 mm): -- °C/W



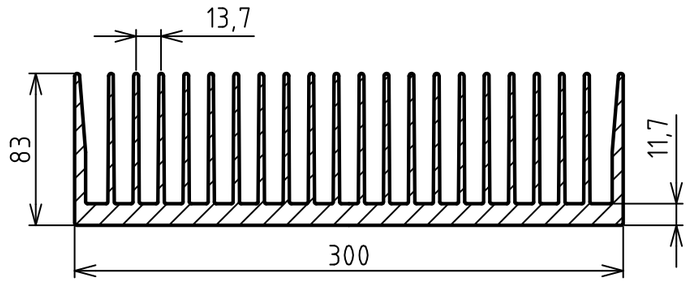


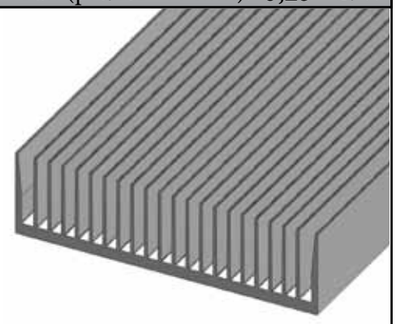
hmotnosť / weight: kg/m obvod / perimeter: mm Rth (pre/for mm): °C/W

hmotnosť / weight: kg/m obvod / perimeter: mm Rth (pre/for mm): °C/W

KE 300

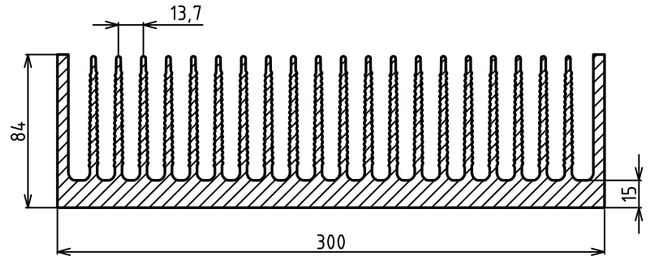
hmotnosť / weight: 23,08 kg/m obvod / perimeter: 3 695 mm Rth (pre/for 150 mm): 0,23 °C/W

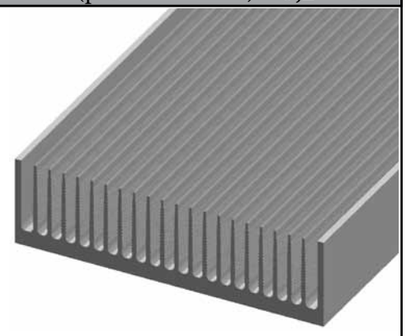




KX 300

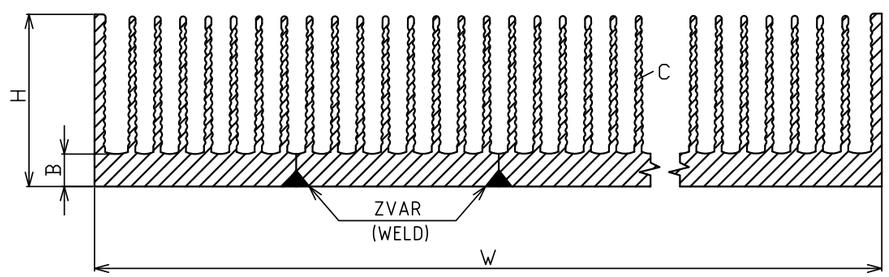
hmotnosť / weight: 28,45 kg/m obvod / perimeter: 3 745 mm Rth (pre/for 150 mm): 0,2 °C/W





zváraný chladič / welded heatsink

hmotnosť / weight: kg/m obvod / perimeter: mm Rth (pre/for mm): °C/W



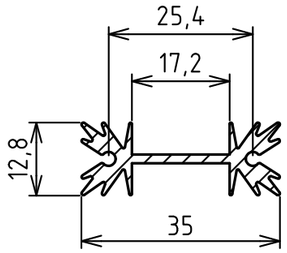
W - šírka podľa požiadavky / width as required

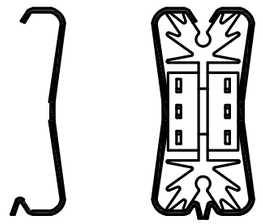
B, C, H - podľa typu použitého chladiča / according to a type of used heatsink

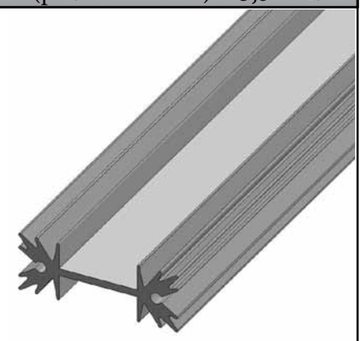
Chladiče sú zvárané na robotizovanom pracovisku / Heatsinks are welded at robotic workstation

TEA 35

hmotnosť / weight: 0,40 kg/m obvod / perimeter: 185 mm Rth (pre/for 50 mm): 8,5 °C/W



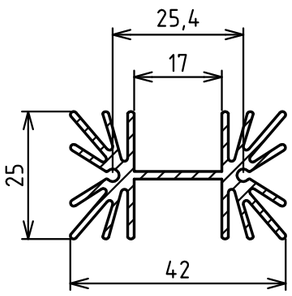


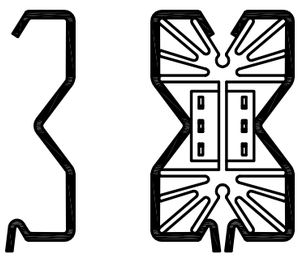


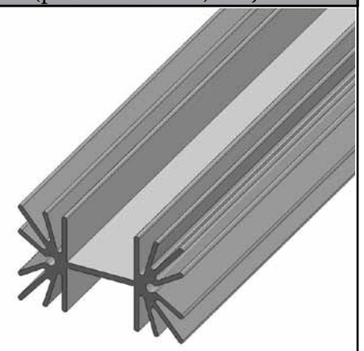
CLIP TEA 35

TEA 40

hmotnosť / weight: 0,74 kg/m obvod / perimeter: 377 mm Rth (pre/for 50 mm): 6,0 °C/W



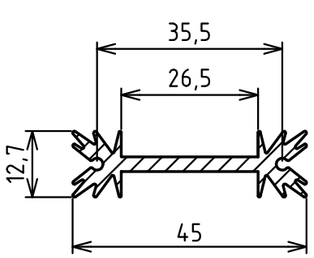


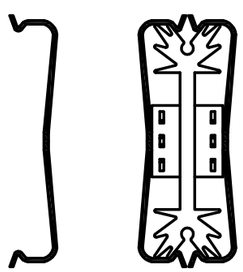


CLIP TEA40

TEA 45

hmotnosť / weight: 0,55 kg/m obvod / perimeter: 201 mm Rth (pre/for 50 mm): 6,2 °C/W

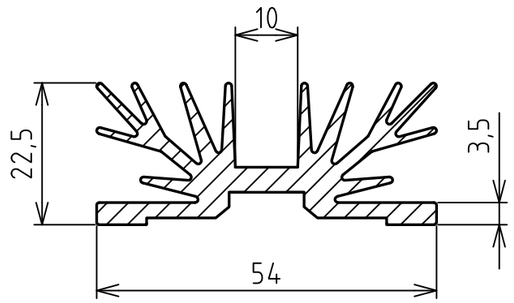


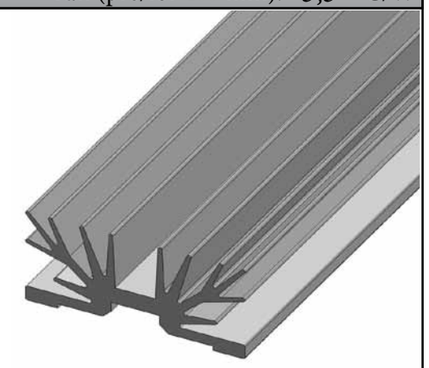


CLIP TEA45

T 54

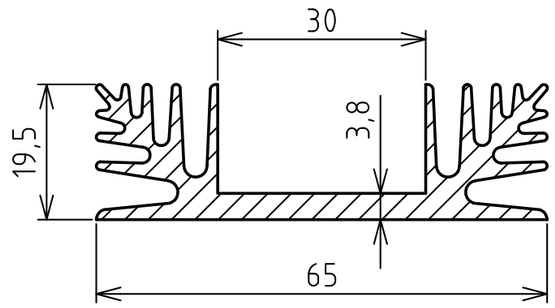
hmotnosť / weight: 1,24 kg/m obvod / perimeter: 394 mm Rth (pre/for 100 mm): 3,3 °C/W

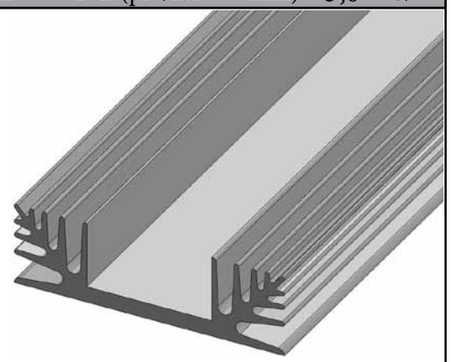




TE 65

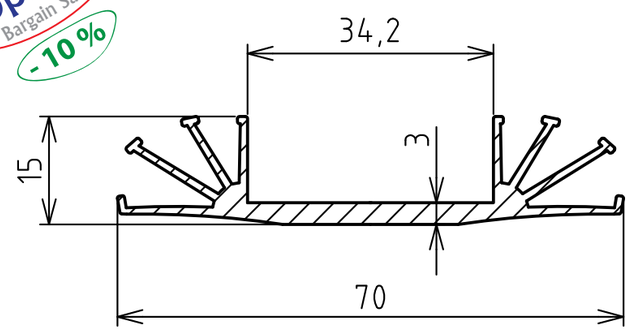
hmotnosť / weight: 1,30 kg/m obvod / perimeter: 382 mm Rth (pre/for 100 mm): 3,0 °C/W

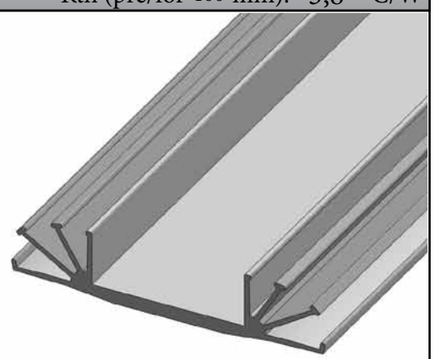




T 70

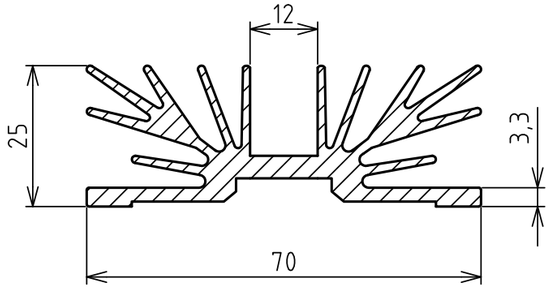
hmotnosť / weight: 0,71 kg/m obvod / perimeter: 303 mm Rth (pre/for 100 mm): 3,8 °C/W

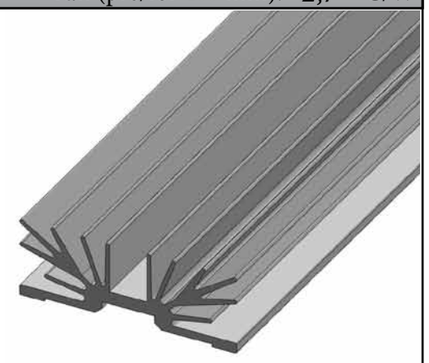




TE 70

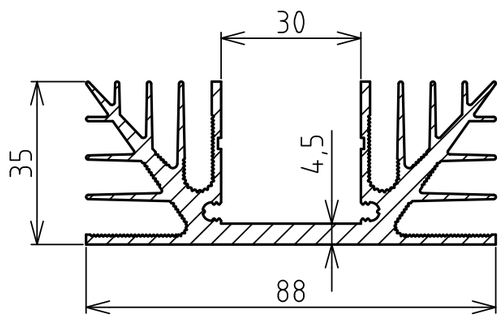
hmotnosť / weight: 1,84 kg/m obvod / perimeter: 518 mm Rth (pre/for 100 mm): 2,7 °C/W

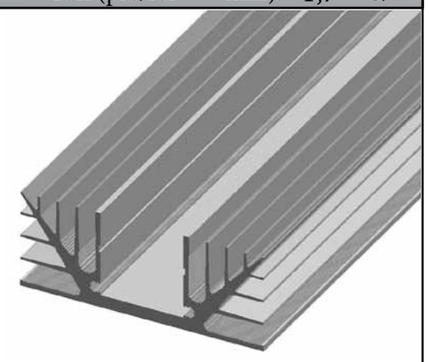




T 88

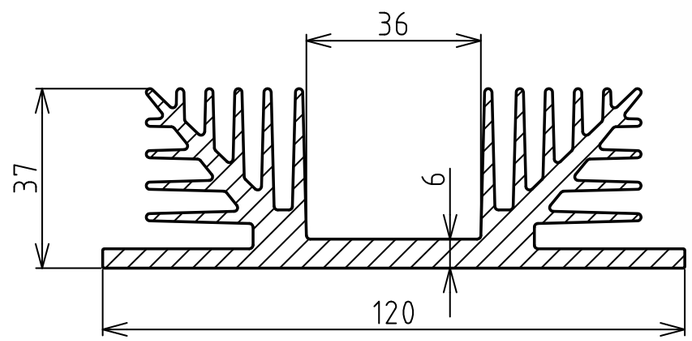
hmotnosť / weight: 2,37 kg/m obvod / perimeter: 712 mm Rth (pre/for 100 mm): 1,7 °C/W

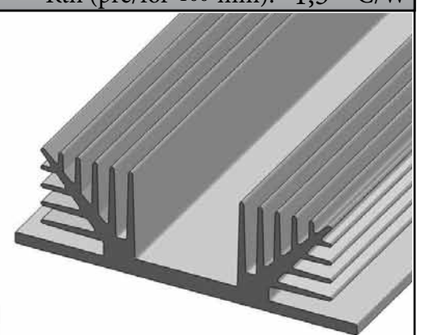




ZH 2476

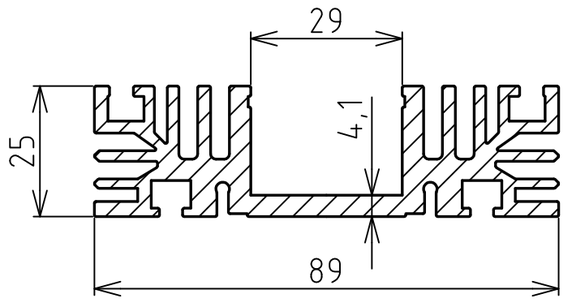
hmotnosť / weight: 4,05 kg/m obvod / perimeter: 876 mm Rth (pre/for 100 mm): 1,5 °C/W

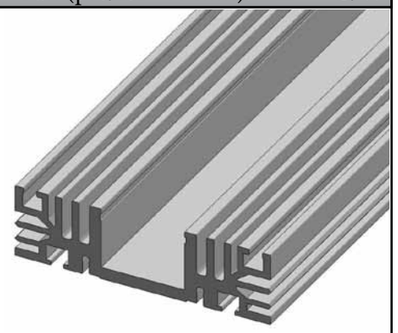




ZH 8779

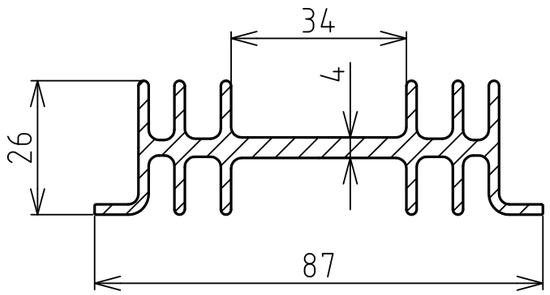
hmotnosť / weight: 2,63 kg/m obvod / perimeter: 633 mm Rth (pre/for 100 mm): -- °C/W

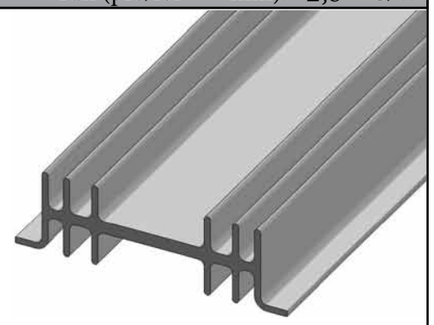




ZH 0752

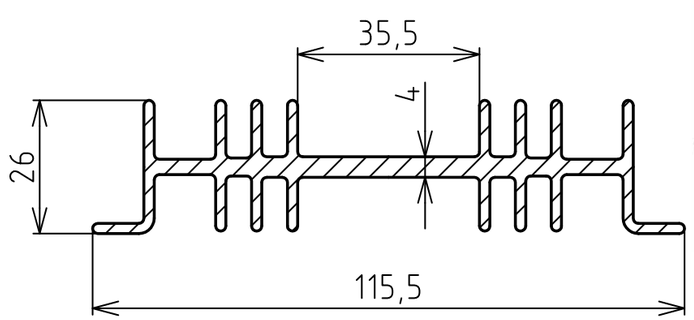
hmotnosť / weight: 1,54 kg/m obvod / perimeter: 485 mm Rth (pre/for 100 mm): 2,8 °C/W

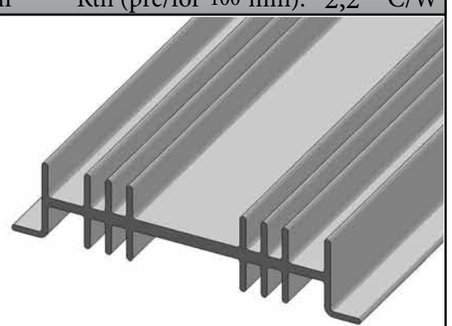




ZH 0136

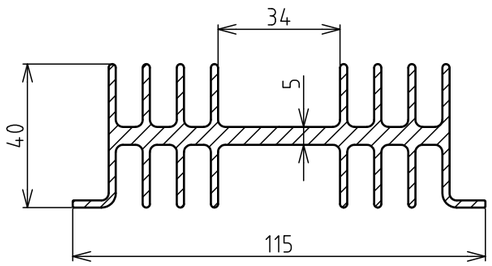
hmotnosť / weight: 1,99 kg/m obvod / perimeter: 561 mm Rth (pre/for 100 mm): 2,2 °C/W

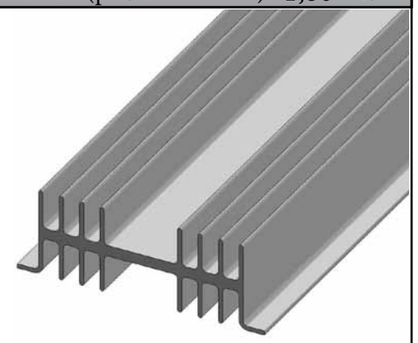




ZH 0753

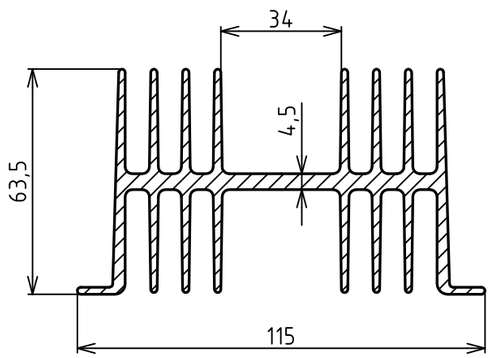
hmotnosť / weight: 2,95 kg/m obvod / perimeter: 758 mm Rth (pre/for 100 mm): 1,80 °C/W

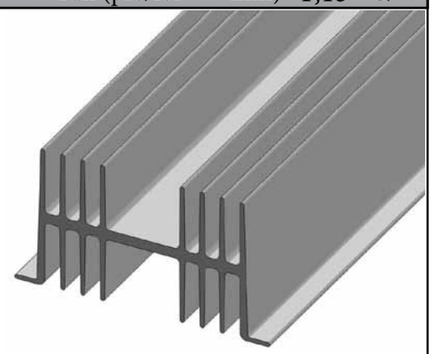




ZH 0137

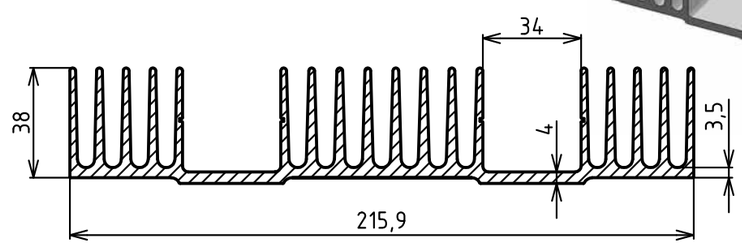
hmotnosť / weight: 4,20 kg/m obvod / perimeter: 1 122 mm Rth (pre/for 100 mm): 1,15 °C/W

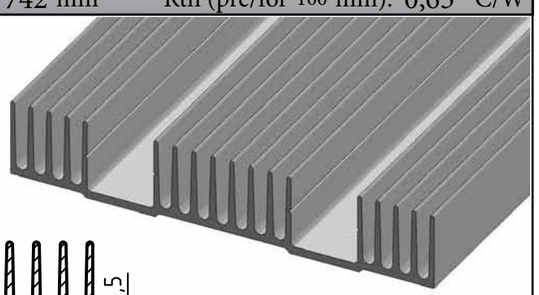




ZH 1929

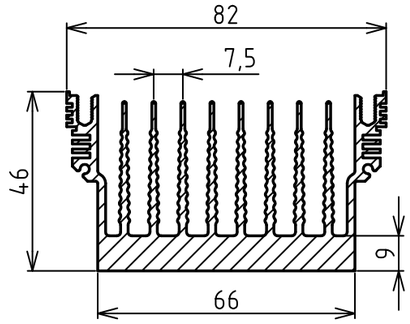
hmotnosť / weight: 6,76 kg/m obvod / perimeter: 1 742 mm Rth (pre/for 100 mm): 0,65 °C/W

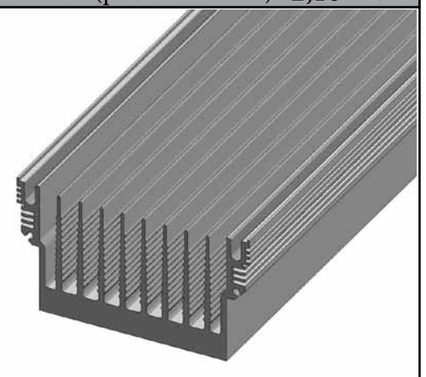




ES 19451

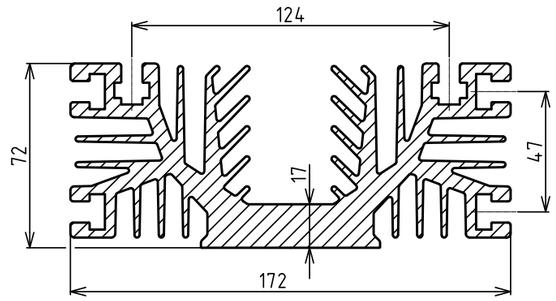
hmotnosť / weight: 3,30 kg/m obvod / perimeter: 1 015 mm Rth (pre/for 100 mm): 2,16 °C/W

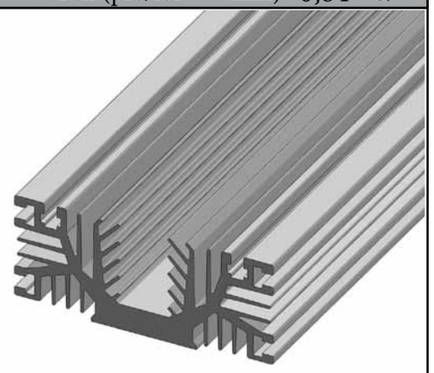




ZH 2428

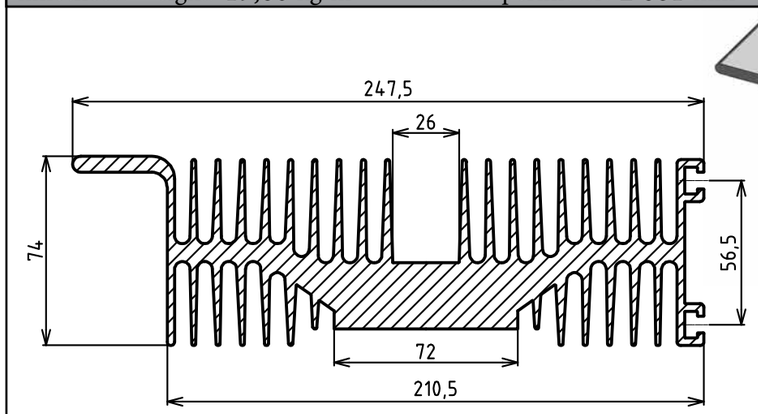
hmotnosť / weight: 13,34 kg/m obvod / perimeter: 1 979 mm Rth (pre/for 100 mm): 0,84 °C/W

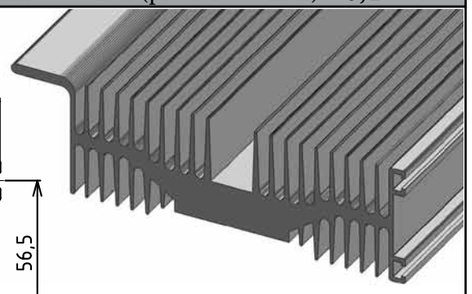




A 6670

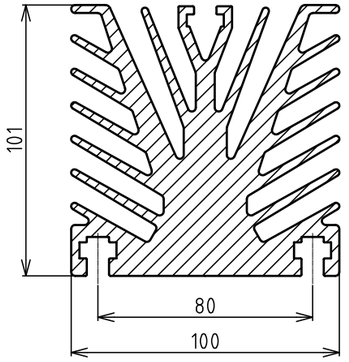
hmotnosť / weight: 17,60 kg/m obvod / perimeter: 2 681 mm Rth (pre/for 100 mm): 0,4 °C/W





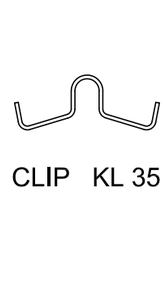
ZH 2838

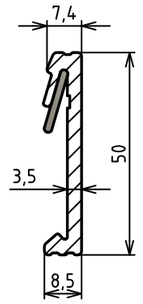
hmotnosť / weight: 14,02 kg/m obvod / perimeter: 1 553 mm Rth (pre/for 100 mm): 0,79 °C/W

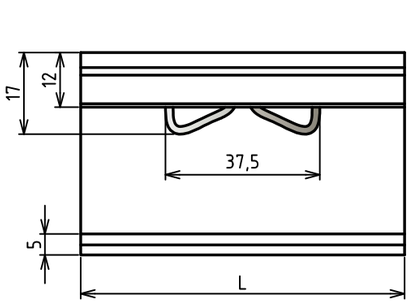


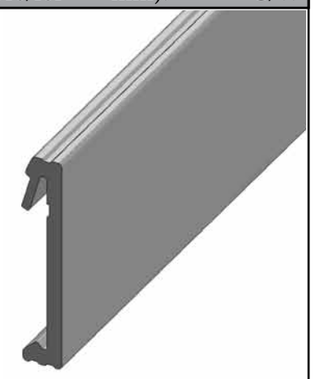
KL 35/50

hmotnosť / weight: 0,64 kg/m obvod / perimeter: 145 mm Rth (pre/for -- mm): -- °C/W





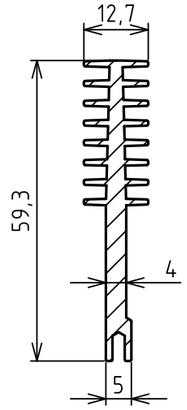


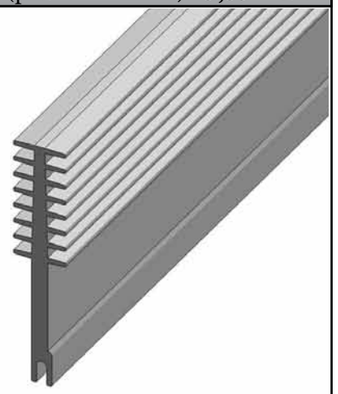


hmotnosť / weight: kg/m obvod / perimeter: mm Rth (pre/for mm): °C/W

ZH 4611

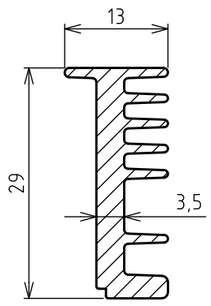
hmotnosť / weight: 0,81 kg/m obvod / perimeter: 279 mm Rth (pre/for 100 mm): 3,59 °C/W

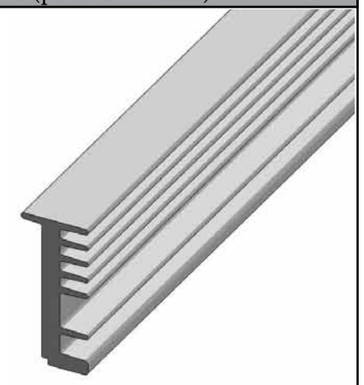




ZH 9057

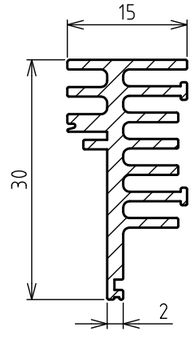
hmotnosť / weight: 0,43 kg/m obvod / perimeter: 141 mm Rth (pre/for 100 mm): -- °C/W

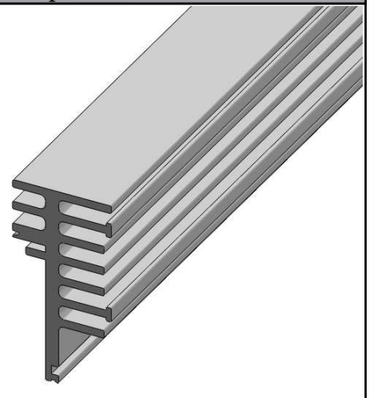




ZH 8678

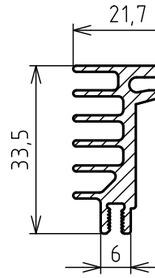
hmotnosť / weight: 0,41 kg/m obvod / perimeter: 205 mm Rth (pre/for 100 mm): -- °C/W

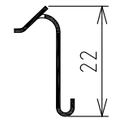




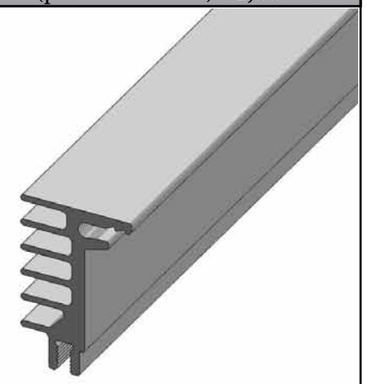
ZH 8247

hmotnosť / weight: 0,56 kg/m obvod / perimeter: 233 mm Rth (pre/for 100 mm): 4,68 °C/W



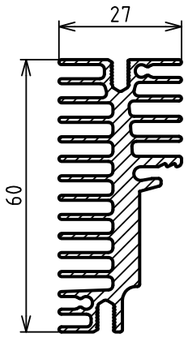


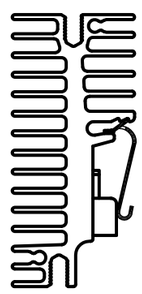
CLIP 221007



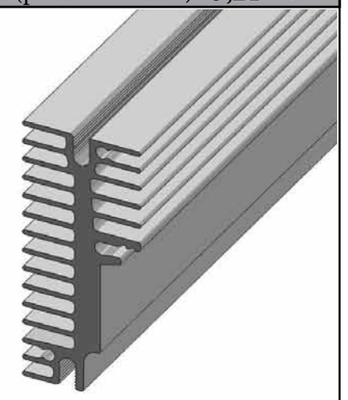
ZH 7505

hmotnosť / weight: 1,53 kg/m obvod / perimeter: 602 mm Rth (pre/for 100 mm): 3,21 °C/W



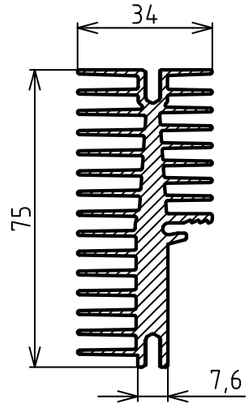


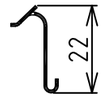
CLIP 221007



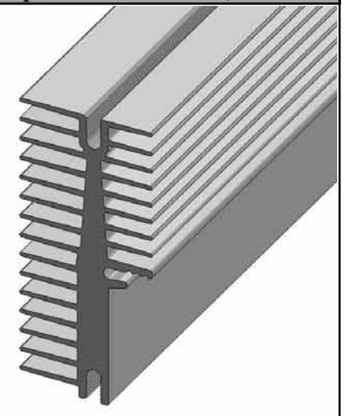
ZH 7504

hmotnosť / weight: 2,42 kg/m obvod / perimeter: 868 mm Rth (pre/for 100 mm): 2,81 °C/W



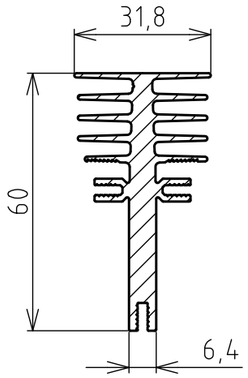


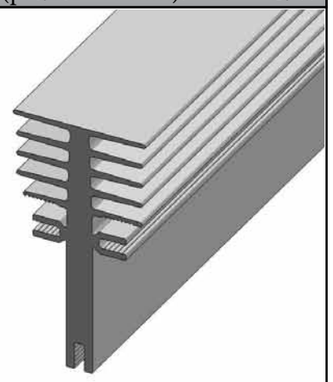
CLIP 221007



ZH 8555

hmotnosť / weight: 1,50 kg/m obvod / perimeter: 455 mm Rth (pre/for 100 mm): -- °C/W

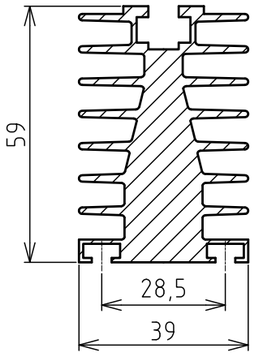


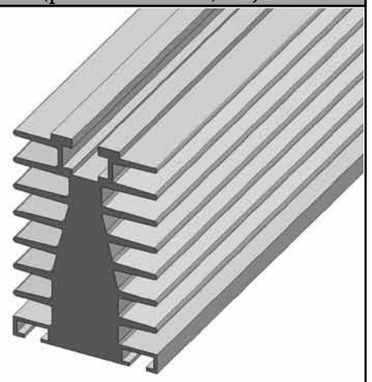


A 59

hmotnosť / weight: 3,30 kg/m obvod / perimeter: 582 mm Rth (pre/for 100 mm): 2,40 °C/W

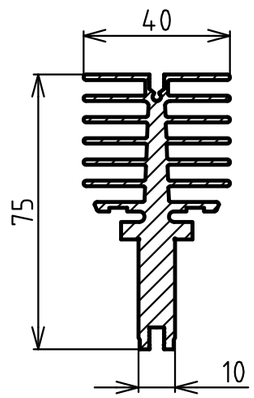
Dopredaj
Bargain Sale
-10 %

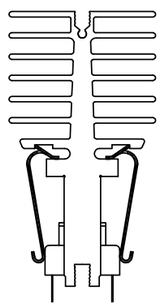


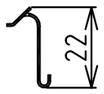


A 75M

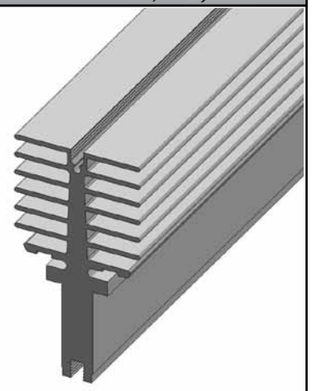
hmotnosť / weight: 2,55 kg/m obvod / perimeter: 684 mm Rth (pre/for 100 mm): 1,5 °C/W





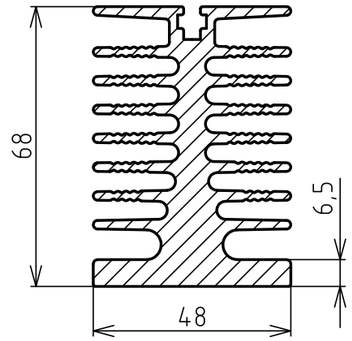


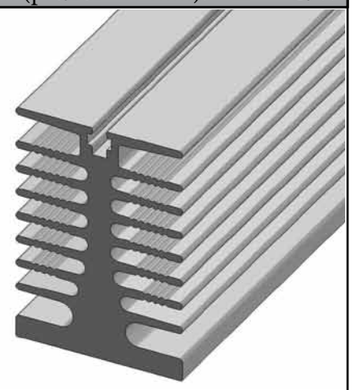
CLIP 221007



ZH 8002

hmotnosť / weight: 4,29 kg/m obvod / perimeter: 849 mm Rth (pre/for 100 mm): -- °C/W



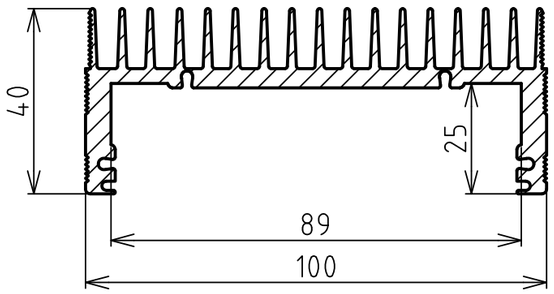


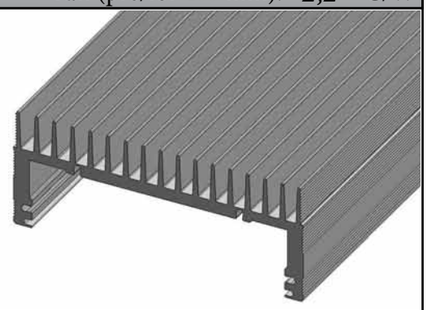
hmotnosť / weight: kg/m obvod / perimeter: mm Rth (pre/for mm): °C/W

hmotnosť / weight: kg/m obvod / perimeter: mm Rth (pre/for mm): °C/W

C 100

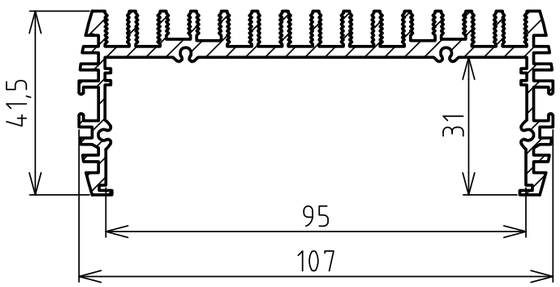
hmotnosť / weight: 2,40 kg/m obvod / perimeter: 782 mm Rth (pre/for 100 mm): 2,2 °C/W

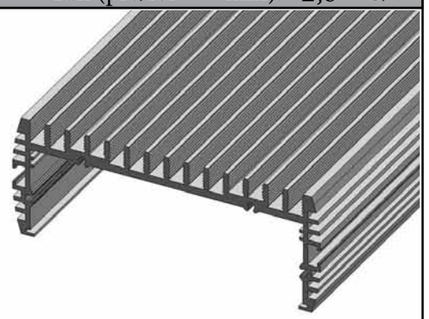




C 107

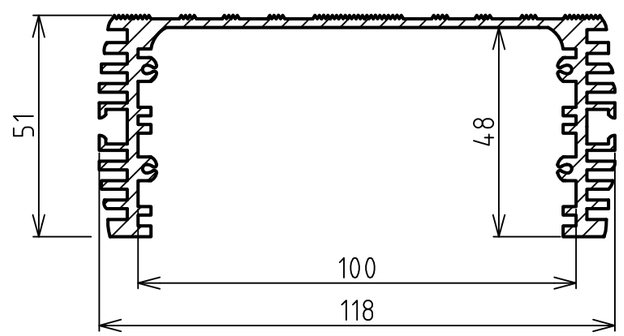
hmotnosť / weight: 1,96 kg/m obvod / perimeter: 795 mm Rth (pre/for 100 mm): 2,6 °C/W

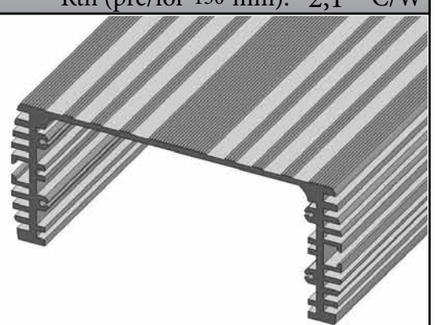




C 118

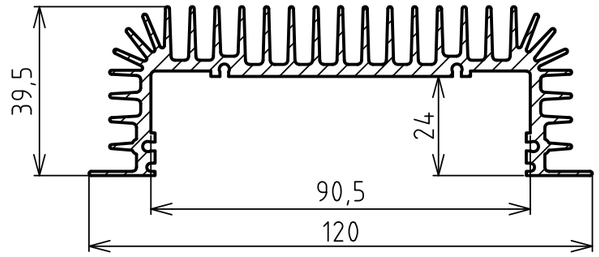
hmotnosť / weight: 2,40 kg/m obvod / perimeter: 684 mm Rth (pre/for 150 mm): 2,1 °C/W

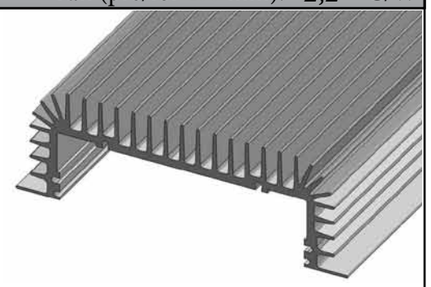




C 120

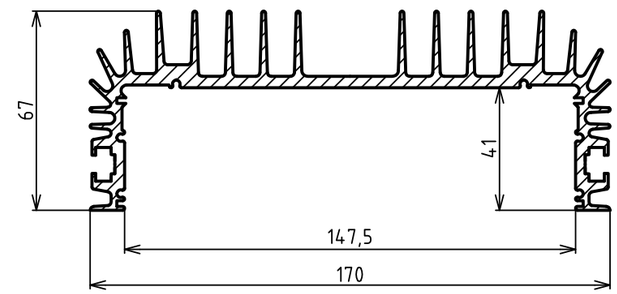
hmotnosť / weight: 2,2 kg/m obvod / perimeter: 782 mm Rth (pre/for 150 mm): 2,2 °C/W

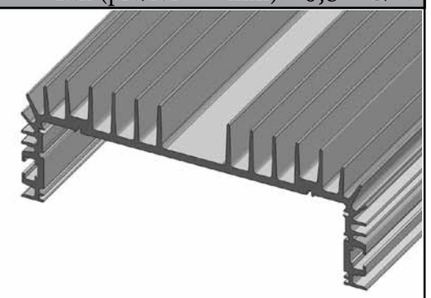




C 170

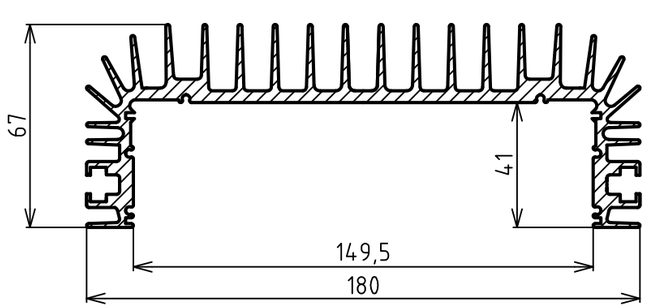
hmotnosť / weight: 4,70 kg/m obvod / perimeter: 970 mm Rth (pre/for 200 mm): 0,8 °C/W

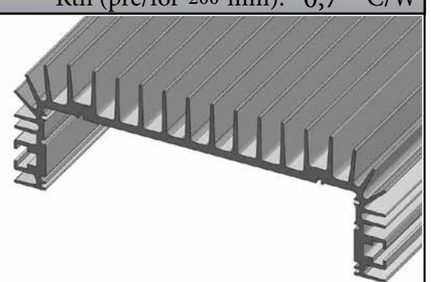




C 180

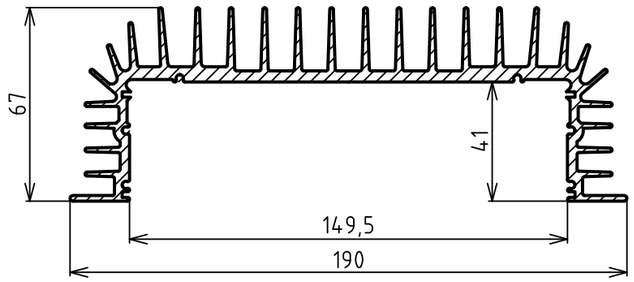
hmotnosť / weight: 5,60 kg/m obvod / perimeter: 970 mm Rth (pre/for 200 mm): 0,7 °C/W

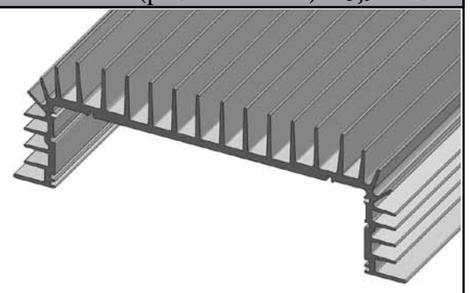




C 190

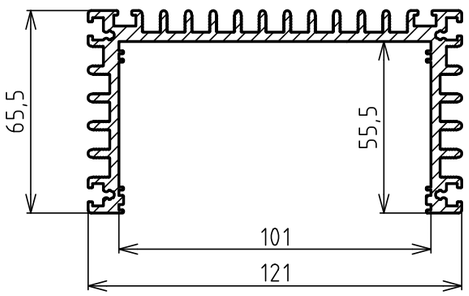
hmotnosť / weight: 4,95 kg/m obvod / perimeter: 970 mm Rth (pre/for 150 mm): 0,9 °C/W

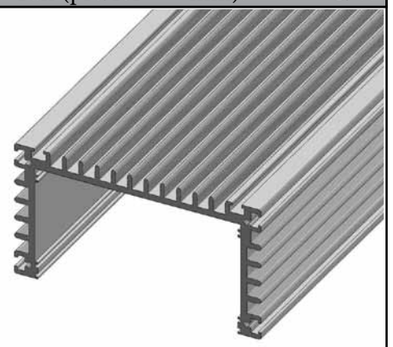




ZH 4268

hmotnosť / weight: 3,35 kg/m obvod / perimeter: 916 mm Rth (pre/for 100 mm): -- °C/W

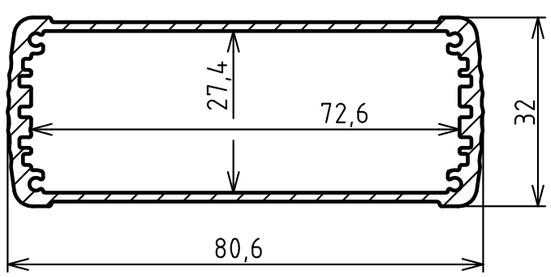


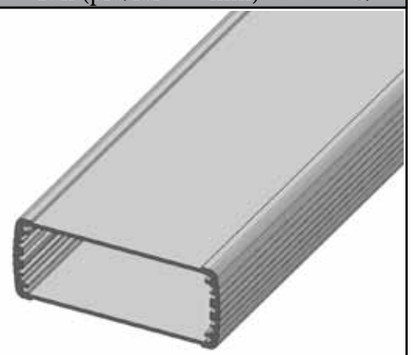


HY 25804

hmotnosť / weight: 1,14 kg/m obvod / perimeter: 218 mm Rth (pre/for 100 mm): -- °C/W

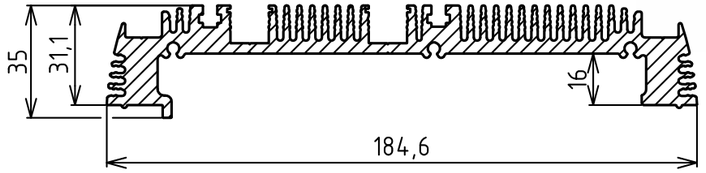
NEW

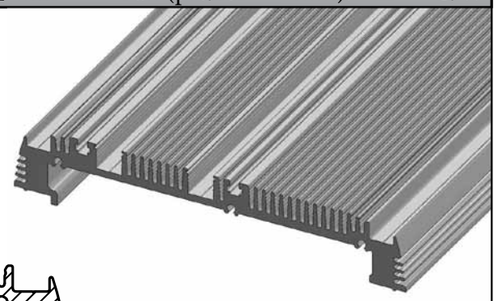




ZH 8927

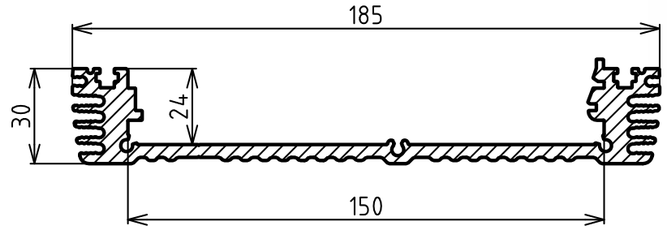
hmotnosť / weight: 5,12 kg/m obvod / perimeter: 1 141 mm Rth (pre/for - mm): -- °C/W

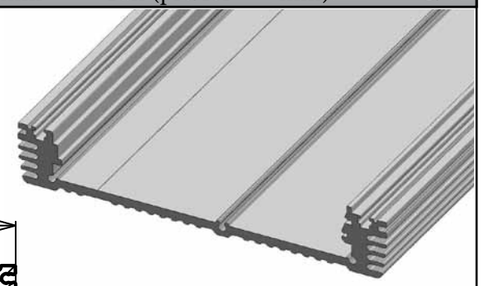




ZH 8926

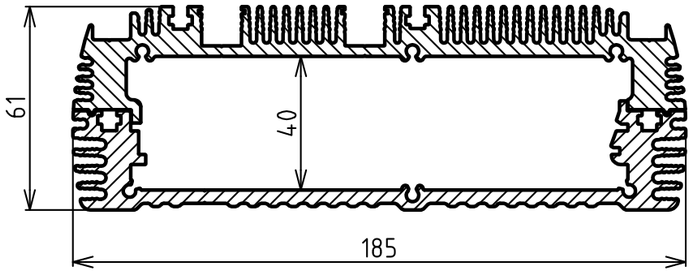
hmotnosť / weight: 3,85 kg/m obvod / perimeter: 734 mm Rth (pre/for - mm): -- °C/W

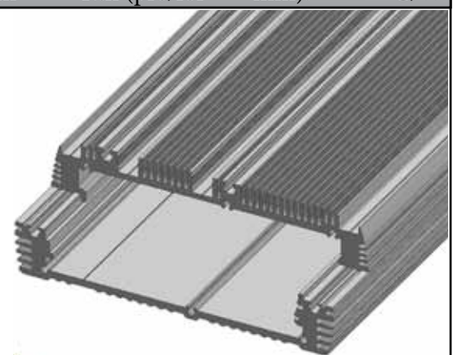




zostava / assembly

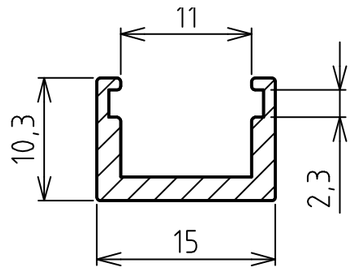
hmotnosť / weight: kg/m obvod / perimeter: mm Rth (pre/for mm): °C/W

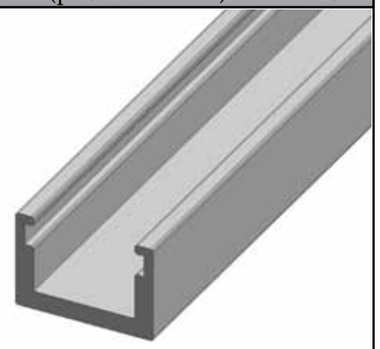




ZH 8608

hmotnosť / weight: 0,16 kg/m obvod / perimeter: 70 mm Rth (pre/for - mm): -- °C/W

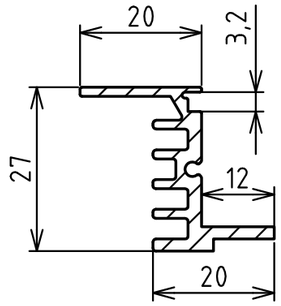


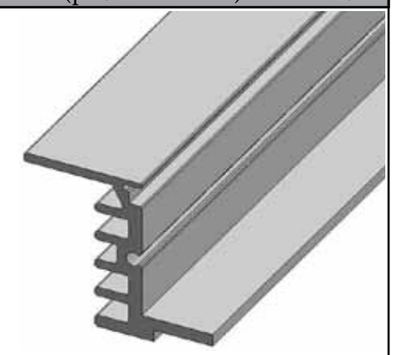


príslušenstvo v katalógu GAMA-svetlá / Accessories in Catalog GAMA-lights

ZH 9952

hmotnosť / weight: 0,44 kg/m obvod / perimeter: 174 mm Rth (pre/for - mm): -- °C/W

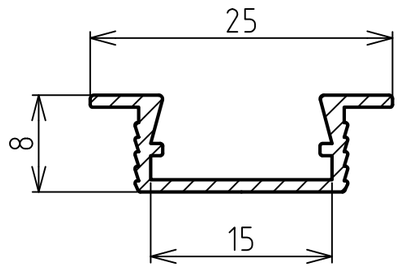




príslušenstvo v katalógu GAMA-svetlá / Accessories in Catalog GAMA-lights

ZH 9099

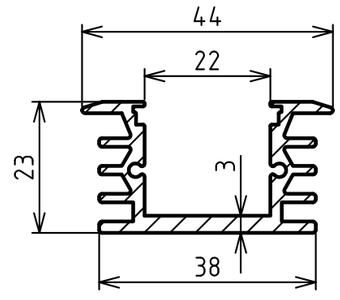
hmotnosť / weight: 0,13 kg/m obvod / perimeter: 88 mm Rth (pre/for - mm): -- °C/W

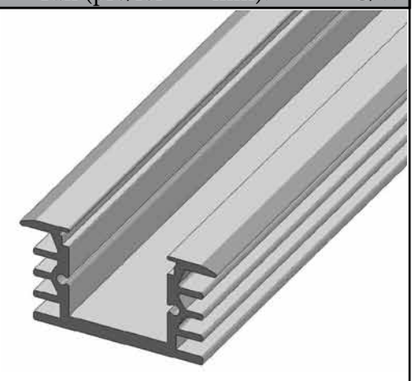


príslušenstvo v katalógu GAMA-svetlá / Accessories in Catalog GAMA-lights

ZH 9044

hmotnosť / weight: 0,73 kg/m obvod / perimeter: 268 mm Rth (pre/for - mm): -- °C/W

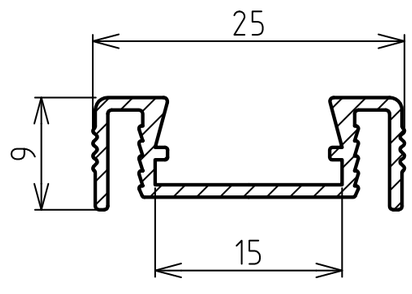




príslušenstvo v katalógu GAMA-svetlá / Accessories in Catalog GAMA-lights

ZH 9460

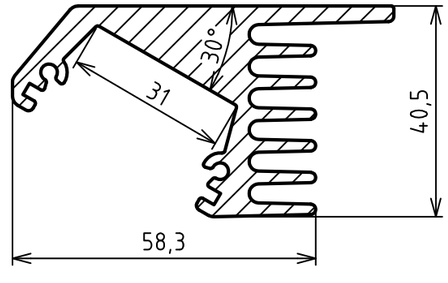
hmotnosť / weight: 0,17 kg/m obvod / perimeter: 119 mm Rth (pre/for - mm): -- °C/W

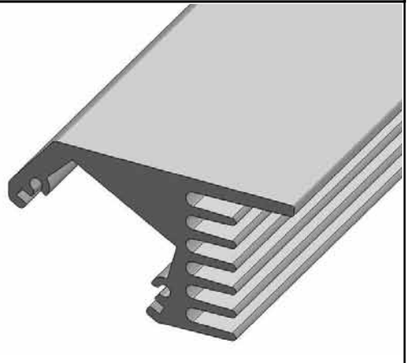


príslušenstvo v katalógu GAMA-svetlá / Accessories in Catalog GAMA-lights

ZH 7788

hmotnosť / weight: 2,34 kg/m obvod / perimeter: 404 mm Rth (pre/for - mm): -- °C/W



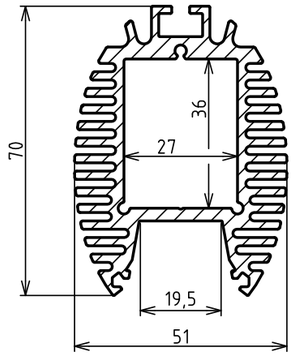


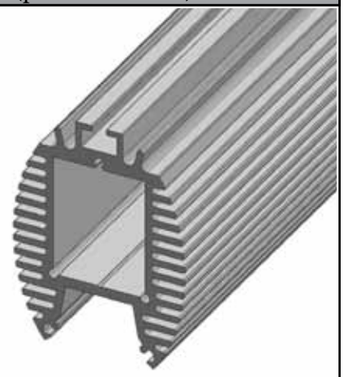
príslušenstvo v katalógu GAMA-svetlá / Accessories in Catalog GAMA-lights

HY 25785

hmotnosť / weight: 2,68 kg/m obvod / perimeter: 690 mm Rth (pre/for - mm): -- °C/W

Novinka NEW

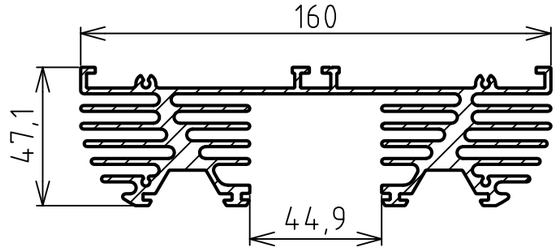


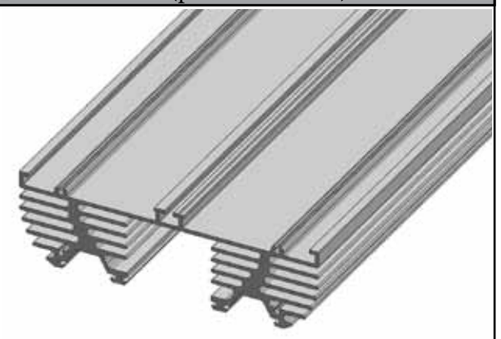


príslušenstvo v katalógu GAMA-svetlá / Accessories in Catalog GAMA-lights

HY 25511

hmotnosť / weight: 5,26 kg/m obvod / perimeter: 1 564 mm Rth (pre/for - mm): -- °C/W



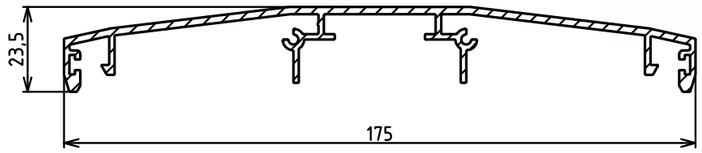


príslušenstvo v katalógu GAMA-svetlá / Accessories in Catalog GAMA-lights

HY 28005

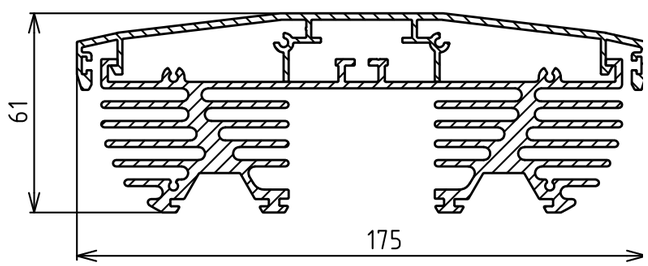
hmotnosť / weight: 1,54 kg/m obvod / perimeter: 614 mm Rth (pre/for - mm): -- °C/W

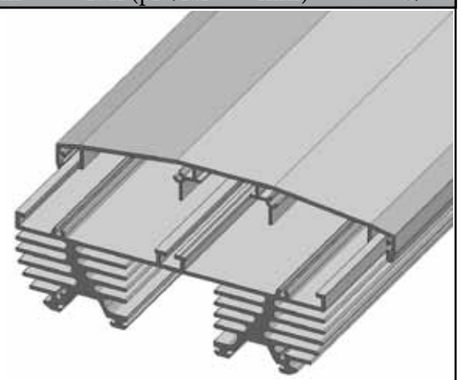
Novinka NEW



zostava / assembly

hmotnosť / weight: kg/m obvod / perimeter: mm Rth (pre/for mm): °C/W

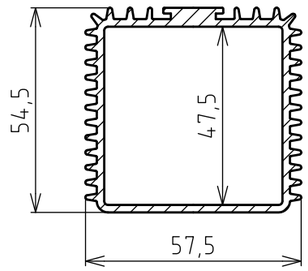


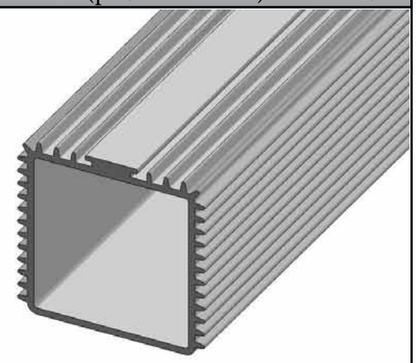


príslušenstvo v katalógu GAMA-svetlá / Accessories in Catalog GAMA-lights

ZH 6504

hmotnosť / weight: 1,55 kg/m obvod / perimeter: 423 mm Rth (pre/for -- mm): -- °C/W

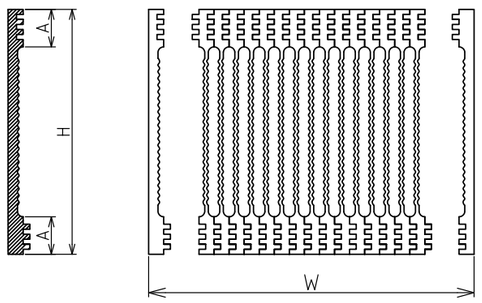




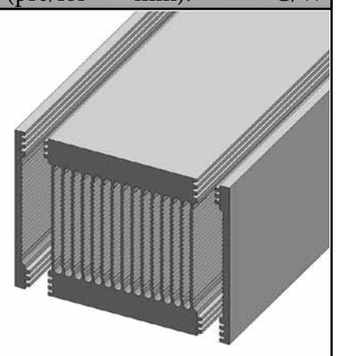
I 50 (71, 80, 91, 128) MF

hmotnosť / weight: --- kg/m obvod / perimeter: ---- mm Rth (pre/for -- mm): -- °C/W

*



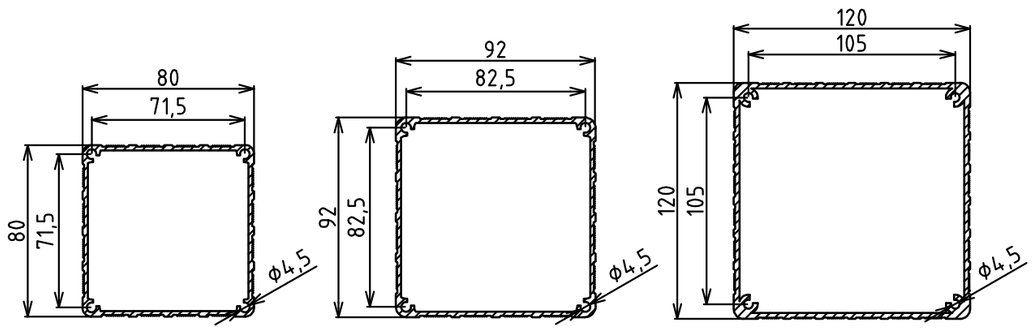
TYP	H	A
I 50 MF	51	11
I 71 MF	71	14
I 80 MF	81,5	11
I 91 MF	91,5	13,8
I 128 MF	128	14



W - podľa požiadavky / according to a request
na objednávku / made-to-order

SPACER

hmotnosť / weight: --- kg/m obvod / perimeter: ---- mm Rth (pre/for -- mm): -- °C/W

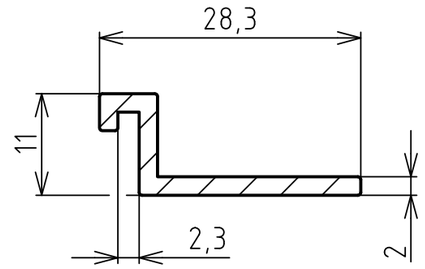


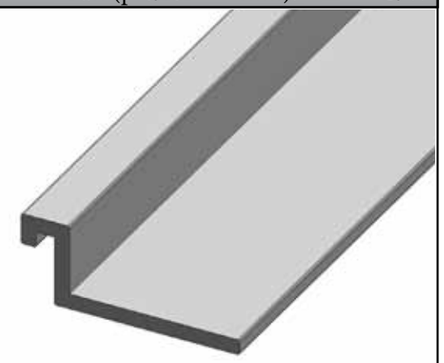
na objednávku / made-to-order

Profily môžu mať iný vzhľad rebier, rozostupy rebier, prípadne hrúbku základne. Informujte sa prosím o aktuálnom stave pred objednaním.
The profiles can have a different visage of ribs, spacing of the ribs or thickness of the base. Please, inquire about the current state before ordering.

ZH 2924

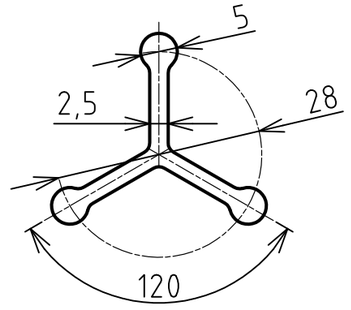
hmotnosť / weight: 0,21 kg/m obvod / perimeter: 82 mm Rth (pre/for -- mm): -- °C/W

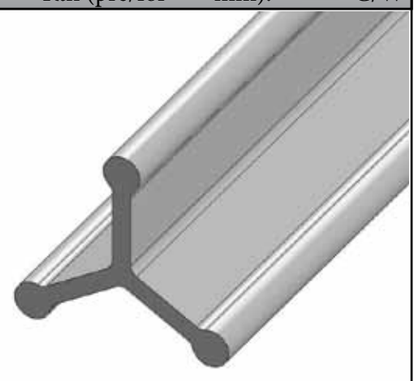




ZH 4410

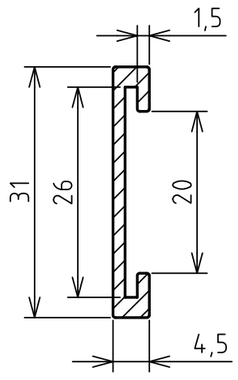
hmotnosť / weight: 0,39 kg/m obvod / perimeter: 105 mm Rth (pre/for -- mm): -- °C/W

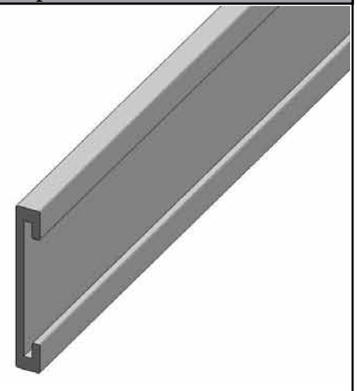




ZH 8090

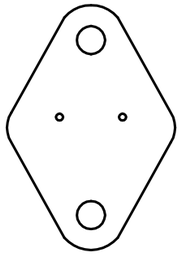
hmotnosť / weight: 0,19 kg/m obvod / perimeter: 88 mm Rth (pre/for -- mm): -- °C/W



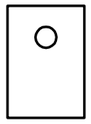


IZOLAČNÉ PODLOŽKY / ISOLATING PLATES

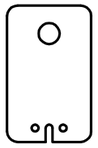
Sľudové podložky / Micaceous plates



TO3

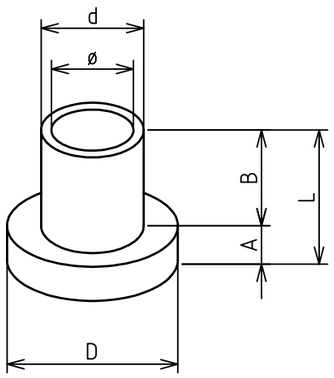


TO126



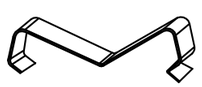
TO220

Nylonové podložky / Nylon plates

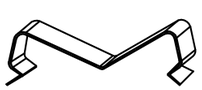


TYP	D	d	ø	A	B	L
TO3	6,6	3,9	3	1,4	3,6	5
TO220	6	3,6	3	1,2	1,2	2,4

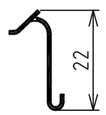
Spony / Clips



TEA 35

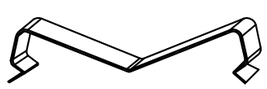


TEA 35A



CLIP 221007

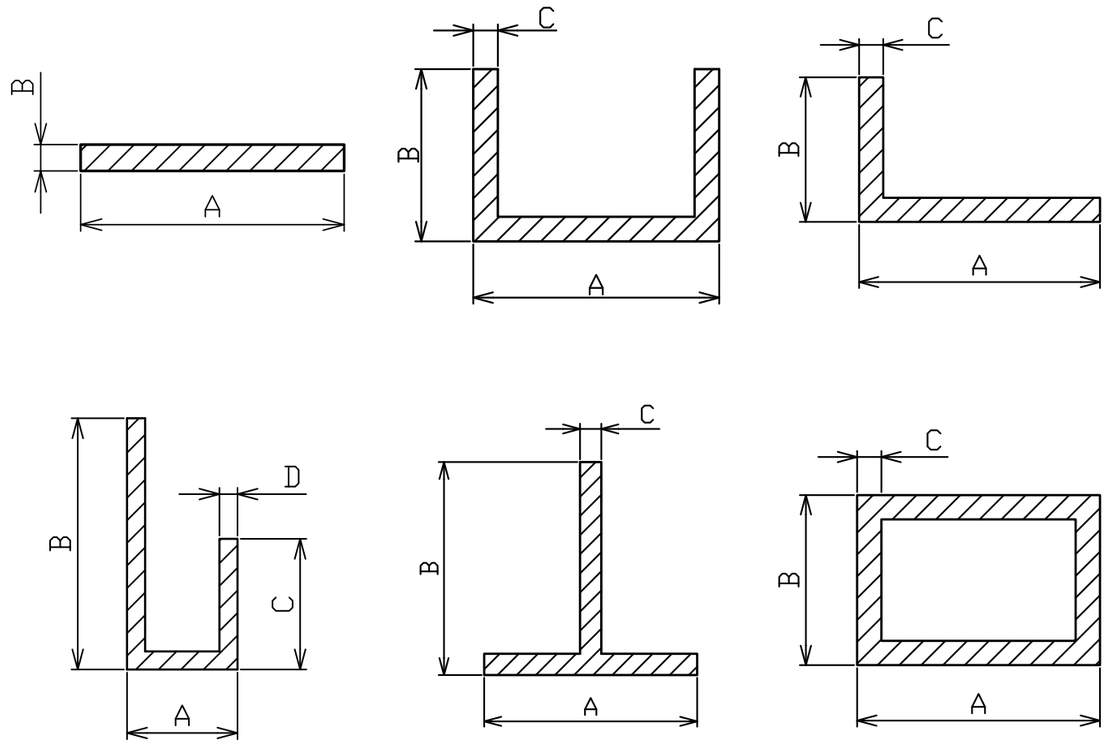
TEA 40



TEA 45

MOLLA T13

ŠTANDARDNÉ PROFILY / *STANDARD PROFILES*



Našu ponuku štandardných profilov si môžete pozrieť na našej stránke:

(You can find an offer of our standard profiles at)

www.gamaaluminium.sk

alebo sa môžete informovať mailom:

(or you can contact us by e-mail)

objednavky@gamaaluminium.sk
mtz@gamaaluminium.sk

Zoznam chladičov / List of heatsinks

Označenie / Mark		Strana / Page
A 59	*-10 %*	34
A 6670		30
A 75M		34
C 100		36
C 107		36
C 118		36
C 120		37
C 170		37
C 180		37
C 190		38
ES 19451		30
HY 25345		15
HY 25346		13
HY 25417		4
HY 25511 - LED		43
HY 25785 - LED		42
HY 25804		38
HY 28005		43
I 50 (71, 80, 91,128) MF		44
IT 0265		20
IT 4377	*-10 %*	17
IT 5303		16
IT 5498		16
K 112		19
K 135		9
K 163		9
K 197		8
K 200		16
K 216		22
K 230	*-10 %*	21
K 245		10
K 250		17
K 300		17
K 400		18
K 66		15
K 76		11
KA 200		22
KE 190		21
KE 215		21
KE 300		24
KEA 300		10
KEAH 200		10
KK 200		8
KL 35/50		31
KX 250		22
KY 250		23
KX 300		24
SPACER		44
ST-45MF		2
ST-T13 / typ		3
ST-T19		3
ST-T22		1
ST-T25A	*-10 %*	1
ST-TE19		1
ST-TE28		2
ST-TEA28		2
T 38		5
T 54		26
T 70	*-10 %*	26
T 88		27
TE 65		26
TE 70		27
TEA 35		25

Označenie / Mark		Strana / Page
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TEA 45		25
ZH 0136		28
ZH 0137		29
ZH 0610		9
ZH 0752		28
ZH 0753		29
ZH 1136		5
ZH 1910		6
ZH 1929		29
ZH 2428		30
ZH 2476		27
ZH 2533		19
ZH 2838		31
ZH 2924		45
ZH 3197		20
ZH 4185		13
ZH 4268		38
ZH 4410		45
ZH 4611		32
ZH 5073	*-10 %*	13
ZH 6465		8
ZH 6504		44
ZH 6681		6
ZH 6789	*-10 %*	14
ZH 7484		15
ZH 7485		14
ZH 7503	*-10 %*	4
ZH 7504		33
ZH 7505		33
ZH 7770		14
ZH 7771		11
ZH 7788 - LED		41
ZH 8001		11
ZH 8002		35
ZH 8090		45
ZH 8247		33
ZH 8501		7
ZH 8555		34
ZH 8608 - LED		40
ZH 8624		7
ZH 8662		5
ZH 8678		32
ZH 8708		20
ZH 8779		28
ZH 8889		6
ZH 8926		39
ZH 8927		39
ZH 9025		4
ZH 9044 - LED		41
ZH 9057		32
ZH 9099 - LED		40
ZH 9152		7
ZH 9238		19
ZH 9250		12
ZH 9460 - LED		40
ZH 9481		12
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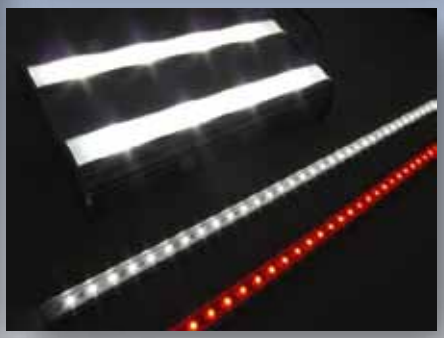
Nylonové podložky / Nylon plates		46
Spony / Clips		46

Aplikácie pre LED hliníkové profily. Viac v katalógu GAMAaluminium lights:



Naši obchodní partneri:

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GAMA alumínium

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