



# PROFILE DESIGN MANUAL





*Headquarters and factory located in Siuro, Nokia.*

## International and innovative specialist in aluminium since 1959

Purso is a Finnish family-owned business that specialises in the designing and manufacturing of aluminium solutions for industrial applications, building facades and lighting systems.

Purso Group

- Purso Oy
- Nedal Aluminium B.V.
- Purso Alucool Oy

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# We offer the following



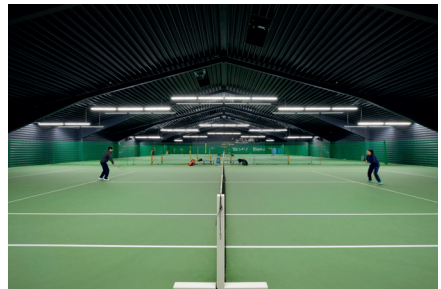
Profiles and components



Transport Systems



Building Systems



SNEP Lighting Systems



## Further processing services

- Bending
- Cutting
- CNC machining
- Punching
- Welding
- Surface Treatment
- Assembly
- Packing



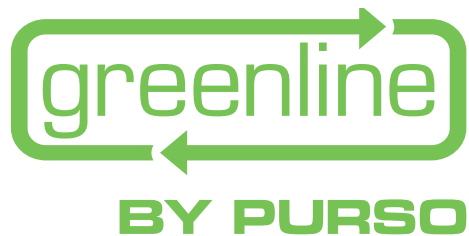
*Billets of raw material*

## Sustainability at Purso

We commit to the UN's Agenda for Sustainable Development in all our operations. We also instruct our personnel, subcontractors, and suppliers to take environmental affairs into consideration in everything they do.

We have taken significant concrete steps towards sustainability by implementing the following: bio heating plant in 2012, energy efficiency agreement in 2016, CO2 calculation according to GHG protocol since 2020 and the usage of biofuels since 2022.

Half of the material used in our production is recycled Greenline Aluminium. Purso Greenline certificate guarantees that the product is produced from 100 % recycled raw material. Remelting aluminium requires only around 5% of the energy required for primary aluminium production.



# Certified Quality

We follow the certified ISO 9001:2015 quality management system and ISO 14001:2015 environmental system in our operations.

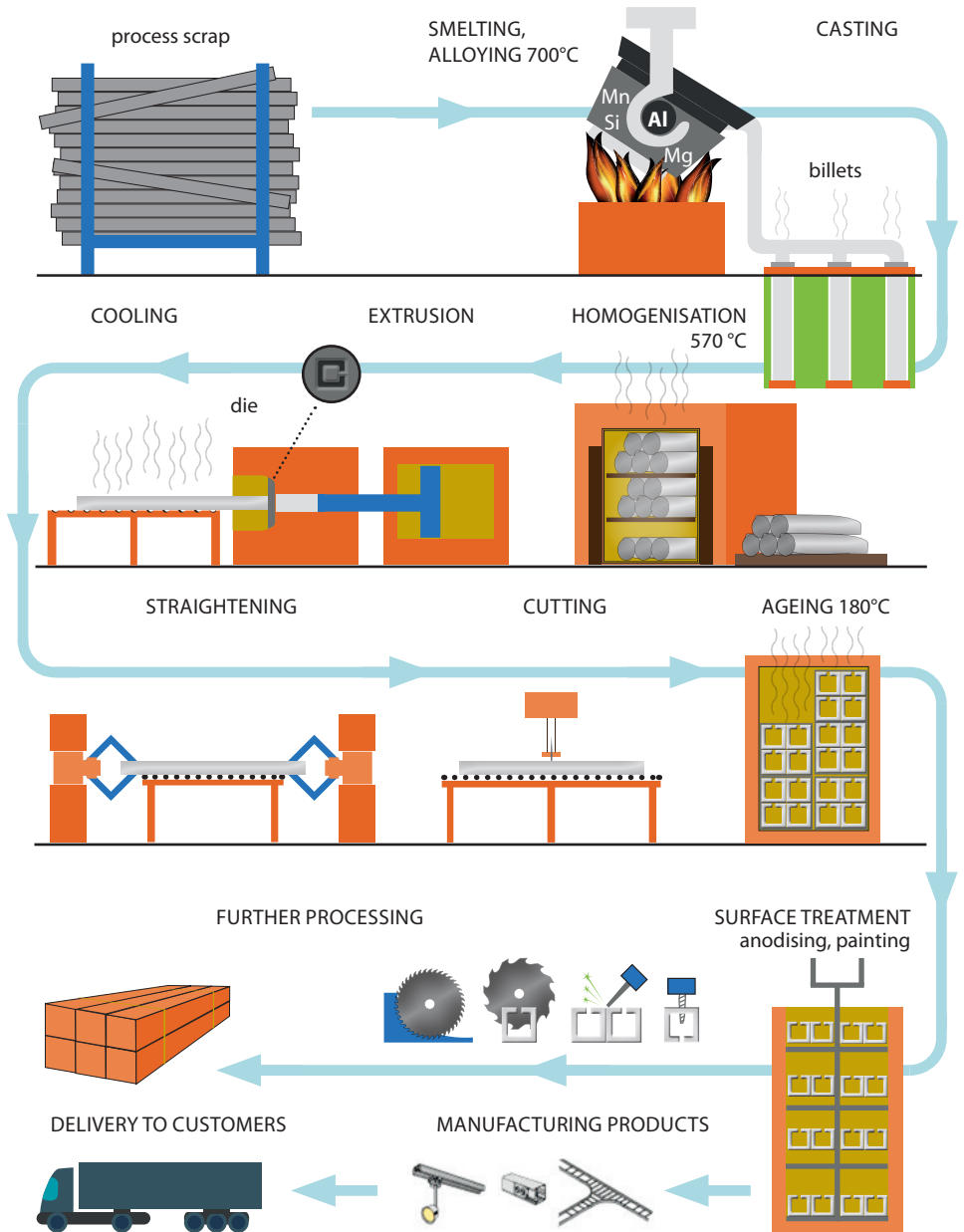
## EPD – Environmental Product Declaration

Purso's aluminium products have product specific EPDs. The EPDs are an independent, internationally recognized documents of the environmental impacts of products.

- Quality management system ISO 9001:2015
- Environmental system ISO 14001:2015
- GSB certificate in powder coating
- EPD certificate
- CoC certificate
- Jotun JAA certificate



# Manufacturing profiles



# Characteristics of extrusion alloys

Mechanical properties of aluminium SFS-EN 755-2  
and chemical composition of aluminium SFS-EN 573-3

| Identifier                 | EN AW-1070A  | EN AW-6060  |                            |                 |  | EN AW-6063  |                            |                 |                 |                 |
|----------------------------|--|---|----------------------------|-----------------|--|---|----------------------------|-----------------|-----------------|-----------------|
| Chemical identifier        | Al 99,70   | Al MgSi   |                            |                 |  | Al Mg0,7Si  |                            |                 |                 |                 |
| Temper designations        | F  | T4  | T5                         | T6              | T66  | T4  | T5                         | T6              | T66             |                 |
| Strength requirements      | Tensile strength<br>Rm (min)<br>MPa (N/mm <sup>2</sup> )                                       | 60  | 120                        | 140<br>-<br>160 | 170<br>-<br>190                                | 195<br>-<br>215   | 120<br>-<br>130            | 160<br>-<br>175 | 195<br>-<br>215 | 225<br>-<br>245 |
|                            | Yield strength<br>Rp0.2 (min)<br>MPa (N/mm <sup>2</sup> )                                      | 23  | 60                         | 100<br>-<br>120 | 140<br>-<br>150                                | 150<br>-<br>160   | 65                         | 110<br>-<br>130 | 160<br>-<br>170 | 180<br>-<br>200 |
|                            | *Elongation<br>A <sub>50mm</sub> (%)<br>(Std. min, no max. limit)                              | 23  | 14                         | 6               | 6  | 6   | 10<br>-<br>12              | 5-6             | 6-8             | 6-8             |
|                            | **Typical Brinell<br>hardness (HBW)<br>Purso   | 18  | 40                         | 50              | 55   | 65  | 40                         | 55              | 65              | 75              |
|                            | Main alloying<br>elements %  | Si 0,2<br>Mg 0,03   | Si 0,30-0,6<br>Mg 0,35-0,6 |                 |  |   | Si 0,20-0,6<br>Mg 0,45-0,9 |                 |                 |                 |
|                            | Aluminium content %  | 99,7  | 98,5                       |                 |  |   | 98,5                       |                 |                 |                 |
| Characteristics            | For separately<br>agreed profile<br>shapes<br><br>Extremely<br>good electrical<br>conductivity | Alloyed, hardenable and<br>extrudable alloy with<br>good tensile properties<br>and good surface<br>quality.<br>Very well suited for<br>anodising. |                            |                 |  | Alloyed, hardenable and<br>extrudable alloy with<br>good tensile<br>properties and good<br>surface quality.<br>Very well suited for ano-<br>dising. |                            |                 |                 |                 |
| General<br>characteristics | Electrical conductivity:<br>30-32 Y ≥ MS/m   |   |                            |                 | Electrical conductivity 20 °C:<br>49-55 IACS % |   |                            |                 |                 |                 |

\*Elongation depends on the shape of the profile

\*\*Hardness value is indicative, dependent on the shape of the profile

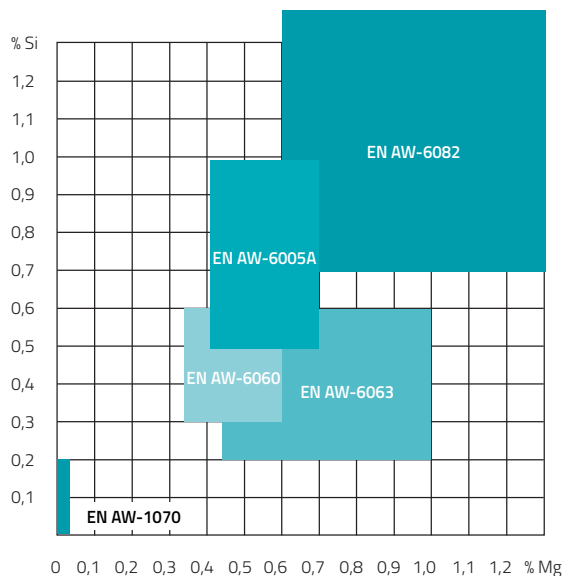


When going from left to right in this table -> more alloying elements-> more challenging to extrude  
-> larger roundings and wall thicknesses are needed for profile shapes

|  | EN AW-6101A   | EN AW-6101B  | EN AW-6005A  |                 | EN AW-6082  |     |                 |
|--|---|--|--|-----------------|---|-----|-----------------|
|  | Al MgSi(A)  | Al MgSi(B)   | Al SiMg(A)   |                 | Al Si1MgMn  |     |                 |
|  | T6  | T6   | T4   | T6              | T4  | T5  | T6              |
|  | 200   | 215  | 180  | 250<br>-<br>270 | 205   | 270 | 270<br>-<br>310 |
|  | 170   | 160  | 90   | 200<br>-<br>225 | 110   | 230 | 250<br>-<br>260 |
|  | 8   | 6  | 13   | 6-8             | 12  | 6   | 6-8             |
|  | 65  | 65   | 50   | 85              | 60  | 75  | 95              |
|  | Si 0,30-0,7<br>Mg 0,40-0,9  | Si 0,30-0,7<br>Mg 0,40-0,9   | Si 0,50-0,9<br>Mg 0,40-0,7   |                 | Si 0,70-1,3<br>Mg 0,60-1,2  |     |                 |
|  | 98,5  | 98,5   | 98,0   |                 | 97,5  |     |                 |
|  | The same tensile properties as the alloy EN AW-6060 / 6063.                           | The same tensile properties as the alloy EN AW-6060 / 6063<br>Good electrical conductivity $\geq 32$ MS/m. | An easily hardenable construction alloy with good tensile properties. Not very well suited for anodising or bending. |                 | An easily hardenable construction alloy with excellent tensile properties. Not very well suited for anodising or bending. Larger dimension and shape tolerances than the other alloys |     |                 |
|  | Coefficient of thermal expansion<br>(change in length): 2-100 °C 10 <sup>-6</sup> /°C |  | Density:<br>2,70 kg/dm <sup>3</sup>  |                 | Thermal conductivity:<br>190-210 W/m°C  |     |                 |

# Aluminium alloys used

The silicon and magnesium content affects e.g. tensile properties, surface quality and extrudability.

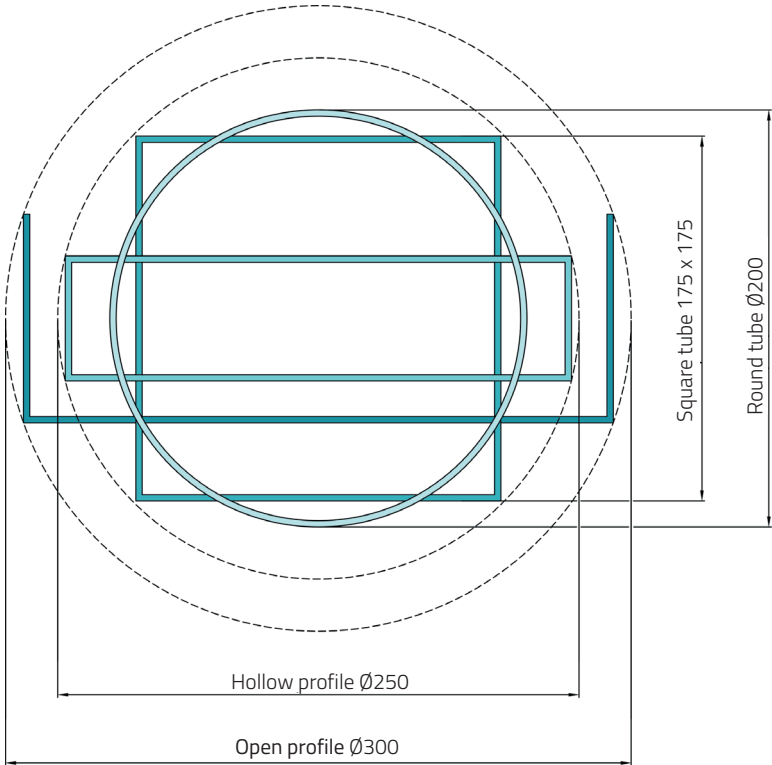


## Käytettävät alumiiniseokset

|                             |  |
|-----------------------------|--|
| EN AW-6063 EN AW-AI Mg0,7Si | The most common alloy. Excellent tensile properties, very suitable for anodising.  |
| EN AW-6060 EN AW-AIMgSi     | Almost the same as alloy 6063, but slightly softer.  |
| EN AW-6005 EN AW-AISiMg     | A harder alloy than 6063. Not very suitable for anodising.   |
| EN AW-6101 EN AW-EAI MgSi   | An alloy with good electrical conductivity. The same tensile properties as alloy 6063.   |
| EN AW-6082 EN AW-AISi1MgMn  | Construction alloy. Not very suitable for anodising. The recommended wall thickness is min. 3 mm.                              |
| EN AW-1070 AI99.70          | Pure aluminium, good mouldability, limited tensile properties. Excellent electrical conductivity and heat transfer properties. |

# Recommended maximum dimensions

Maximum sizes of the profiles to be extruded  
a circle drawn around the profile  $\emptyset$



## Basic information on profile extrusion

|                                   |                                       |
|-----------------------------------|---------------------------------------|
| Maximum profile cross section     | 200-300mm (depending on profile type) |
| Wall thickness                    | minimum 1.2 mm                        |
| Maximum weight                    | 18 kg/m — alloy 6082 15 kg/m          |
| Minimum weight                    | ~ 0,200 kg/m                          |
| Minimum delivery quantity         | alloy 6063 250 kg — alloy 6082 500 kg |
| Maximum length                    | 16 m                                  |
| Maximum length, anodised          | 8,0 m                                 |
| Maximum length, powder coated     | 8,0 m                                 |
| Max. weight of the profile length | 100 kg                                |
| Tolerances                        | SFS-EN 755-3...9 / SFS-EN 12020-1...2 |

# Dies and extrudability



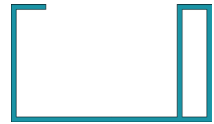
Uniform wall thickness



Rounded shapes



Symmetric



- The profile shape should be as symmetric as possible
- The wall thickness should be consistent at every point
- Radiuses min. 0,5mm: R0, is not possible to extrude.
- The maximum size of the profile is determined according to the shape and the wall thickness.

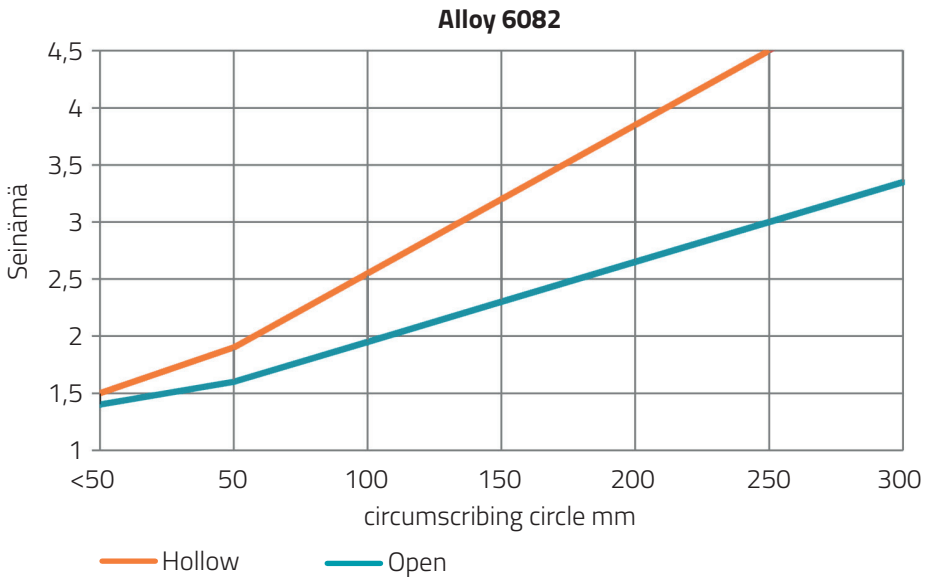
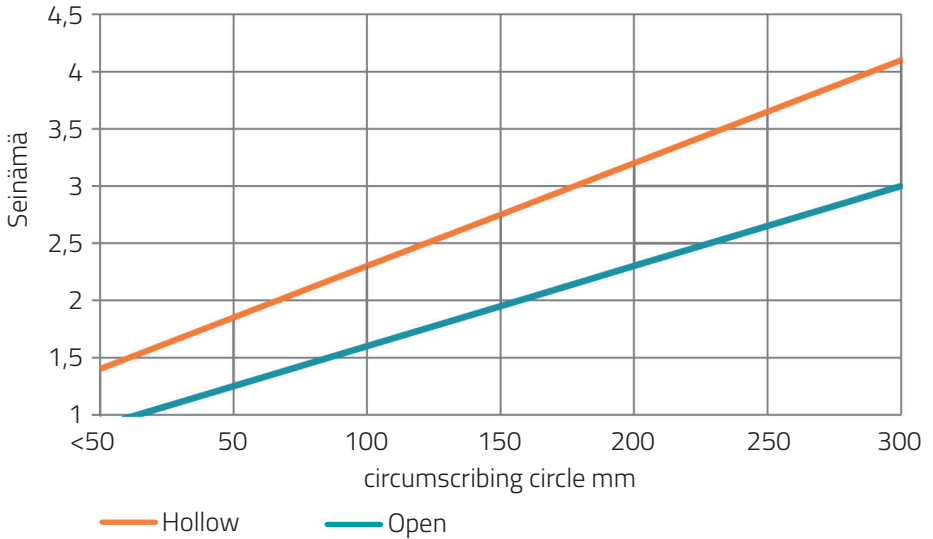
*The profiles are tailored according to the application.*



# Wall thickness

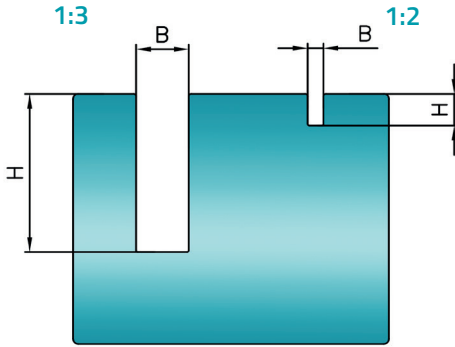
Note! The finalised wall thicknesses are profile specific.  
The wall thickness of 1070 Alloy profiles have to be checked individually.

**Alloys 6060/6063/6101/6005**



# Cavity

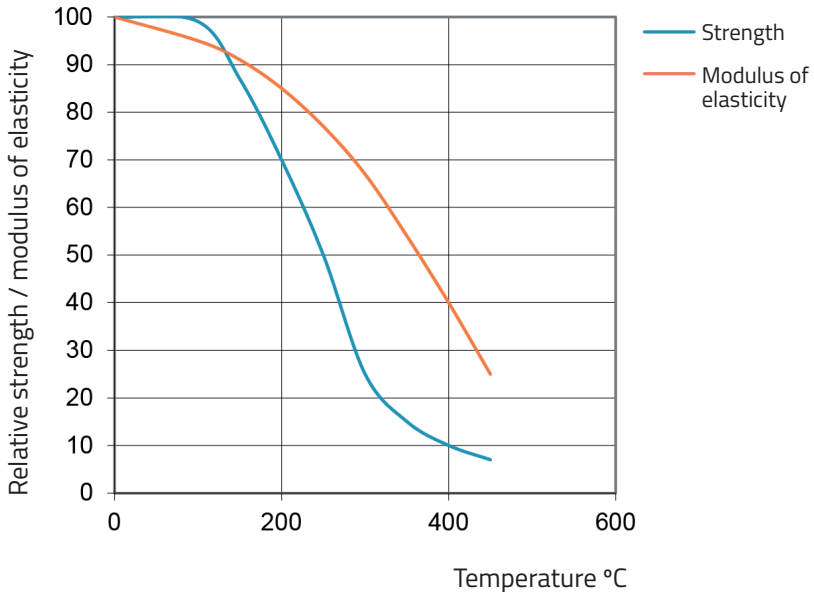
In design, the width should be considered in relation to the depth:  
1:3 is a good basic rule.



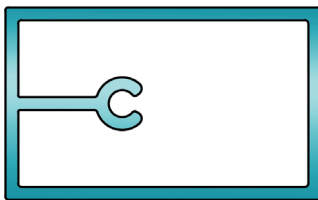
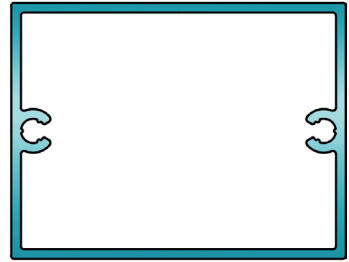
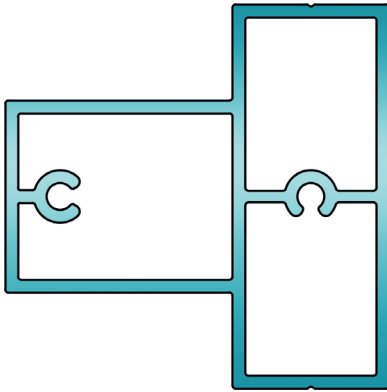
*The relation of the mouth of the cavity to its depth affects the durability of the extrusion die.*

| B (mm) | max. H:B |
|--------|----------|
| 1-3    | 2        |
| 3-5    | 3        |
| 5-15   | 4        |
| 15-30  | 3.5      |

## The effects of temperature on the strength of aluminium



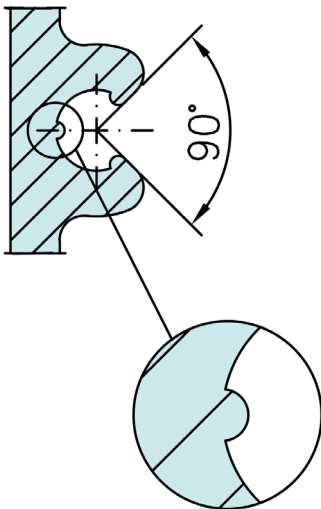
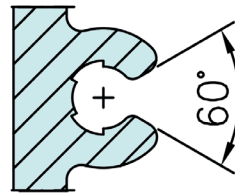
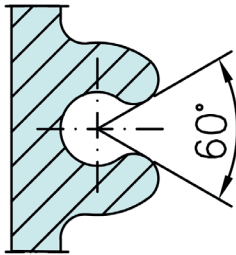
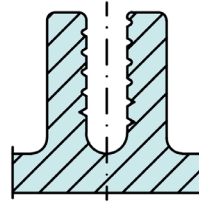
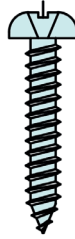
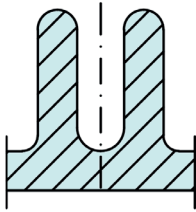
# The placement of screw pockets



*The space between the screw pocket and the outer wall is too narrow. The extrusion die won't last.*

# Screw pocket design

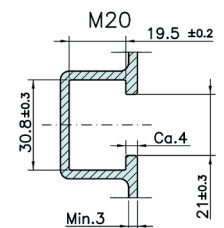
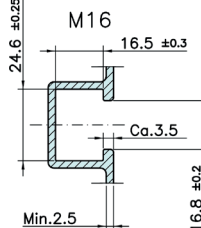
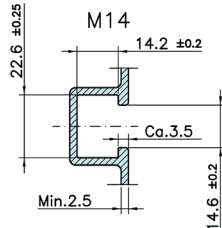
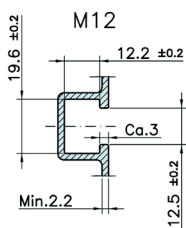
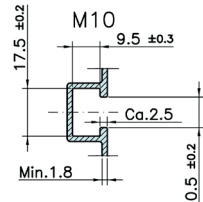
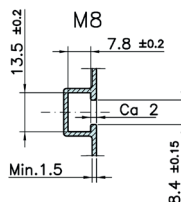
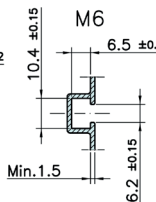
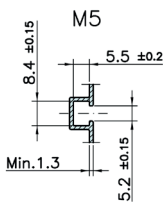
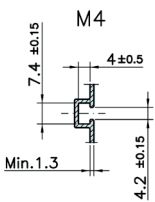
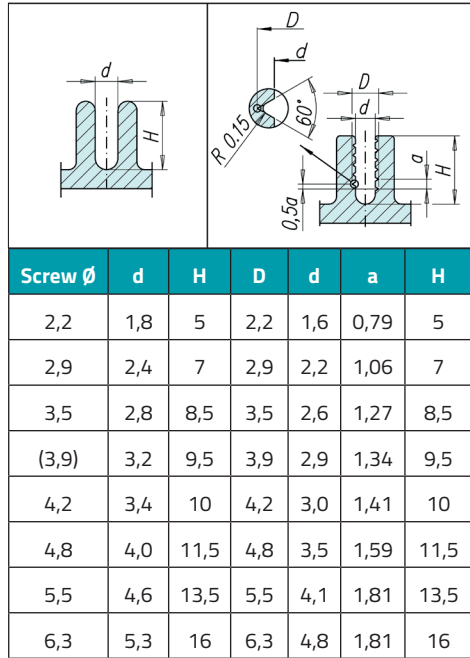
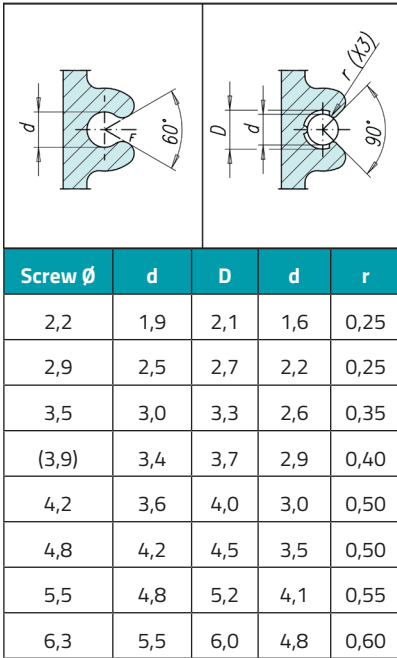
Factors to be taken into account in screw pocket design.



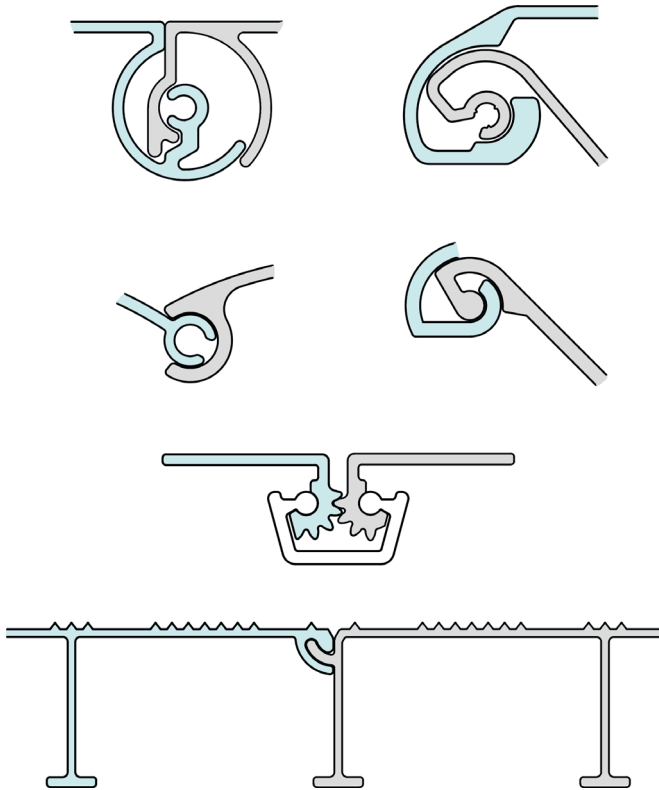
Nubs located in the screw pocket can improve functionality and compensate the natural variation occurring in the profile.



# Design schemes for screw grooves and pockets



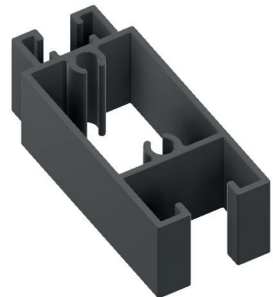
# Examples of hinge joints



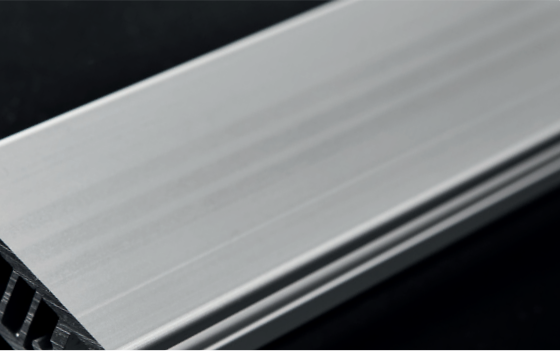
## 3D modelling

Purso's 3D modelling service enables rapid and cost-effective modelling of the profile shapes before ordering the die. Printing can ensure e.g., the compatibility of the profiles and their functioning in the future product.

The tray size is 320 x 132 mm, and the max. height is 154 mm. The material used is PA12-plastic in the colour black. Upon request we can also deliver aluminium 3D samples.

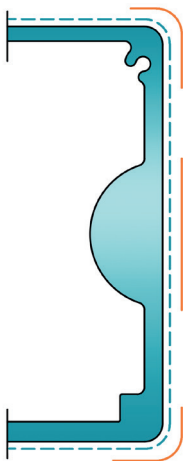
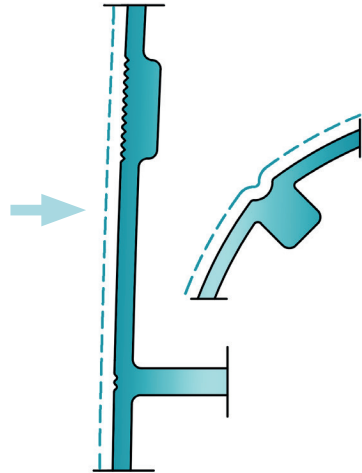


# Surface quality in profile design



Variations in the mass of the profile may create visual stripes on the opposite side of the wall. On anodised profiles this may appear as thermal stripes/tracks and on powder coated profiles as reflections, although the surface of the profile is smooth.

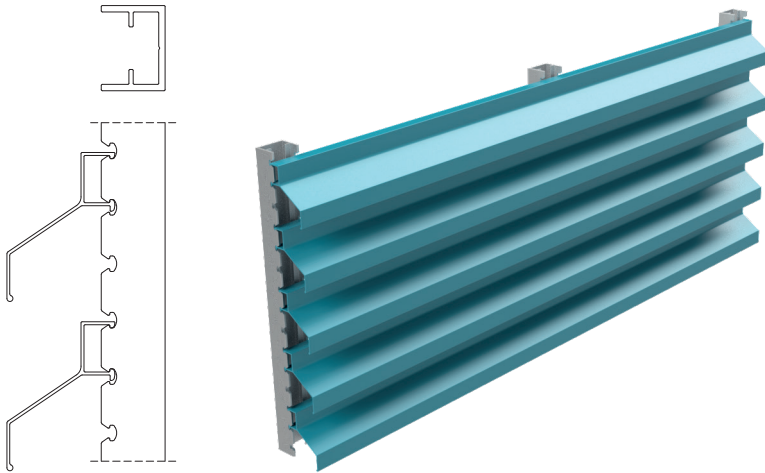
The visibility of the mass variations on the opposite side of the wall can be diminished e.g., by breaking up the surface with grooves as shown here.



The most likely locations of thermal tracks, visual and physical defects due to the extrusion method can be marked in the profile drawings if necessary.

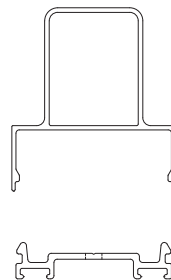
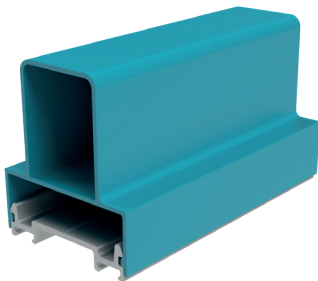
— Possible thermal track  
- - - Visible surface

# Joints



## Factors that should be considered when designing clip-on joints:

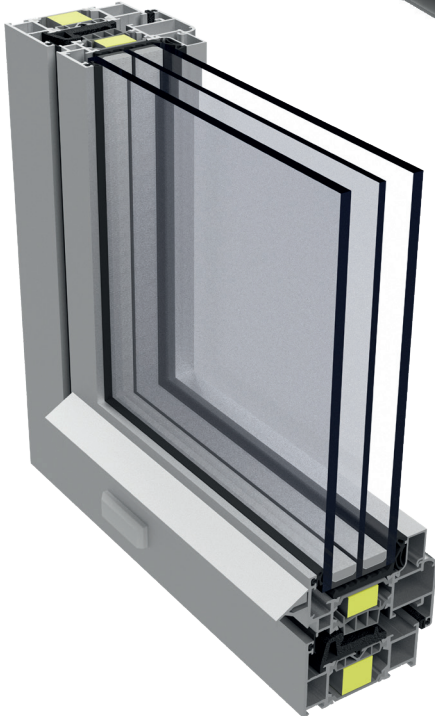
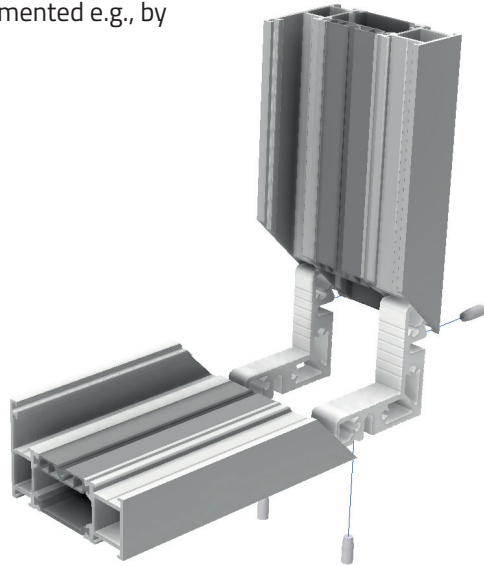
- Surface treatments affect joint function
- Powder coated and anodised profiles may require different dimensions/tolerances.
- Length of the profiles to be joined: straightness and twist tolerances
- Tolerances must preserve functionality
- Information about the counterpart and its tolerances (if e.g., a different material/an existing object is involved)



# Corner joints

Corner joints can be implemented e.g., by

- Riveted corner pieces
- Glued corner pieces
- Welding
- Screws



## Thermal breaks

Purso LK78X door and window system is exceptionally well sealed. It combines very low U-value and user friendliness.

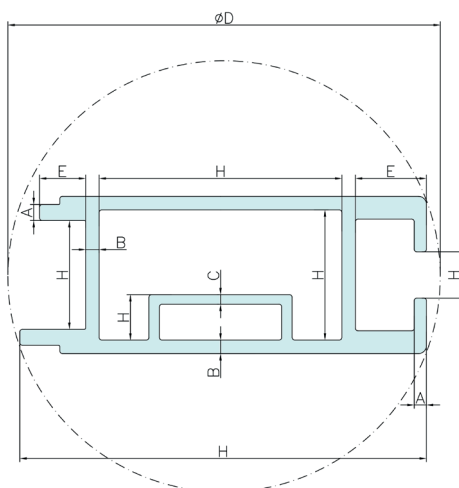
# The cross-section measurement tolerances for aluminium profiles

## EN AW-6060, EN AW-6063, EN AW-6101A, EN AW-6005A, EN AW-1070

| Dimension H | Tolerances on dimension H for circumscribing circle D |         |               |               |               |               |
|-------------|---|---------|---------------|---------------|---------------|---------------|
| Over        | Up to & incl.   | D ≤ 100 | 100 < D ≤ 200 | 200 < D ≤ 300 | 300 < D ≤ 500 | 500 < D ≤ 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         |

| Dimension E | Additions to the tolerances on H for dimensions across the ends of open ended profiles |        |
|-------------|--|--------|
| Over        | Up to & incl.  |        |
| -           | 20   | -      |
| 20          | 30   | ± 0,15 |
| 30          | 40   | ± 0,25 |
| 40          | 60   | ± 0,40 |
| 60          | 80   | ± 0,50 |
| 80          | 100  | ± 0,60 |

| Dimension E | Additions to the tolerances on H for dimensions across the ends of open ended profiles |        |
|-------------|--|--------|
| Over        | Up to & incl.  |        |
| 100         | 125  | ± 0,80 |
| 125         | 150  | ± 1,0  |
| 150         | 180  | ± 1,2  |
| 180         | 210  | ± 1,4  |
| 210         | 250  | ± 1,6  |
| 250         | -  | ± 1,8  |



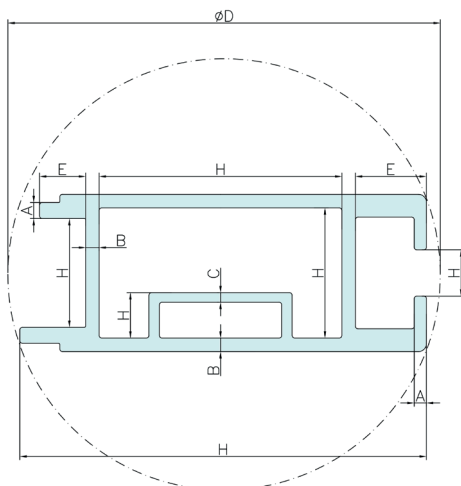
*Tighter tolerances to be checked separately.*

# The cross-section measurement tolerances for aluminium profiles

| EN AW-6082  |   |         |               |               |               |               |
|-------------|---|---------|---------------|---------------|---------------|---------------|
| Dimension H | Tolerances on dimension H for circumscribing circle D |         |               |               |               |               |
| Over        | Up to & incl.   | D ≤ 100 | 100 < D ≤ 200 | 200 < D ≤ 300 | 300 < D ≤ 500 | 500 < D ≤ 800 |
| -           | 10  | ± 0,40  | ± 0,50        | ± 0,55        | ± 0,60        | ± 0,70        |
| 10          | 25  | ± 0,50  | ± 0,70        | ± 0,80        | ± 0,90        | ± 1,1         |
| 25          | 50  | ± 0,80  | ± 0,90        | ± 1,0         | ± 1,2         | ± 1,3         |
| 50          | 100   | ± 1,0   | ± 1,2         | ± 1,3         | ± 1,6         | ± 1,8         |
| 100         | 150   | -       | ± 1,5         | ± 1,7         | ± 1,8         | ± 2,0         |
| 150         | 200   | -       | ± 1,9         | ± 2,2         | ± 2,4         | ± 2,7         |
| 200         | 300   | -       | -             | ± 2,5         | ± 2,8         | ± 3,1         |
| 300         | 450   | -       | -             | -             | ± 3,5         | ± 3,8         |

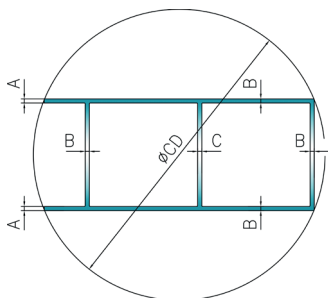
| Dimension E | Additions to the tolerances on H for dimensions across the ends of open ended profiles |        |
|-------------|--|--------|
| Over        | Up to & incl.  |        |
| -           | 20   | -      |
| 20          | 30   | ± 0,15 |
| 30          | 40   | ± 0,25 |
| 40          | 60   | ± 0,40 |
| 60          | 80   | ± 0,50 |
| 80          | 100  | ± 0,60 |

| Dimension E | Additions to the tolerances on H for dimensions across the ends of open ended profiles |        |
|-------------|--|--------|
| Over        | Up to & incl.  |        |
| 100         | 125  | ± 0,80 |
| 125         | 150  | ± 1,0  |
| 150         | 180  | ± 1,2  |
| 180         | 210  | ± 1,4  |
| 210         | 250  | ± 1,6  |
| 250         | -  | ± 1,8  |



*Tighter tolerances to be checked separately.*

# Wall thickness tolerances



## EN AW-6060, EN AW-6063, EN AW-6101A, EN AW-6005A, EN AW-1070

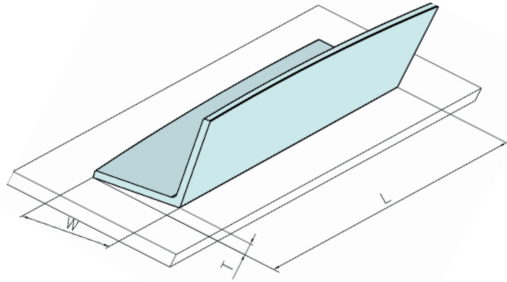
| Nominal wall thickness<br>A, B or C | Wall thickness tolerances, dimensions in mm |                     |                     |   |                     |                     |   |                     |                     |
|-------------------------------------|---|---------------------|---------------------|---|---------------------|---------------------|---|---------------------|---------------------|
|                                     | Wall thickness A<br>circumscribing circle   |                     |                     | Wall thickness B<br>circumscribing circle |                     |                     | Wall thickness C<br>circumscribing circle |                     |                     |
| over-at maximum                     | $CD \leq 100$                               | $100 < CD \leq 300$ | $300 < CD \leq 500$ | $CD \leq 100$                             | $100 < CD \leq 300$ | $300 < CD \leq 500$ | $CD \leq 100$                             | $100 < CD \leq 300$ | $300 < CD \leq 500$ |
| -1,5                                | $\pm 0,15$                                  | $\pm 0,20$          | $\pm 0,25$          | $\pm 0,20$                                | $\pm 0,30$          | -                   | $\pm 0,25$                                | $\pm 0,35$          | -                   |
| 1,5-3                               | $\pm 0,15$                                  | $\pm 0,25$          | $\pm 0,35$          | $\pm 0,25$                                | $\pm 0,40$          | $\pm 0,60$          | $\pm 0,30$                                | $\pm 0,50$          | $\pm 0,75$          |
| 3-6                                 | $\pm 0,20$                                  | $\pm 0,30$          | $\pm 0,40$          | $\pm 0,40$                                | $\pm 0,60$          | $\pm 0,80$          | $\pm 0,50$                                | $\pm 0,75$          | $\pm 1,00$          |
| 6-10                                | $\pm 0,25$                                  | $\pm 0,35$          | $\pm 0,45$          | $\pm 0,60$                                | $\pm 0,80$          | $\pm 1,00$          | $\pm 0,75$                                | $\pm 1,00$          | $\pm 1,20$          |
| 10-15                               | $\pm 0,30$                                  | $\pm 0,40$          | $\pm 0,50$          | $\pm 0,80$                                | $\pm 1,00$          | $\pm 1,20$          | $\pm 1,00$                                | $\pm 1,20$          | $\pm 1,50$          |
| 15-20                               | $\pm 0,35$                                  | $\pm 0,45$          | $\pm 0,55$          | $\pm 1,20$                                | $\pm 1,50$          | $\pm 1,70$          | $\pm 1,50$                                | $\pm 1,90$          | $\pm 2,00$          |
| 20-30                               | $\pm 0,40$                                  | $\pm 0,50$          | $\pm 0,60$          | $\pm 1,50$                                | $\pm 1,80$          | $\pm 2,00$          | $\pm 1,90$                                | $\pm 2,20$          | $\pm 2,50$          |
| 30-40                               | $\pm 0,45$                                  | $\pm 0,60$          | $\pm 0,70$          | -   | $\pm 2,00$          | $\pm 2,20$          | -   | $\pm 2,50$          | $\pm 2,70$          |
| 40-50                               | -   | $\pm 0,70$          | $\pm 0,80$          | -   |                     |                     |   |                     |                     |

## Seos EN AW-6082

| Nominal wall thickness<br>A, B or C | Wall thickness tolerances, dimensions in mm |                     |   |                     |   |                     |
|-------------------------------------|---|---------------------|---|---------------------|---|---------------------|
|                                     | Wall thickness A<br>circumscribing circle   |                     | Wall thickness B<br>circumscribing circle |                     | Wall thickness C<br>circumscribing circle |                     |
| over-at max.                        | $CD \leq 100$                               | $100 < CD \leq 300$ | $CD \leq 100$                             | $100 < CD \leq 300$ | $CD \leq 100$                             | $100 < CD \leq 300$ |
| -1,5                                | $\pm 0,20$                                  | $\pm 0,25$          | $\pm 0,30$                                | $\pm 0,40$          | $\pm 0,35$                                | $\pm 0,50$          |
| 1,5-3                               | $\pm 0,25$                                  | $\pm 0,30$          | $\pm 0,35$                                | $\pm 0,50$          | $\pm 0,45$                                | $\pm 0,65$          |
| 3-6                                 | $\pm 0,30$                                  | $\pm 0,35$          | $\pm 0,55$                                | $\pm 0,70$          | $\pm 0,60$                                | $\pm 0,90$          |
| 6-10                                | $\pm 0,35$                                  | $\pm 0,45$          | $\pm 0,75$                                | $\pm 1,00$          | $\pm 1,00$                                | $\pm 1,30$          |
| 10-15                               | $\pm 0,40$                                  | $\pm 0,50$          | $\pm 1,00$                                | $\pm 1,30$          | $\pm 1,30$                                | $\pm 1,70$          |
| 15-20                               | $\pm 0,45$                                  | $\pm 0,55$          | $\pm 1,50$                                | $\pm 1,80$          | $\pm 1,90$                                | $\pm 1,20$          |
| 20-30                               | $\pm 0,50$                                  | $\pm 0,60$          | $\pm 1,80$                                | $\pm 2,20$          | $\pm 2,20$                                | $\pm 2,70$          |
| 30-40                               | $\pm 0,60$                                  | $\pm 0,70$          | -   | $\pm 2,50$          | -   | -                   |
| 40-50                               | -   | $\pm 0,80$          | -   |                     |   |                     |

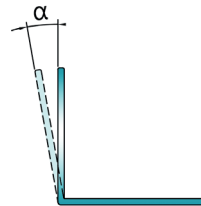
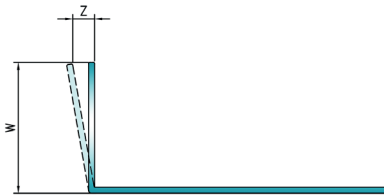


# Shape tolerances



## Twist tolerances (mm)

| Width W      | Twist tolerance T for length L       |                                |            |
|--------------|--------------------------------------|--------------------------------|------------|
|              | Dimension for the length of 1,000 mm | For the whole profile length L |            |
| over-at max. |                                      | at maximum 6 000               | over 6 000 |
| 0–30         | 1,20                                 | 2,50                           | 3,00       |
| 30–50        | 1,50                                 | 3,00                           | 4,00       |
| 50–100       | 2,00                                 | 3,50                           | 5,00       |
| 100–200      | 2,50                                 | 5,00                           | 7,00       |
| 200–300      | 2,50                                 | 6,00                           | 8,00       |

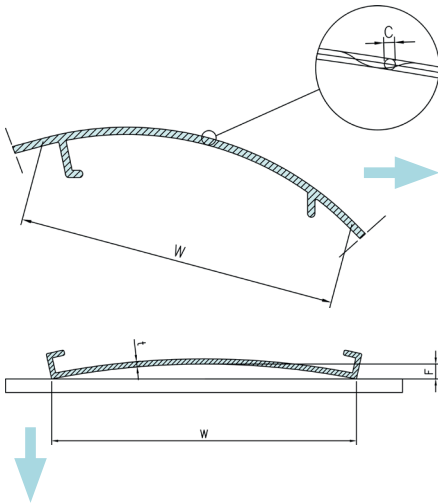


## Suorakulmaisustoleranssit (mm)

| Width W      | Largest permitted deviation Z |
|--------------|-------------------------------|
| over-at max. |                               |
| –30          | 0,40                          |
| 30–50        | 0,70                          |
| 50–80        | 1,00                          |
| 80–120       | 1,40                          |
| 120–180      | 2,00                          |
| 180–240      | 2,50                          |

For angles lesser or greater than  $90^\circ$  the greatest allowed deviation  $\alpha$  is max.  $\pm 1^\circ$

# Shape tolerances



| Curvature tolerances (mm) |  |
|---------------------------|--|
| Width W                   | Curvature tolerance = Circumscribing circle diameter C |
| over-at maximum           |  |
| -30                       | 0,30   |
| 30-60                     | 0,50   |
| 60-90                     | 0,70   |
| 90-120                    | 1,00   |
| 120-150                   | 1,20   |
| 150-200                   | 1,50   |
| 200-250                   | 2,00   |
| 250-300                   | 2,50   |

| Convexity and concavity tolerances (mm) |                               |         |               |
|---|-------------------------------|---------|---------------|
| Width W                                 | Largest permitted deviation F |         |               |
|   | Hollow profiles               |         | Open profiles |
| over-at maximum                         | $t \leq 5$                    | $t > 5$ |               |
| -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          |

## Length tolerances for extruded profiles

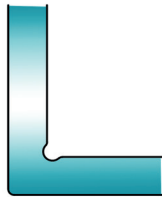
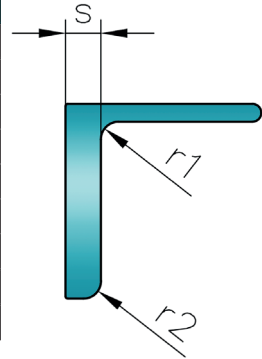
| Circumscribing circle diameter |               | Tolerances on fixed length L mm |                      |                       |                        |
|--------------------------------|---------------|---------------------------------|----------------------|-----------------------|------------------------|
| Over                           | Up to & incl. | $l \leq 2000$                   | $2000 < l \leq 5000$ | $5000 < l \leq 10000$ | $10000 < l \leq 15000$ |
| -                              | 100           | + 5/- 0                         | + 7/- 0              | + 10/- 0              | + 16/- 0               |
| 100                            | 200           | + 7/- 0                         | + 9/- 0              | + 12/- 0              | + 18/- 0               |
| 200                            | 450           | + 8/- 0                         | + 11/- 0             | + 14/- 0              | + 20/- 0               |

The squareness of cut ends shall be within half of the fixed length tolerance range specified in above table, e.g. for a fixed length tolerance of +10/-0 mm, the squareness of cut ends shall be within 5 mm.

# Corner radii

The following corner radii are recommended for corner design:

| Corner radii        |                           |       |
|---------------------|---------------------------|-------|
| Wall thickness (mm) | Recommended corner radius |       |
|                     | $r^1$                     | $r^2$ |
| over-up to          |                           |       |
| -2                  | 2                         | 1     |
| 2-4                 | 2,5                       | 1,6   |
| 4-6                 | 4                         | 2     |
| 6-10                | 6                         | 3     |
| 10-20               | 10                        | 5     |
| 20-35               | 16                        | 10    |
| 35-50               | 20                        | 16    |



*If the inner corner will be fitted with a precise fit, we can make a divot as shown in the picture.*

## Minimum corner radii to be followed

Due to technical reasons related to manufacturing process, perfectly sharp corners are not possible in practice. Minimum corner radii to be followed:

| Minimum corner radii |                                    |
|----------------------|------------------------------------|
| Wall thickness (mm)  | Sharp inner and outer corner radii |
| -3                   | 0,5                                |
| 3-6                  | 0,6                                |
| 5-10                 | 0,8                                |
| 10-18                | 1                                  |
| 18-30                | 1,2                                |
| 30-50                | 1,6                                |

# Guide to Purso profile drawings

Both the customer and Purso Oy to approve the profile drawing before ordering the extrusion die.

## Required initial information

- Order quantity / batch size
- Alloys
- Temper (T4/T5/T6/T66)
- ID-mark location
- Delivery length
- Surface requirements
- Visible surfaces
- Further processing
- Product application (e.g., weight bearing structures, decorative elements or possible joint with another element/profile)

Drawings to be sent in .dwg / .dxf format.  
We recommend not to use spines.

**Ix** = vertical surface moment of inertia

**Wx** = vertical bending resistance

**Iy** = horizontal surface moment of inertia

**Wy** = horizontal bending resistance

**f** = Full rad = fully rounded

**r** = radius of rounding marked in the profile drawing

**+** = radius of rounding marked in the profile drawing

**SB** = profile difficulty level

(the first letter indicates the profile classification:

**A** = open profile, **S** = closed profile, **P** = semi-hollow profile; the second letter indicates the difficulty class: A, B, C, D)

**Ref.** = the customer's own identifier (no.), if necessary

**Øc.a.s.** = diameter of a circle drawn around the profile

**P.m** = perimeter, length of the profile's outer surface

**S.a** = profile surface area

**Surf. Categ.** = surface quality category

**Kg/m** = weight of the profile per metre

**Alloy** = the aluminium alloy to be used; T5 = temper

**Toler.** = the tolerances to be used (EN 755-9, EN 12020-2)

**Anod.** = to be anodised: YES, not anodised: NO

**Identif.** = identifier: YES; NO

**Primary surface** ----- = primary visible surface

**Secondary surface** - - - - - = secondary visible surface, mild roughness and extrusion tracks allowed

**Visib. Surf.** YES = visible surface, NO = no visible surface

**Gen. thickn.** = wall thickness

**Gen. Rad.** = general radii

**Straightn.** = straightness and the tolerances used

**Flatness** = flatness and the tolerances used

**Torsion** = distortion and the tolerances used

**Customer no.:** = customer number

**Drawn** = creator of the drawing and the date of the drawing

**Insp.** = inspector

**T-no.** = profile tender number for the customer

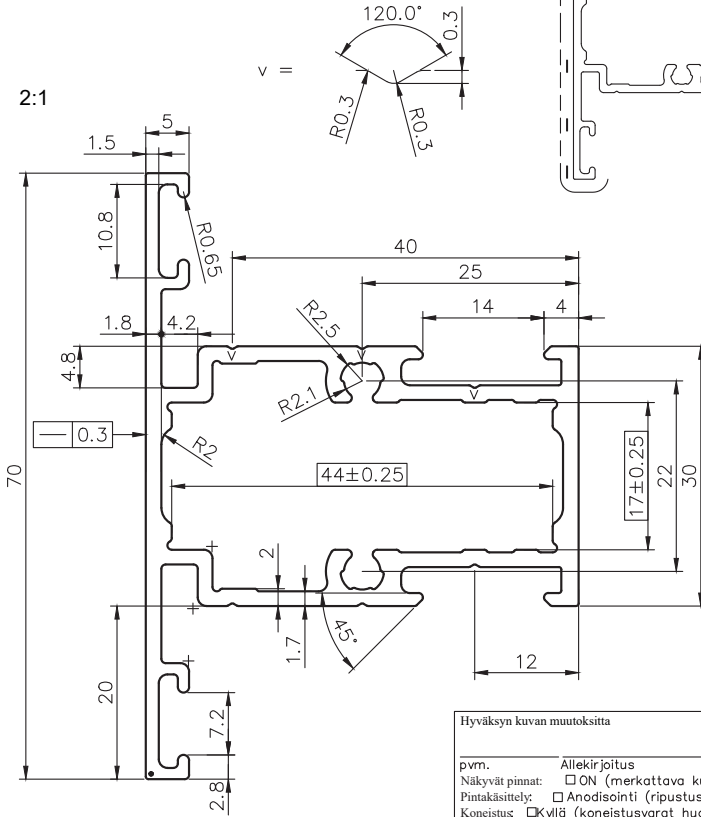
**No.** = profile number

**ID** = location of the identifier (area, in which the identifier can be placed)

|    |                       |
|----|-----------------------|
| Ix | 10.64 cm <sup>4</sup> |
| Wx | 3.04 cm <sup>3</sup>  |
| Iy | 14.97 cm <sup>4</sup> |
| Wy | 5.03 cm <sup>3</sup>  |

Preliminary

1:1

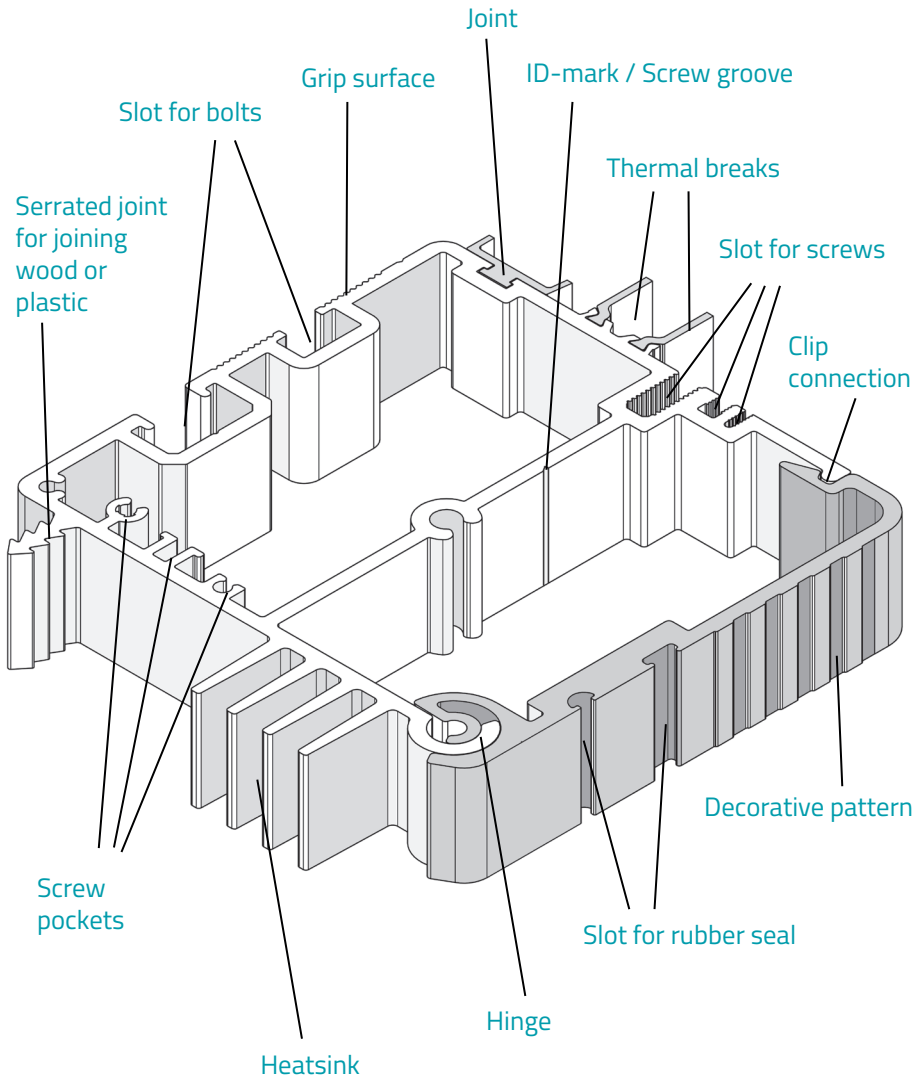


|                                |   |
|--------------------------------|---|
| Hyväksyn kuvan muutoksista     |   |
| pvm. _____ Allekirjoitus _____ |   |
| Näkyvät pinnat:                | <input type="checkbox"/> ON (merkittava kuvaan) <input type="checkbox"/> Ei             |
| Pintakäsittely:                | <input type="checkbox"/> Anodisointi (ripustuspaikat?) <input type="checkbox"/> Maalaus |
| Koneistus:                     | <input type="checkbox"/> Kyllä (koneistusvarat huomioitu) <input type="checkbox"/> Ei   |
| Hyväksyn ID-tunnisteuran:      | <input type="checkbox"/> Kyllä <input type="checkbox"/> Ei                              |
| ID →                           | on v-ura 0.3x90° koko profiilin pituudella.   |

|  |     |                  |          |   |               |   |   |         |                 |
|--|-----|------------------|----------|---|---------------|---|---|---------|-----------------|
| — Mahdollinen lämpöräita tai peilauma (Possible thermal track or reflection) |     |                  |          |   |               |   |   |         |                 |
| f FULL RAD • R0.5 + R1.0   |     |                  |          | Primary surface ----- Secondary surface ----- |               |   | Net visible surface Identification area ----- |         |                 |
| S C Ref.   | P50 |                  |          | Visib. surf. YES                              | Net. P.m. 0   | PMY   | Customer nr:                                  | 2230    | Drawn 271123SPa |
| Øc.a.s.  | 76  | Kg/m             | 1.231    | Gen. thickn.                                  | Gen. Rad. 0.5 |   |   | Insp.   |                 |
| P.m.   | 323 | Alloy AW-6063 T5 |          | Straightn. EN 755-9                           |               |   |   | Acc.    |                 |
| S.a.   | 456 | Toler.           | EN 755-9 | Flatness EN 755-9                             |               | 37200 SIURO FINLAND<br>TEL INT+358-03-3404111<br>FAX INT+358-03-3404310<br>www.purso.fi |   | T -no.  | 12345T          |
| Surf.gateg.  | N   | Anod.            | YES      | Identif.                                      | YES           |   |   | Torsion | EN 755-9        |

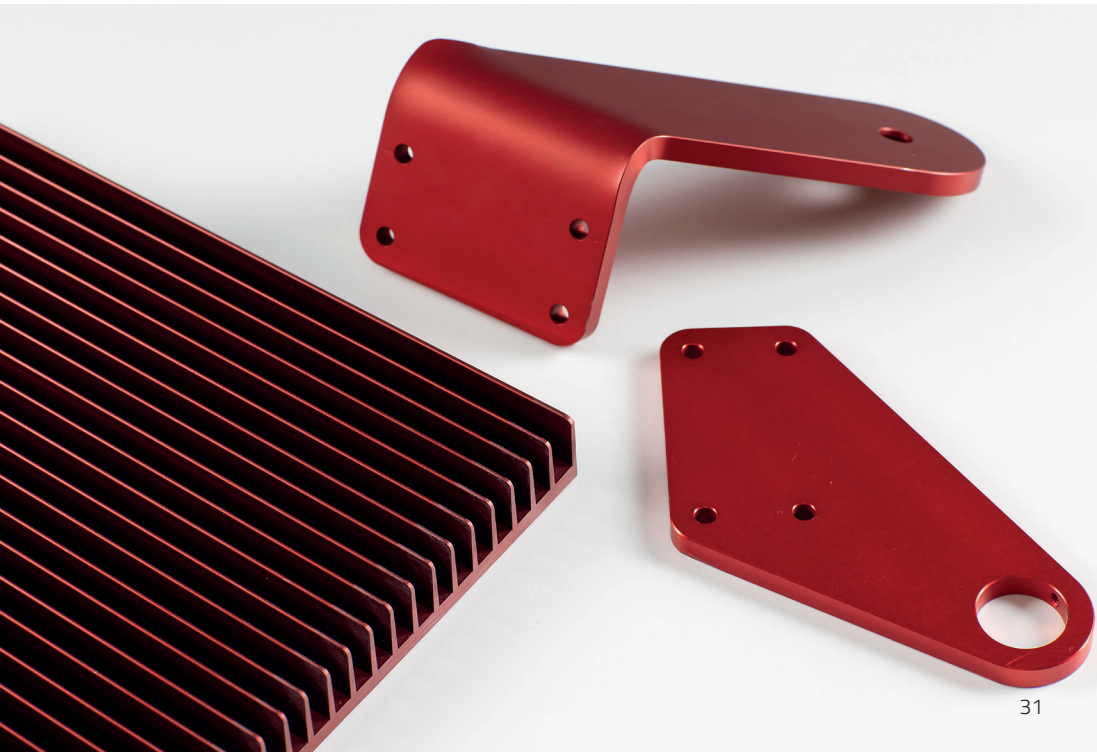
The profile drawings created by Purso Oy are the property of Purso Oy, and they may not be disclosed to third parties without a separate agreement.

# Profile design possibilities



# Surface treatments: anodising

- Anodising forms a protective oxide layer on the surface of the profile. The resulting surface is hard and withstands mechanical wear, with excellent weather resistance. Maximum profile length is 8,0 m. In some cases, we can provide anodising for longer profiles.
- A part of the anodising process, etching, removes a small amount of aluminium from the surface of the profile, which should be considered when designing functional surfaces.
- The most common anodising tone is silver/natural colour. We also provide colour options, from shades of brown all the way to black. Through our partners we also offer different tones of blue, red, and gold anodising. In addition, hard anodising is possible.
- It's not recommended to use anodised profiles for welding. Provided the welded structure is required to be anodised, it's advised to anodise the profile after welding.



# Surface treatments: Powder coating

- During the powder coating process, the powder accumulates in the corners and ends of the profile. The most challenging parts to powder coat are inner corners and u-shaped areas.
- The design affects the smoothness of the powder coated surface, which should be considered as much as possible during the design stage.
- When designing joints, hinges and other precise functional points, the powder coat layer should be taken into consideration.
- The thickness of the powder coated layer is 60-120  $\mu\text{m}$

## Other surface treatment options

- Tin coating
- Special electrolytic coatings (Surtec Iridite)
- Chrome coating
- Galvanising
- Gold and silver coating







*MDiverse further processing possibilities*

## Cutting and processing

- Cutting to fixed lengths
- Mitre cutting
- Drilling, milling, threading, and punching
- CNC machines with 3, 4 and 5 axes
- Processing lengths up to 15 metres
- Assembly
- Laser cutting
- Injection moulded plastic parts
- Heatsinks (lamella)
- Skiving

# Machining and profile design

Any planned machining should be considered already in the design phase:

- The interface between profile and machining standards:
- When planning machining, the impact of profile tolerances on the measurements should be considered. When necessary extra material must be added to the profile shape to meet the measurement and tolerance requirements.
- Sometimes the profile and machining tolerances can be contradictory:
- If the profile is under the agreed measurement but still within tolerance, it may not be possible to produce a machined product with a tighter tolerance.
- Extra material for machined surfaces
- Dimensions of screw pockets and functional areas should be planned with the profile tolerances in mind.
- Surface treatments: before / after
- (for example, small threads must be protected before anodising)
- Dimensions of bended components cannot fully comply with the most common machining standards.



# Common machining tolerances in accordance with the standard DIN ISO 2768-1

|                 | Permitted deviations from basic measurements (mm) |        |        |          |           |            |             |             |
|-----------------|---|--------|--------|----------|-----------|------------|-------------|-------------|
| Tolerance class | 0,5–3   | > 3–6  | > 6–30 | > 30–120 | > 120–400 | > 400–1000 | > 1000–2000 | > 2000–4000 |
| f (fine)        | ± 0,05  | ± 0,05 | ± 0,1  | ± 0,15   | ± 0,2     | ± 0,3      | ± 0,5       | -           |
| m (medium)      | ± 0,1   | ± 0,1  | ± 0,2  | ± 0,3    | ± 0,5     | ± 0,8      | ± 1,2       | ± 2         |
| c (coarse)      | ± 0,15  | ± 0,2  | ± 0,5  | ± 0,8    | ± 1,2     | ± 2        | ± 3         | ± 4         |
| v (very coarse) | -   | ± 0,5  | ± 1    | ± 1,5    | ± 2,5     | ± 4        | ± 6         | ± 8         |

|                               | Permitted deviations from basic measurements (mm) |       |     |
|-------------------------------|---|-------|-----|
| Tolerance class               | 0,5–3   | > 3–6 | > 6 |
| f (fine)<br>m (medium)        | ± 0,2   | ± 0,5 | ± 1 |
| c (coarse)<br>v (very coarse) | ± 0,4   | ± 1   | ± 2 |

|                        | Permitted deviations from basic measurements (mm) |        |         |         |        |
|------------------------|---|--------|---------|---------|--------|
| Tolerance class        | <10   | >10–50 | >50–120 | >50–400 | >400   |
| f (fine)<br>m (medium) | ± 1 °   | ± 30 ′ | ± 20 ′  | ± 10 ′  | ± 5 ′  |
| c (coarse)             | ± 1 ° 30 ′  | ± 1 °  | ± 30 ′  | ± 15 ′  | ± 10 ′ |
| v (very coarse)        | ± 3 °   | ± 2 °  | ± 1 °   | ± 30 ′  | ± 20 ′ |

*Separate tolerances should be given to nominal measurements under 0.5 mm.*

|                 | Fixed cutting |          |           |            |             |             |
|-----------------|---------------|----------|-----------|------------|-------------|-------------|
| Tolerance class | > 6–30        | > 30–120 | > 120–400 | > 400–1000 | > 1000–2000 | > 2000–4000 |
| m (medium)      | ± 0,2         | ± 0,3    | ± 0,5     | ± 0,8      | ± 1,2       | ± 2         |
| c (coarse)      | ± 0,5         | ± 0,8    | ± 1,2     | ± 2        | ± 3         | ± 4         |



## Welding

TIG, MIG and friction stir welding – all the aluminium alloys we use can be welded.

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## Bending

Any planned bending should be considered already in the design phase. Bending is carried out by programmed bending stations. The method of bending is defined by the shape and size of the profile and the required radius.

Other things to consider:

- Temper
- Dimensional accuracies
- Bending margins, e.g., in roll bending approx. + 500 mm / profile end
- Machining: before / after
- Surface treatment: before / after
- Packing

# Purso general terms 2023 (PGT-2023)

## Alloys

If not otherwise stated, the alloy used is EN AW-6063 T5, according to EN 573-3:1994. Mechanical properties are according to EN 755-2:1997. If anodizing quality is required this shall be separately and clearly stated in the order.

## Tolerances

Tolerances of the profiles are according to EN 755-9. Other tolerances can be used if separately agreed. Normal radius for sharp corners and edges is 0,5 mm.

## Orders

Profile and component orders to be sent by e-mail to: orders@purso.fi. Building system orders to: psarjatilaukset@purso.fi. The order must contain profile ID, ordered qty, request of delivery time, delivery- and invoicing address, VAT-number, customer order number and contact person.

## Order changes and cancellation

Confirmed order is always binding! In case of agreed changes / cancellation between parties, Purso reserves right to invoice 10% of the original order value. Changes to be always made in writing and apply on a case by case basis.

## Delivery lengths

Standard delivery length of the profiles is between 4,0-8,0 m, for building systems 6,6 m, tolerance according to EN 755. Other lengths can be delivered according to a separate agreement. Pls. note that max. length is 16 m.

## Prices

If not otherwise stated the prices given are in Euros (EUR) and based on the assumption that the goods are ordered in minimum consignments of 1000 kg per profile. Taxes, duties, levies or payments of similar kind are not included in the prices. Prices given are valid for deliveries during a period of one (1) month from the date of the offer.

## Terms of payment

Payment of each delivery shall be made against PURSO OY's invoice and prior to the delivery. Open credit is granted only against sufficient guarantees and shall be separately agreed. Interest on overdue payments will be charged at a rate stated on each invoice.

## Validity of the offers

If not otherwise stated, the given prices and conditions are valid for orders one (1) month from the date of the offer.

## Execution of orders

Orders for delivery of the goods are to be given in writing. No order is binding without a written acknowledgment from PURSO OY.

## Minimum quantities

Minimum ordering quantity of a standard or customized profile is 500 kg. For smaller quantities a separate setting cost will be charged.

## Terms of delivery

If not otherwise agreed prices given are based on the trade terms FCA Siuro, INCOTERMS 2020.

## Retention of title rights

Title of the delivered goods shall remain the property of Purso Oy until customer has completely met all its obligations arising from the business relationship. Unpaid Goods to be stored separately at customer. Extended retention of title is effective in countries where applicable according to law, among others in Germany ("erweiterter Eigentumsvorbehalt").

## Packing

Given prices are including standard export packing, i.e. cardboard box with wooden hoops, plastic wrap and PE carpet between layers.

## Deviations in quantity

Ordered amounts are considered approximate quantities only and the delivered quantities may differ from the ordered with +/- 10 %, but not less than +/- 50 kg. For components, delivered quantities may differ from order -0/+10%. Invoicing is done according to the delivered quantity.

## Remarks and claims

Remarks or claims concerning the delivered goods have to be made within 14 days and in transport damages within 7 days from the delivery at the customer. If no remarks have been made during this period of time, the goods delivered shall be deemed conforming to the order as to quality and quantity.

## Drawings

All drawings and models made by PURSO OY are the property of PURSO OY and may not be copied or disclosed to any third party without the written consent from PURSO OY.

## Anodized and powder coated profiles.

Hanging marks will appear by the sides and at the end of the profiles. In case additional support is needed in the middle of the profile, it may cause an additional mark.

## Storage of powder-coated, anodised and raw profiles

Profiles in their transport packaging, which are to be installed or processed further at a later stage, shall always be stored in a dry place, well protected from rain, direct sun light and any risk of mechanical damage. The packaging of profiles may not be wet nor be exposed to humidity.

## Surface care for powder-coated, anodised and raw profiles

Surfaces shall be inspected and cleaned at least once within 12 months: washing with a synthetic, neutral (pH 5-8) detergent solution followed by rinsing with clean water at room temperature. For cleaning no mechanical means such as steel wool, steel brushes etc. may be used. Furthermore, neither basic nor alkaline cleaning detergents may be used.

## Extrusion dies

All extrusion dies placed at PURSO OY, whether paid by the customer or PURSO OY, are the property of PURSO OY. Dies for customized profiles are used only by order from the original customer for the profile concerned or with his/her written consent. Dies will be stored three (3) years after last delivery of the profile whereafter they will be destroyed. By written agreement between the parties, dies can be stored for a longer period at the expense of the customer. All the rights for the dies will cease if the customer will be set up in liquidation, bankruptcy or if the operations cease. For first delivery produced with new die, no binding time of delivery can be given. New die(s) requires several trials / corrections before it is ready for production.

## Test reports

If customer wants test report for each delivery, separate cost will be charged. To be agreed at the latest upon order.

## Patents

PURSO OY takes no responsibility for possible patent or copyright violations or other infringements of industrial property rights concerning profiles made according to the customers model or drawing.

## Force Majeure

According to Orgalime S2000/NL17 In addition to the reasons mentioned in Orgalime S2000 / NL 17, machines or tools and the simultaneous failure of any backup dies in a way that makes contractual ones impossible to fulfilling obligations on time.

## Other conditions

The contract shall be governed by the substantive law of Finland. Other conditions according to ORGALIME S2000, except in Scandinavia according to NL 17.

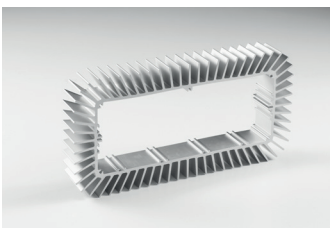
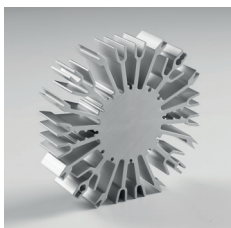
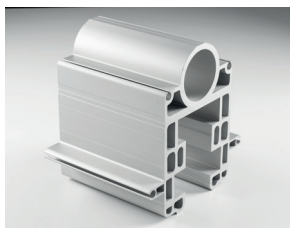
# Nedal Aluminium B.V.



*Nedal factory and headquarters in Utrecht, the*

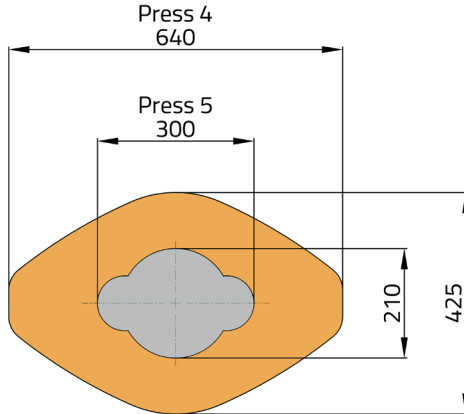
The Dutch extrusion plant Nedal Aluminium B.V. has been a part of the Purso Group since 2019. Established in 1938 Nedal was the first Dutch aluminium extruder.

Nedal specialises in the production of large aluminium sections and lighting columns. The company has 230 employees (2023) and is active in 30 European countries.



# Extrusion lines

Profile maximum length is 30 metres, maximum width is 650 mm and weight 0,3 kg/m – 100 kg/m



## Used aluminium alloys

EN AW-6005A

EN AW-6101B

EN AW-6060

EN AW-6106

EN AW-6061

EN AW-7003

EN AW-6063

EN AW-7020

EN AW-6082

EN AW-7108A



*Nedal in collaboration with CityCharge produces lighting columns that have integrated electrical charging points.*



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