

ROLLERI

TOOLING LAB

LASER CONSUMABLES
PUNCHING TOOLS - IRON WORKER
SHEAR BLADES
PANEL BENDING TOOLS

BENDING

ROLLERI TECH
SERVICES AND SPECIFICATIONS





ISO 9001 - ISO 45001
CERTIFIED
COMPANY



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Download Rolleri **Bending App**

It contains not only a lot of interesting contents but also sheet metal development calculator and bending ruler. Furthermore this free app contains a useful tool to scan the QR codes in this catalogue.



Ask for our punching tooling, ironworker, laser consumables, panel bending tooling and shear blades catalogues at www.rolleritools.com/download



The **Bending handbook** target is to supply practice and useful information to reach quickly the required result. A lot of examples, easy formulas and information which explain the proper attitude towards the bending process.



Create your account on www.rolleritools.com
You can use Rolleri website to check the delivery time, request quotes, stay update with the news, check prices and place orders directly.



Click on the QR code or scan it to find prices and availability. Create your account on www.rolleritools.com



Check standard available sectioning.
You can also ask for customized tool sectioning. Contact sales@rolleri.it to ask for feasibility and for customized products.



Download Rolleri **Clamping App**

Rolleri App contains a lot of useful information about our fast clamping systems, details for their installation and all user manuals.



BENDING TOOLS

R1 TOOLS TYPE

Compatible with press brakes: Accurl, Accurpress, ACL, Adira, Amada, Atlantic, Baykal, BL, Boschert, Boutillon, Bystronic, Beyeler, Euro-B, Coastone, Colgar, Dener, Deratech, Durmazlar, Ermaksan, Farina, Gade, Gasparini, Gecko, Gilardi, Gizelis, Haco, Hindustan, HPM, Iturraspe, Jfy, JMT, LFK, Metfab, MVD, Oriance, Prima Power, Promecam, Rico, Salvagnini, Schiavi, SMD, Sorg, Somo, Vicla, Vimercati, Warcom, Yawei,...

R2-R3 TOOLS TYPE

Compatible with press brakes: Darley, LVD, Safan, Trumpf and press brakes with NSCL system, Bystronic Beyeler RFA, RF, R, S

R4 TOOLS TYPE

Compatible with press brakes: LVD

R5 TOOLS TYPE

Compatible with press brakes: American

R6 TOOLS TYPE

Compatible with press brakes: Hämmerle-Bystronic

R7 TOOLS TYPE

Compatible with press brakes: Colly

R8 TOOLS TYPE

Compatible with press brakes: Colgar

R9 TOOLS TYPE

Compatible with press brakes: Gasparini (axial)

R10 TOOLS TYPE

Compatible with press brakes: Ajial Axial

Rx TOOLS TYPE

Compatible with press brakes: EHT, Ursviken and Weinbrenner

ROLLERI TECH, MODIFICATIONS AND SERVICES

Compatible with all types of press brakes

CLAMPING SYSTEMS, INTERMEDIATES AND ADAPTERS

Compatible with all types of press brakes

ROLLA-V AND SPECIAL DIES

Compatible with all types of press brakes

MARK FREE BENDING AND ACCESSORIES

Compatible with all types of press brakes

PANEL BENDING TOOLS

SHEAR BLADES

PUNCHING TOOLS

R1 TOOLS TYPE

Compatible with punching machines Amada, Amada ABS, Wilson HP, Wilson HP WLS, Mate Ultra Tec

R2 TOOLS TYPE

Compatible with Trumpf punching machines

RS TOOLS TYPE

Compatible with Salvagnini punching machines

SPECIAL TOOLS

Compatible with different types of punching machines

ACCESSORIES

Compatible with different types of punching machines

IRON WORKER

Iron cutting tools

LASER CONSUMABLES

Find our wide range of laser consumables: one of the widest in the market.

ROLLERI TECH

In these pages you will find examples of profiles even with difficult geometry, which have been studied and solved by Roller technicians.

Every profile corresponds to the new "F" nomenclature, like F1, F2, until the latest profiles studied which amount to far more than 100.

This is intended to be a new approach to technical solutions, as Roller proposes at least 5 solutions to bend every "F" profile and each of them is supplied with technical study and bending sequence.

Roller staff analyzes the profile, the number of profiles to be bent, the customer's press brake features, intended to be length, press force, daylight, stroke and tool type connection and prepares the most suitable technical study. Roller technicians and customer evaluate together the best solution for the return of investment.

Every proposal is provided with a drawing and bending sequence. To bend short profiles, Roller technicians always evaluate the possibility to propose stage bending in order to reduce the number of press brake setup and therefore the bending process time. To bend long profiles, Roller technicians reduce the sheet metal overturning in order to guarantee operators' safety.

Thanks to this technical approach, customer can choose technical solutions involving standard tooling, modified tooling or special tooling which can perform more bends in one hit or a combination of the 3 tooling possibilities.

For some applications Roller produces a special tool sample with its EDMs or sends the CAD drawing directly to our 3D printing machine in order to have a tool prototype ready in a few hours and test it immediately.

Roller new technical approach has the aim to give the best solution in a short time ensuring quality, safety and economic benefits.

REGISTER AT WWW.ROLLERITOOLS.COM AND BY SIGNING IN YOU CAN USE MANY USEFUL TOOLS FOR SHEET METAL WORKING.

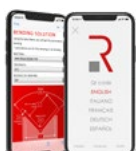
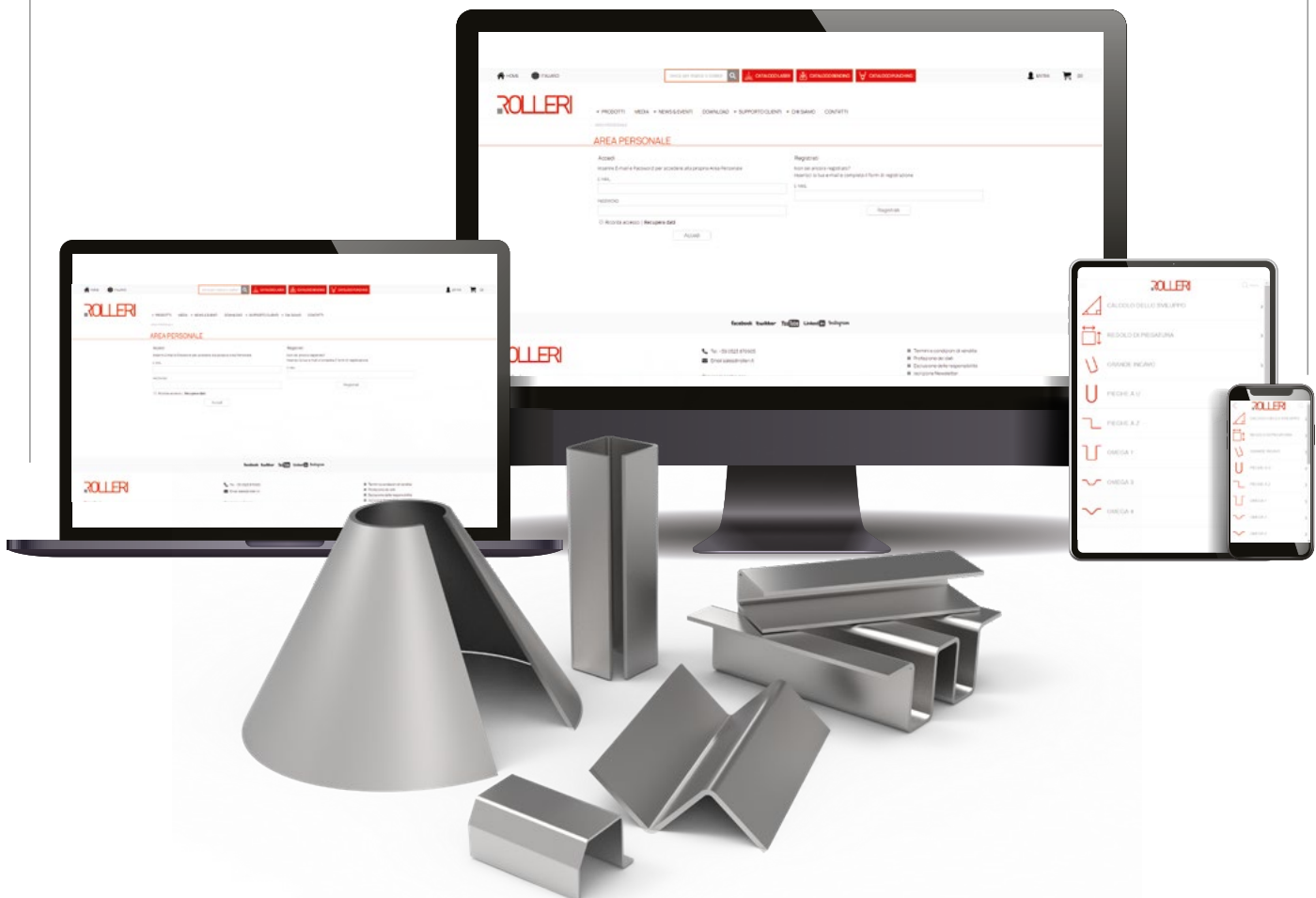
YOU WILL ALWAYS BE UP-TO-DATE ABOUT NEWS AND PROMOTIONS.

CHECK ALL ROLLERI TECH SERVICES ONLINE.

NEW ROLLERI **BENDING APP** CONTAINS USEFUL CALCULATION TOOLS FOR SHEET METAL WORKING.

YOU CAN FIND BENDING RULERS FOR MANY PROFILES LIKE:

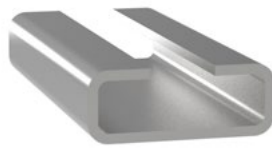
- JOGGLES
- U PROFILES
- OMEGA 1
- OMEGA 3
- OMEGA 4
- HINGES
- Z BENDS
- FLATTENING
- LARGE-RADIII
- BIG GOOSENECK PUNCHES
- ROLLA-V



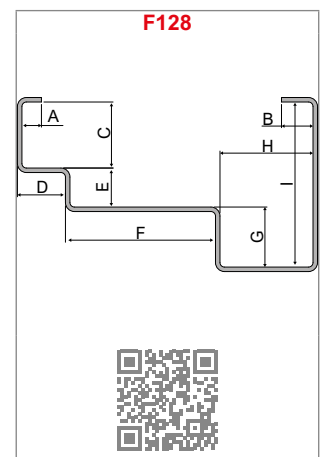
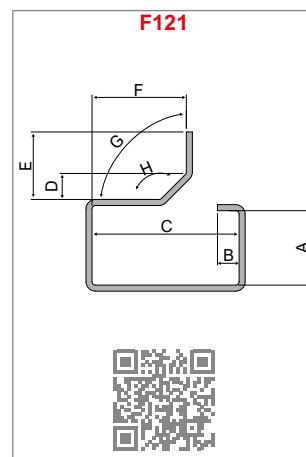
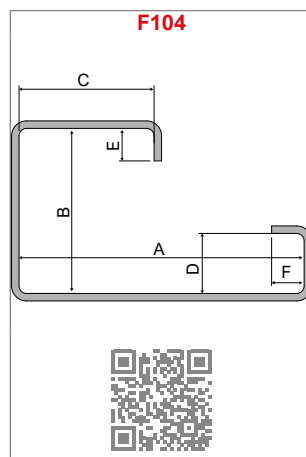
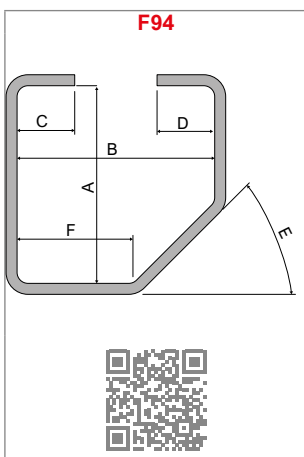
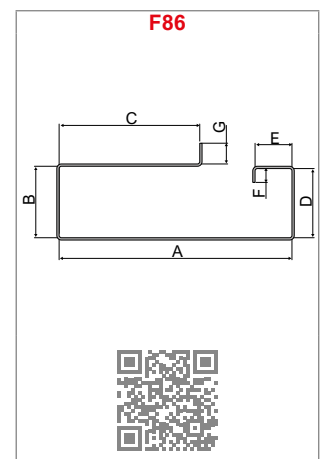
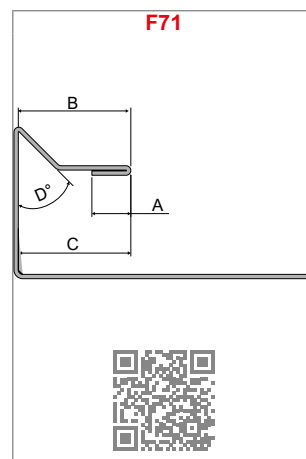
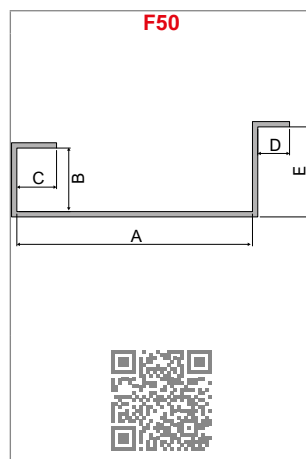
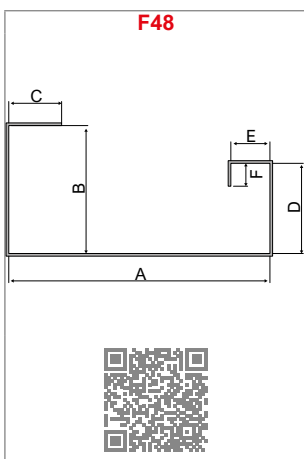
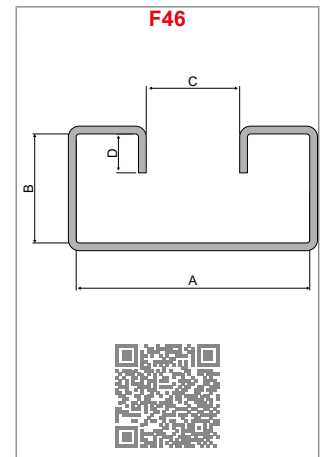
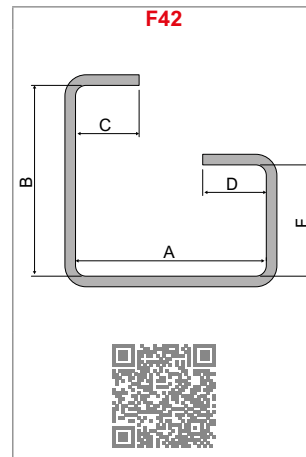
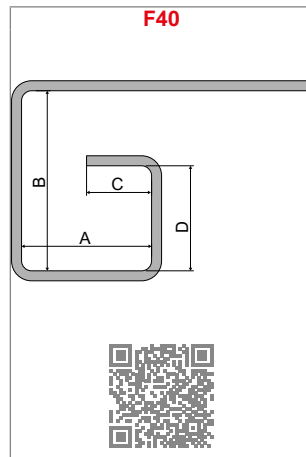
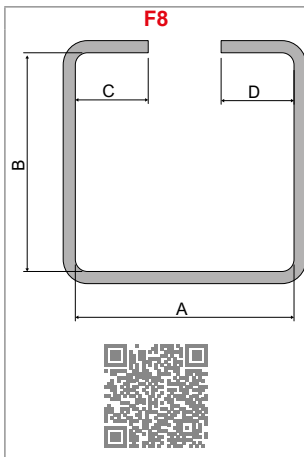
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"C" type profile



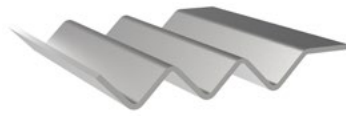
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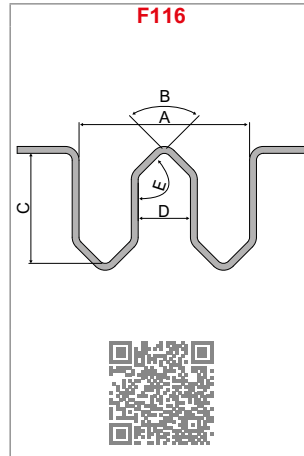
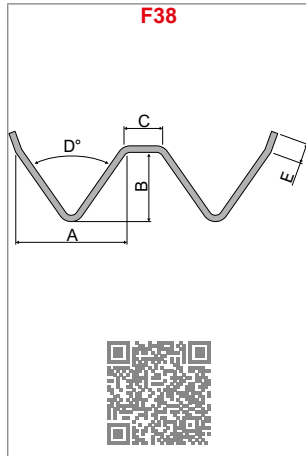
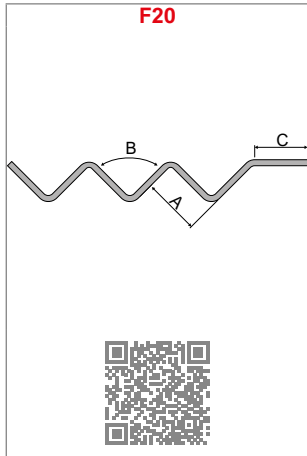


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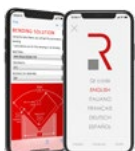
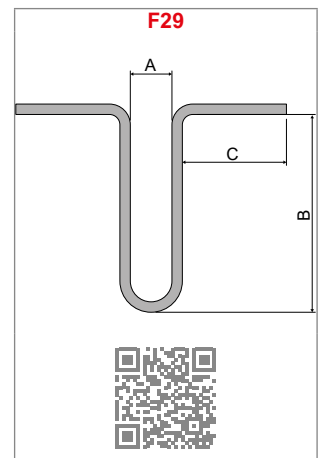
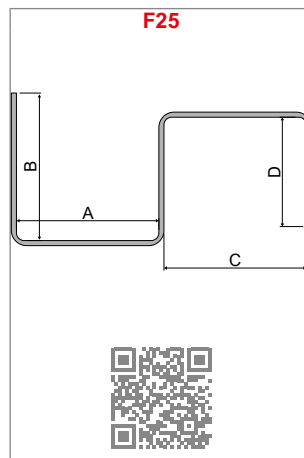
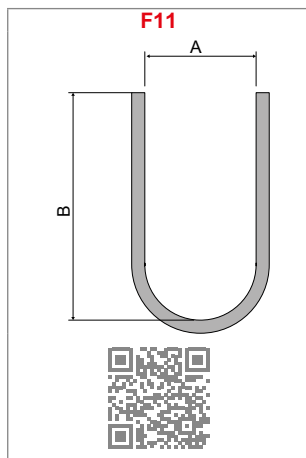
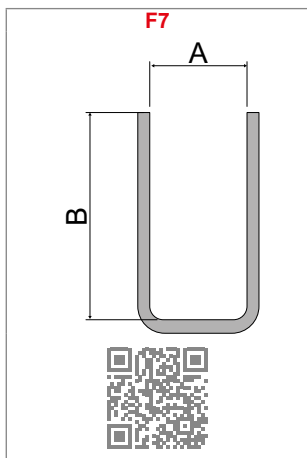
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"W" type profile



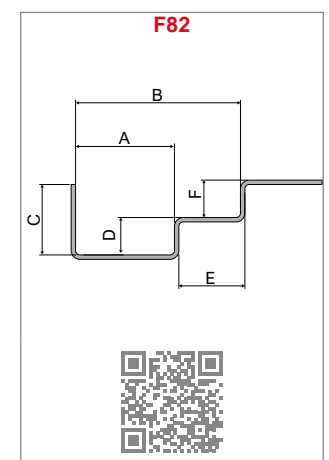
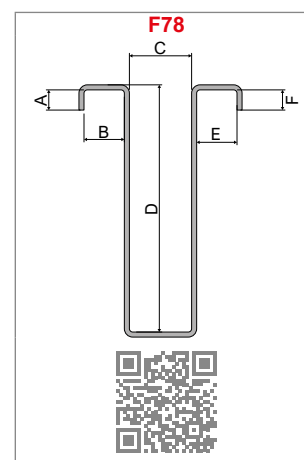
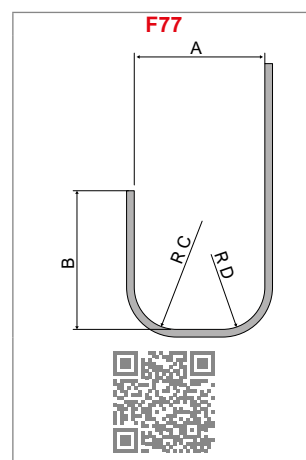
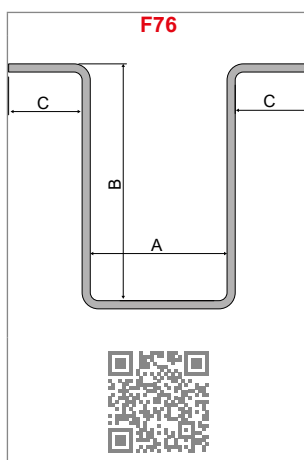
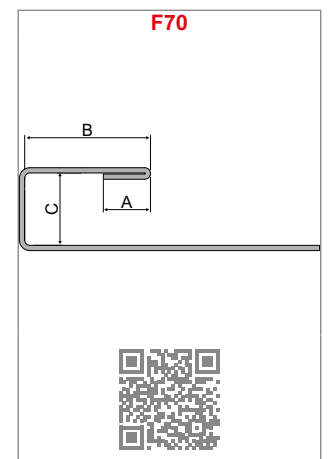
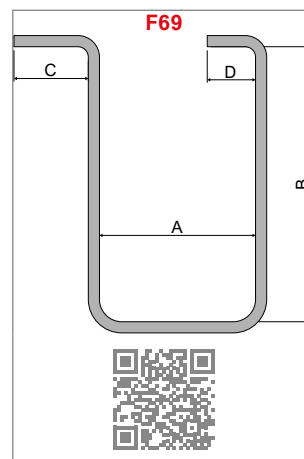
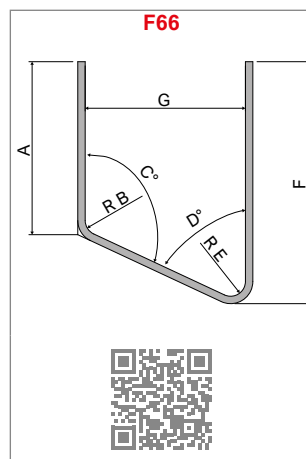
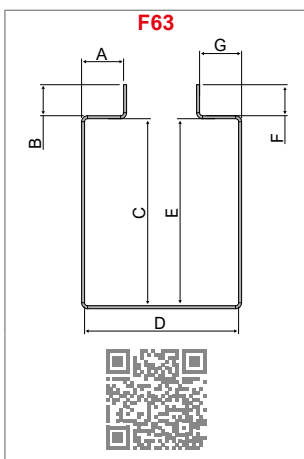
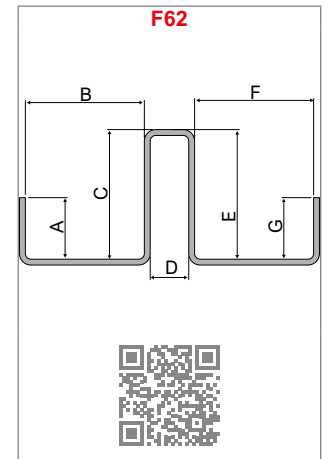
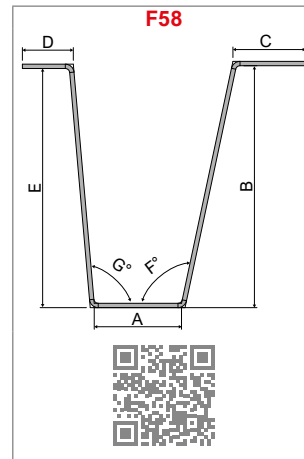
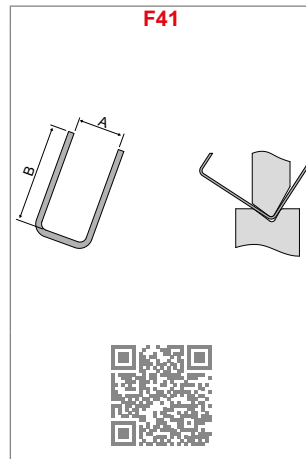
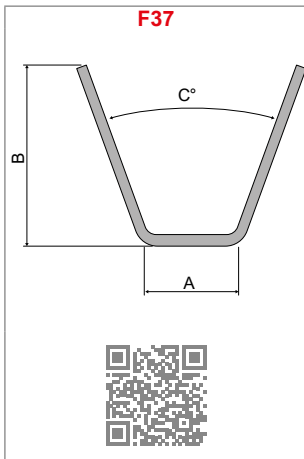
"U" type profile



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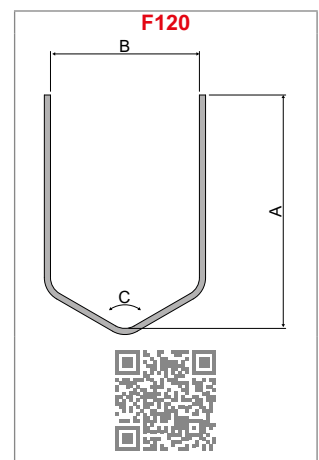
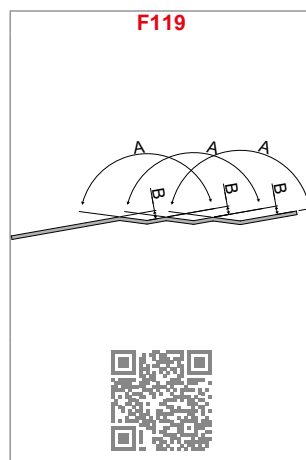
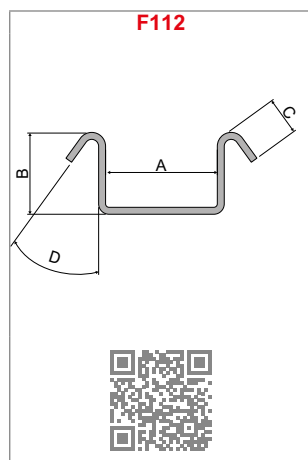
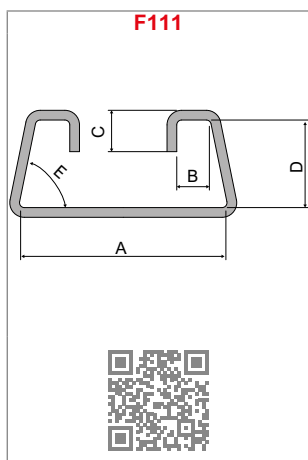
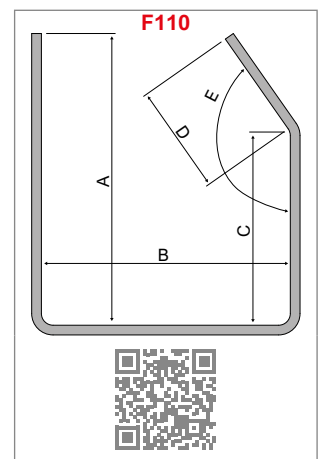
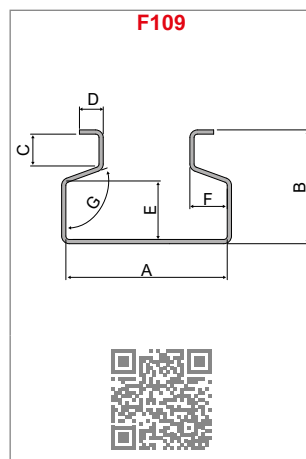
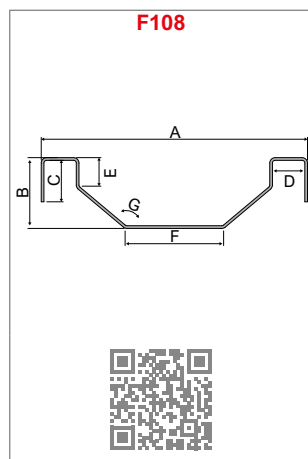
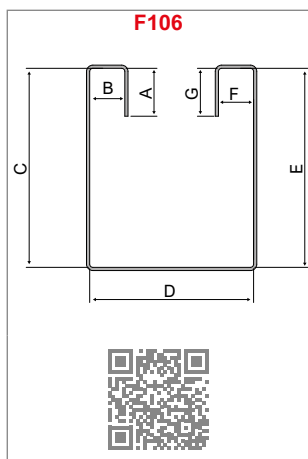
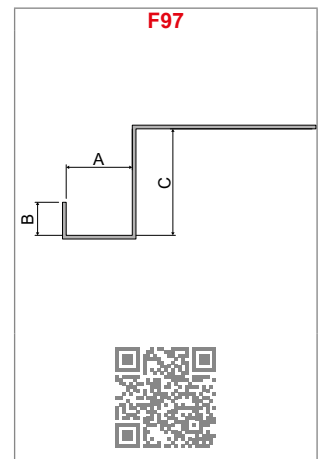
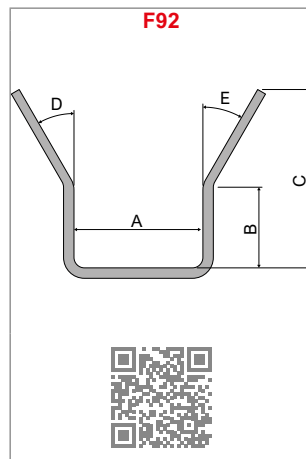
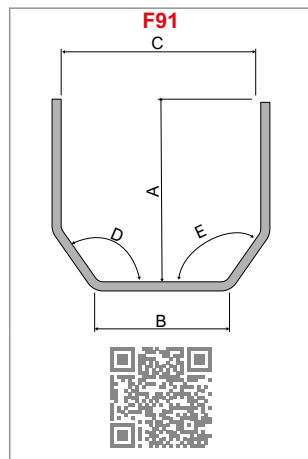
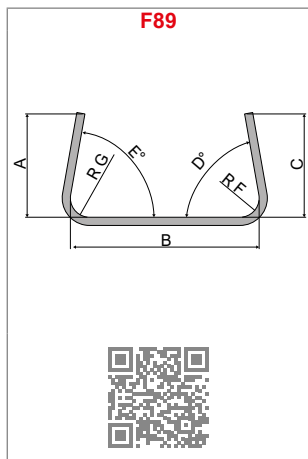
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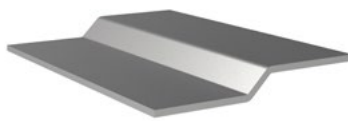
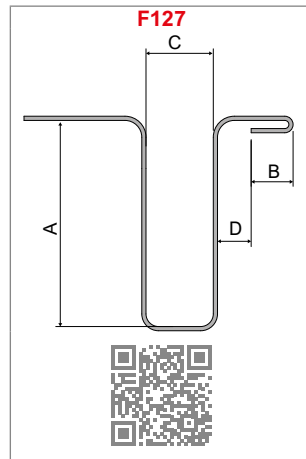
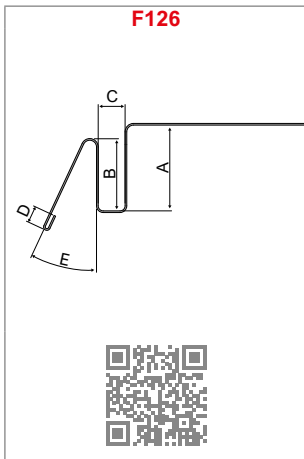
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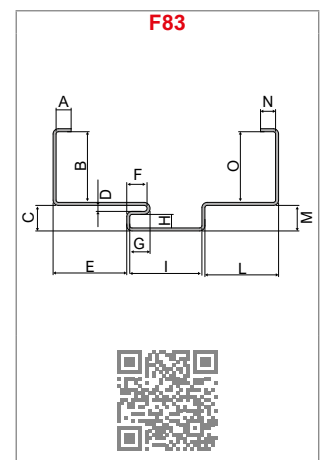
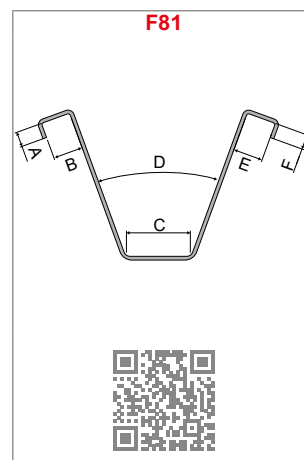
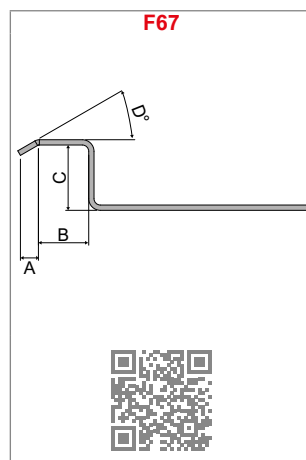
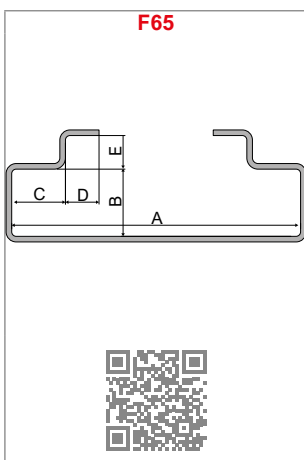
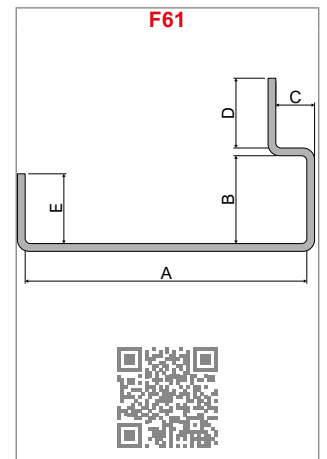
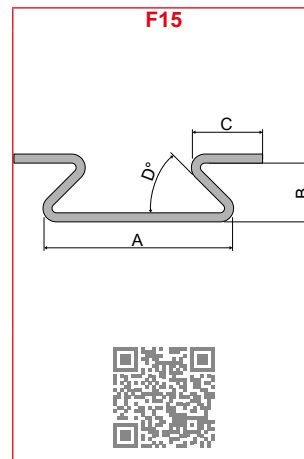
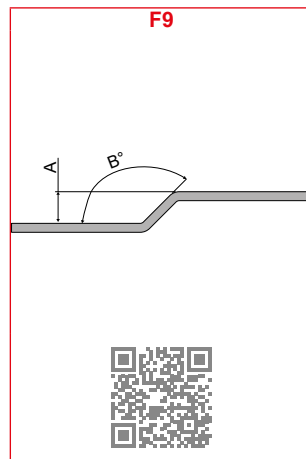
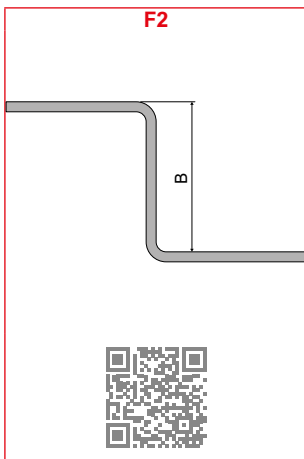
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"Z" type profile



(F2-F9-F15-F93-F102)
offset Z bend



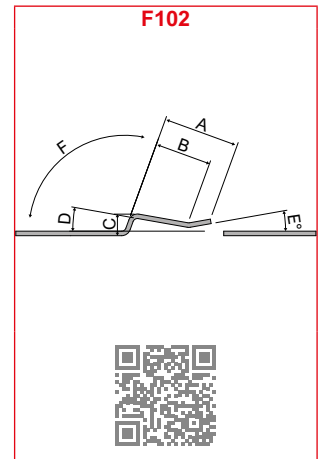
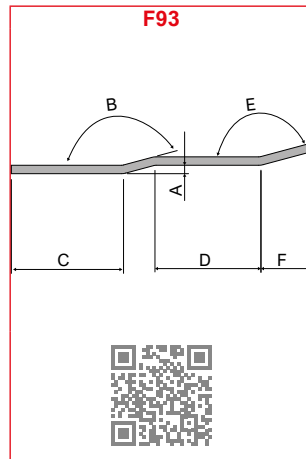
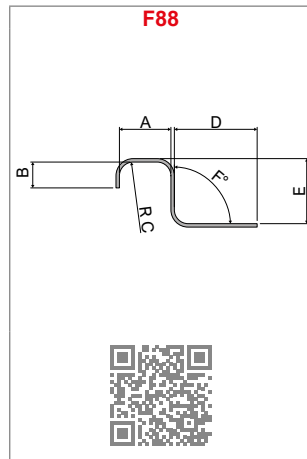
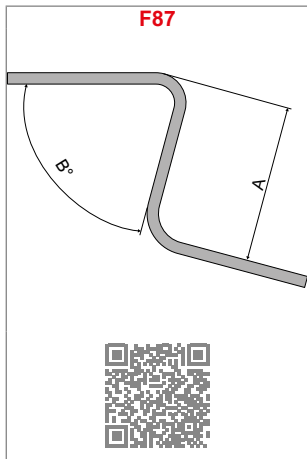
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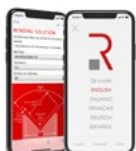
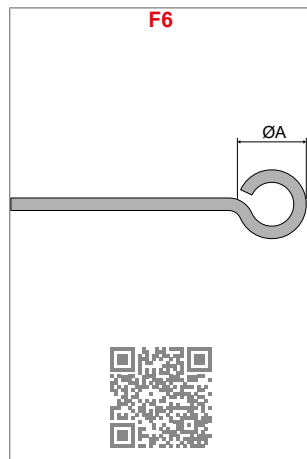
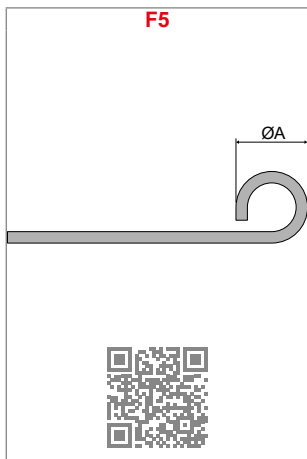


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"HINGES" type profile



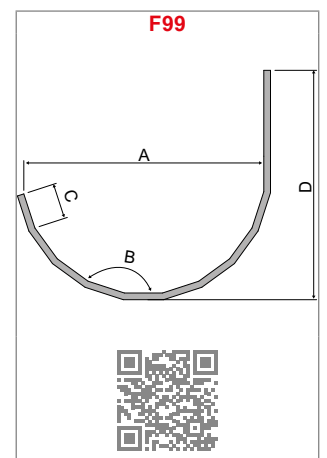
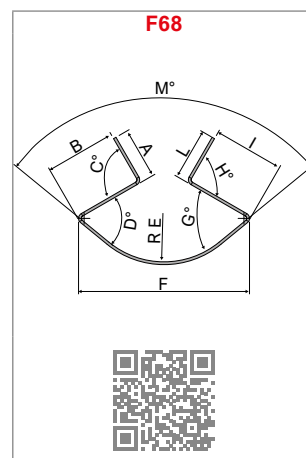
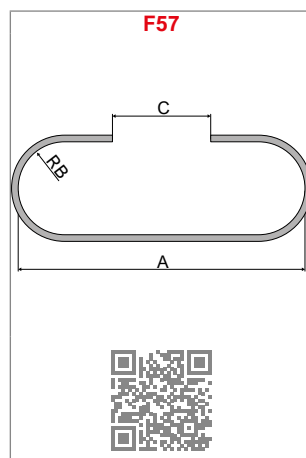
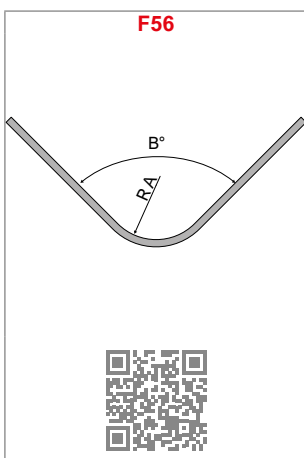
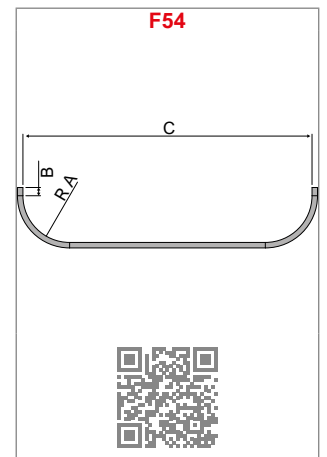
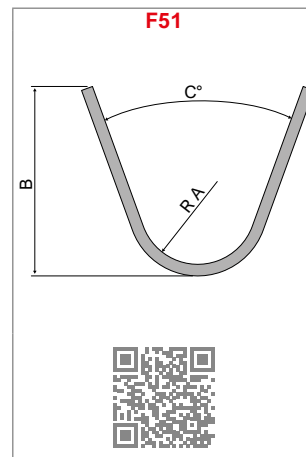
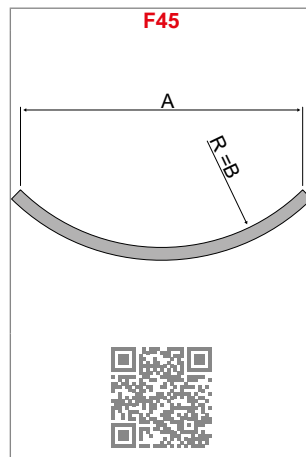
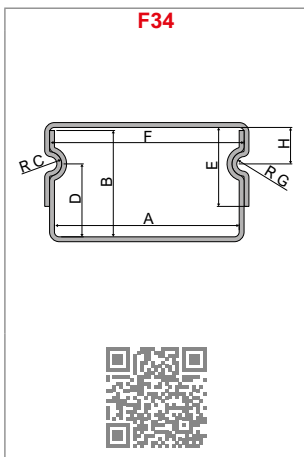
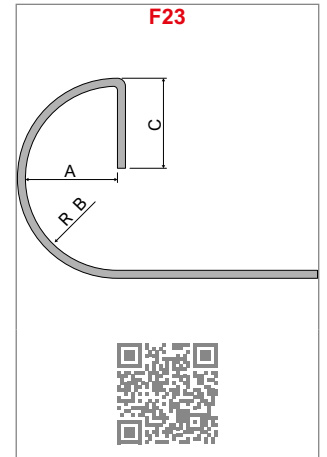
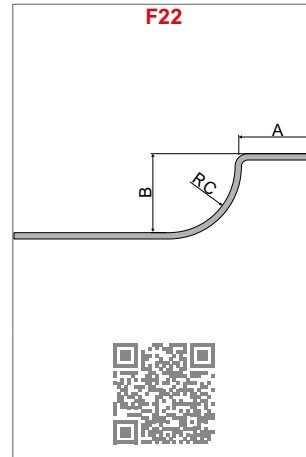
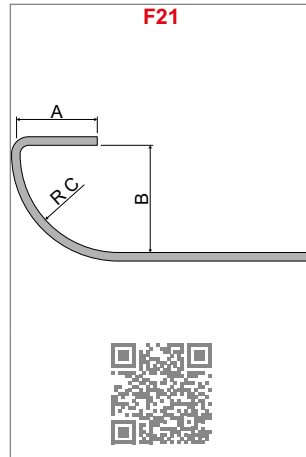
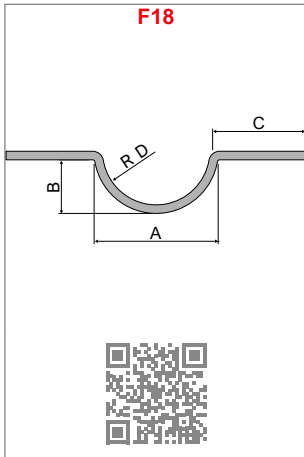
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"RADIUS" type profile



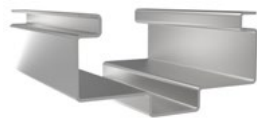
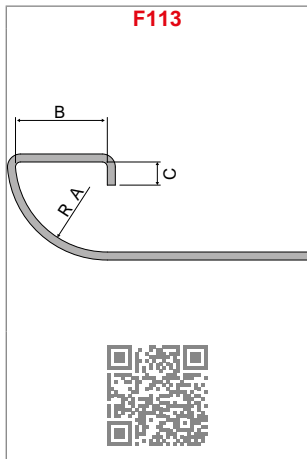
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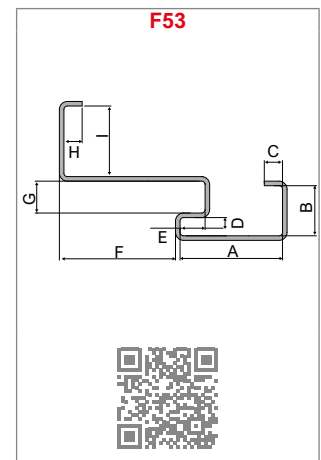
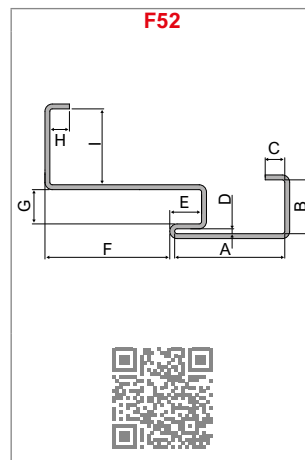
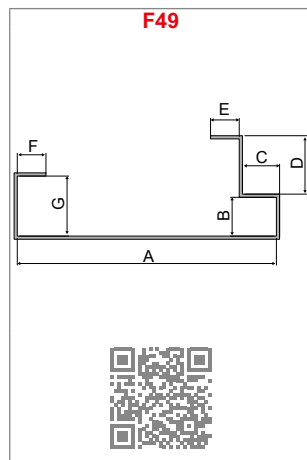
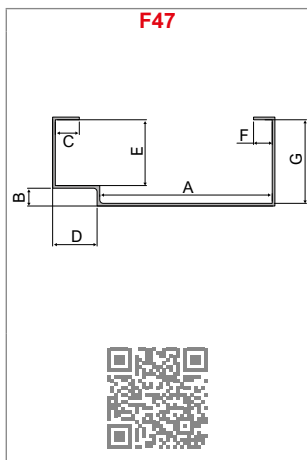
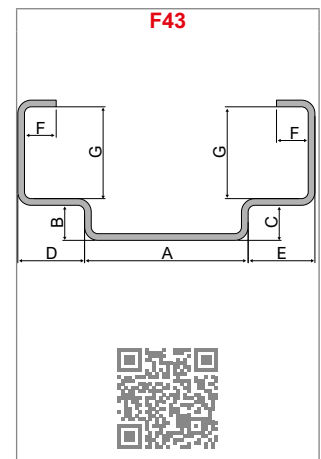
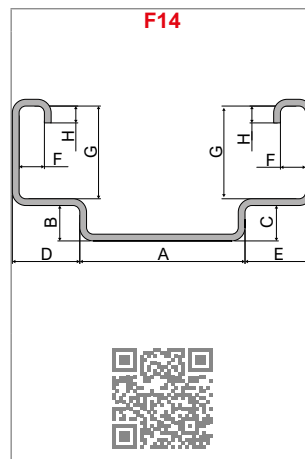
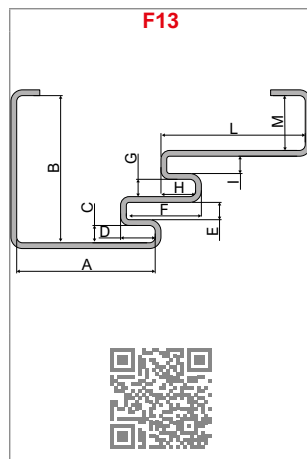
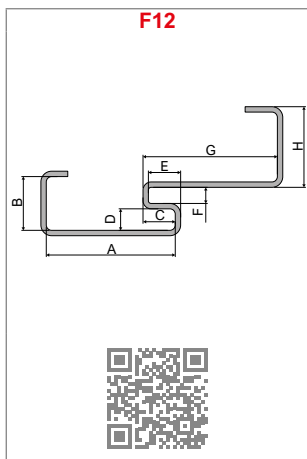


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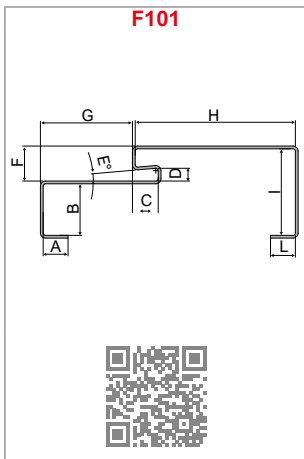
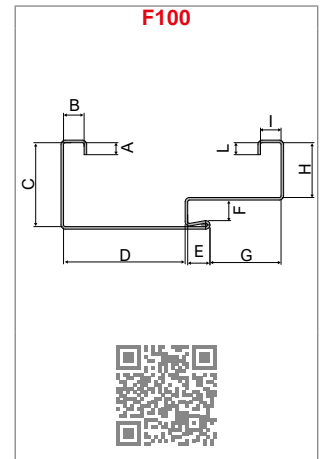
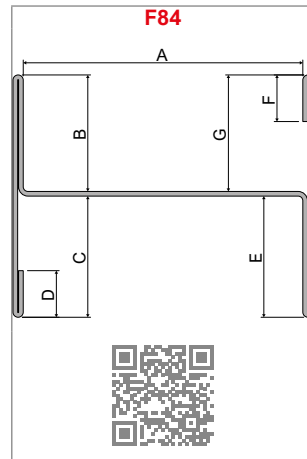
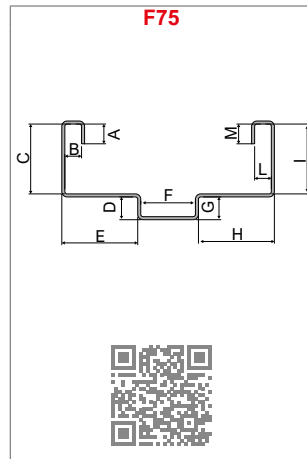
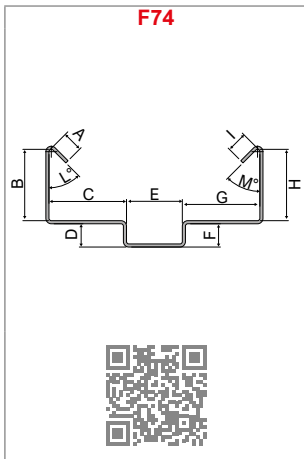
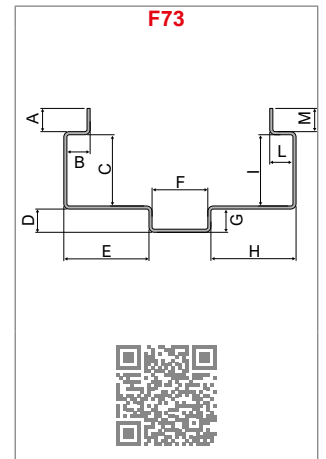
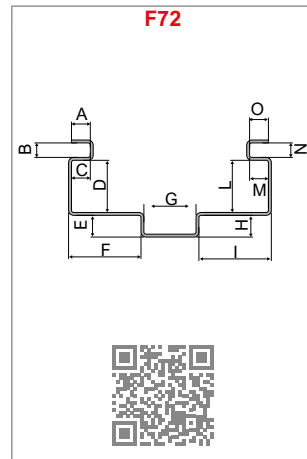
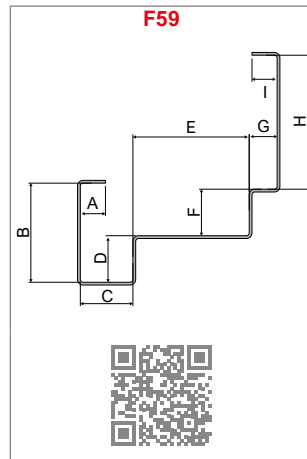
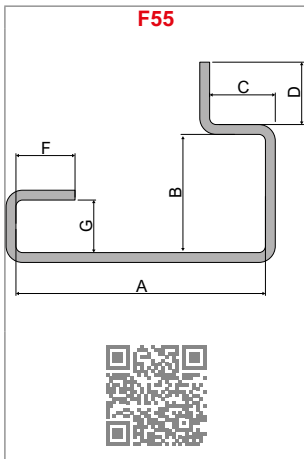
"DOORFRAME" type profile



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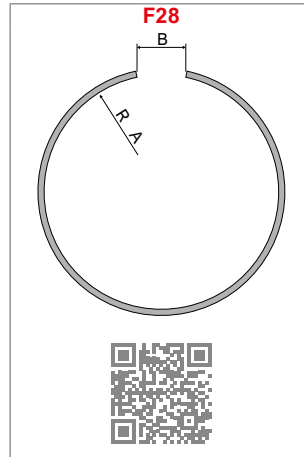
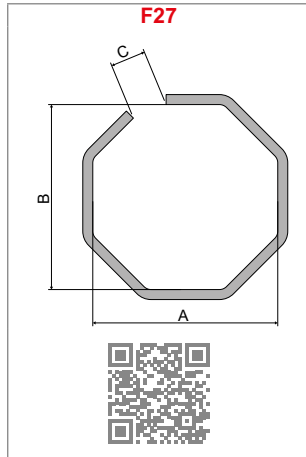
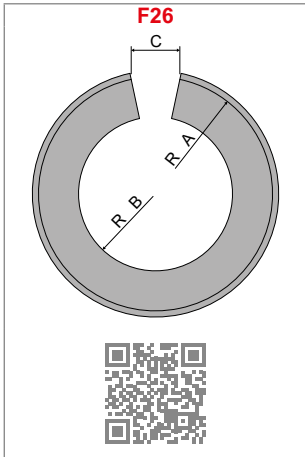


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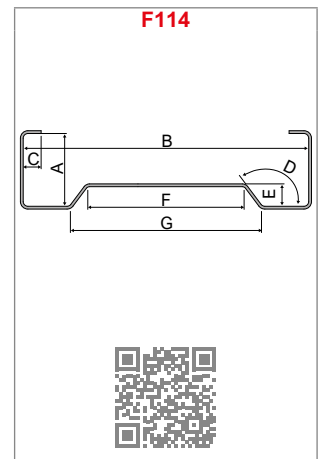
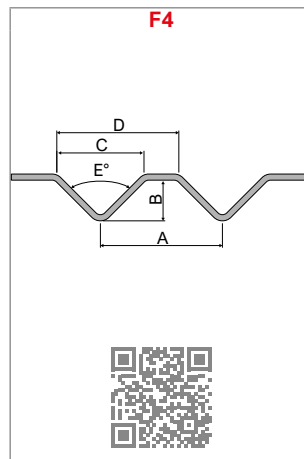
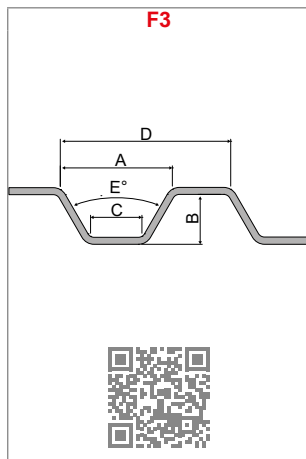
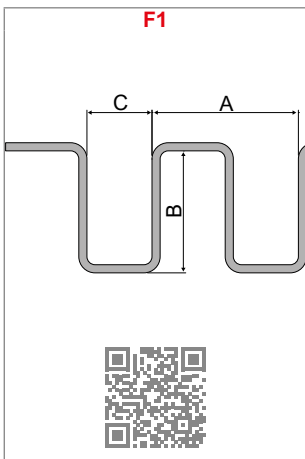
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"POLE" type profile



"OMEGA" type profile



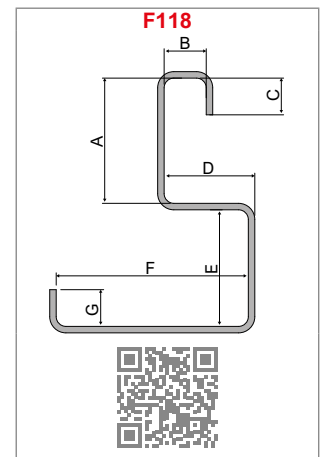
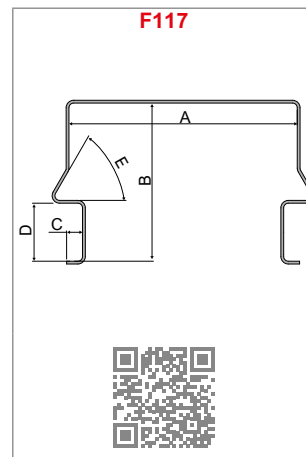
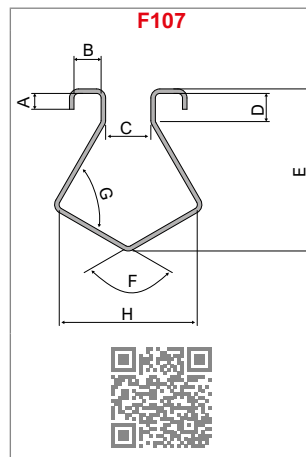
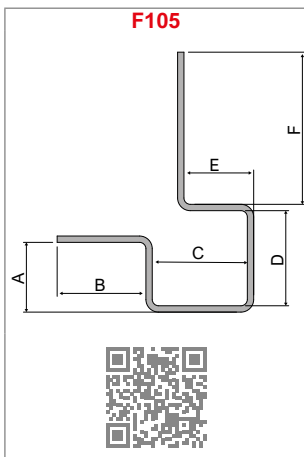
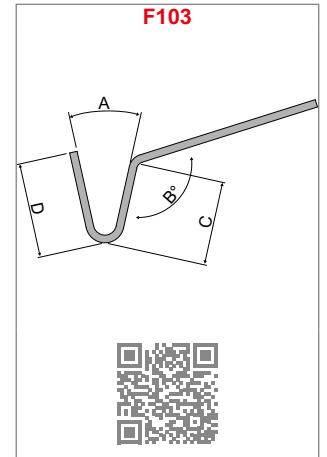
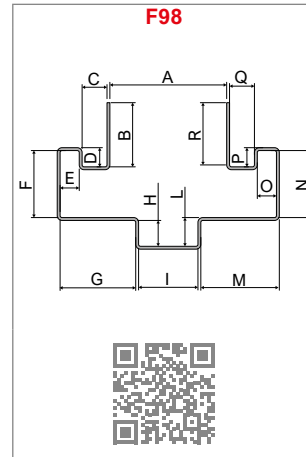
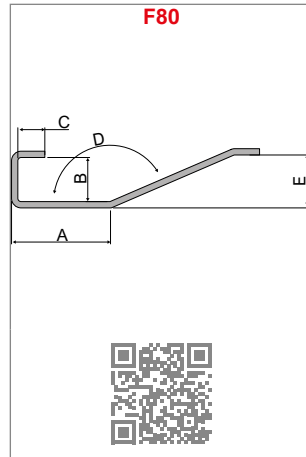
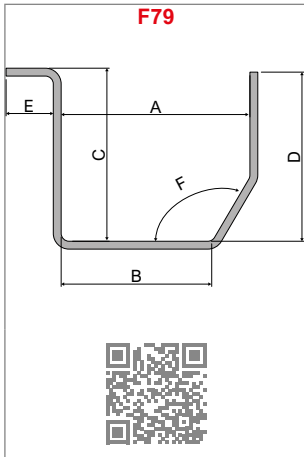
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"MULTIPLE BENDS" type profile



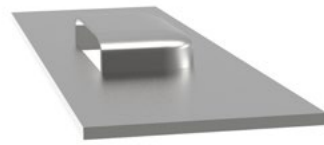
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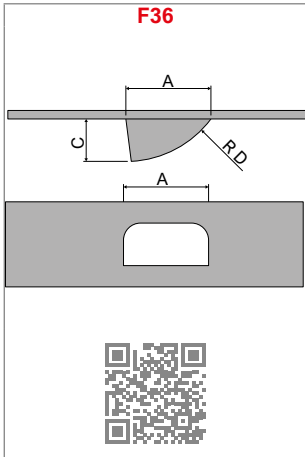


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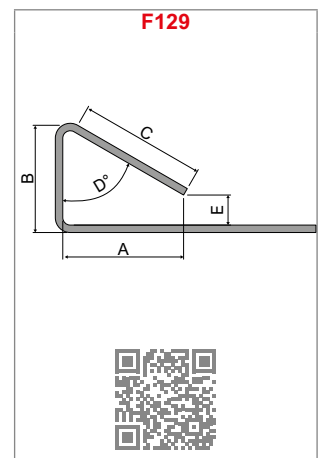
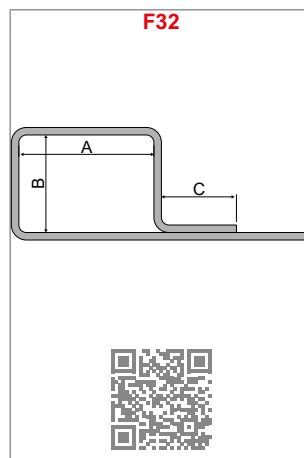
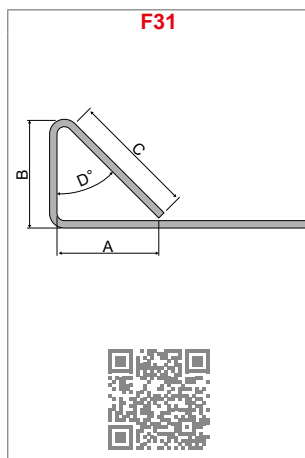
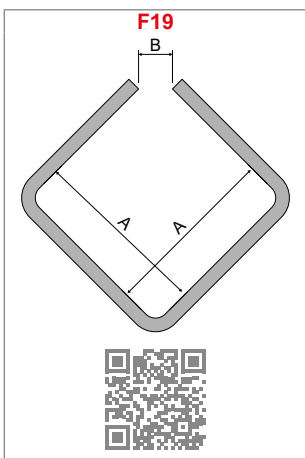
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"LOUVERS" type profile



"CLOSED" type profile



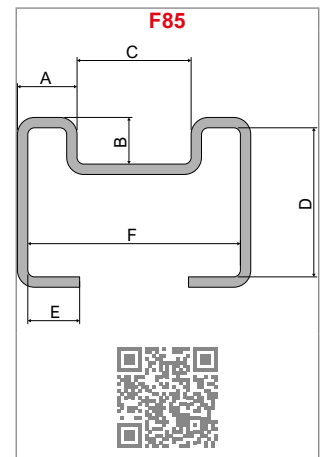
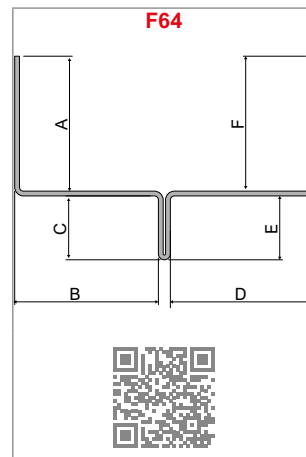
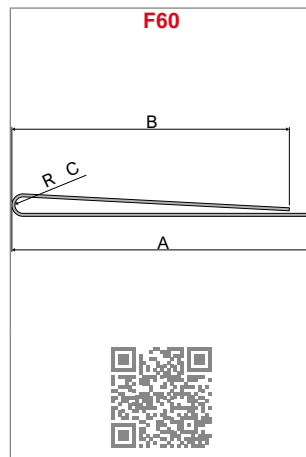
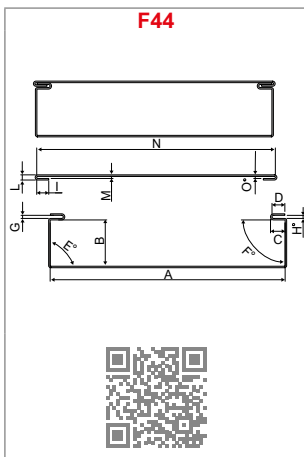
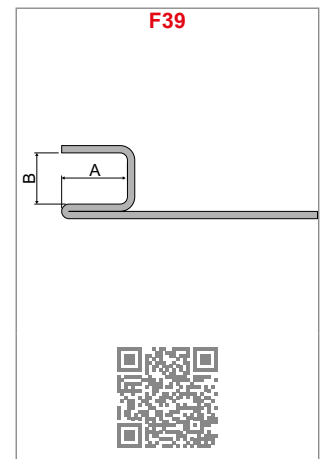
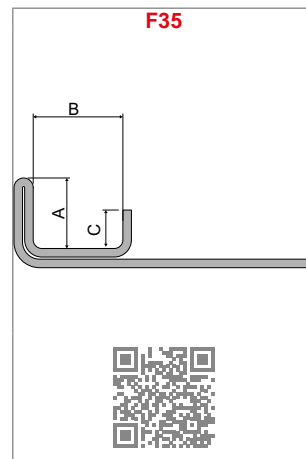
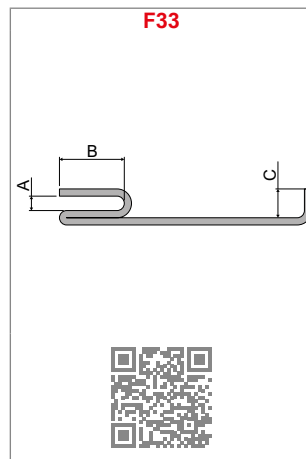
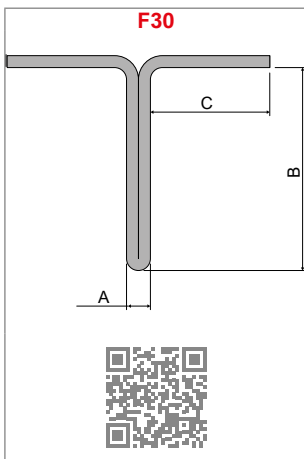
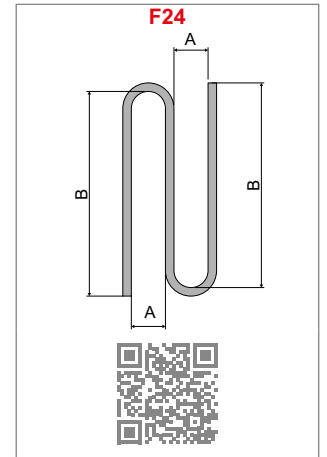
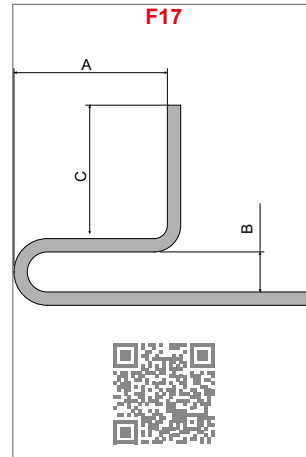
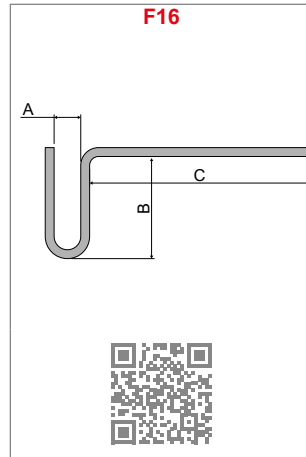
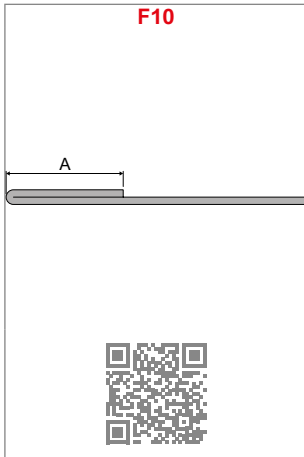
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FLATTENED profiles



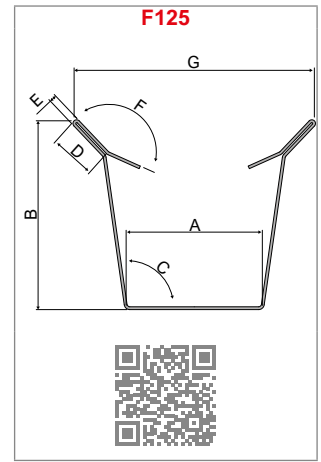
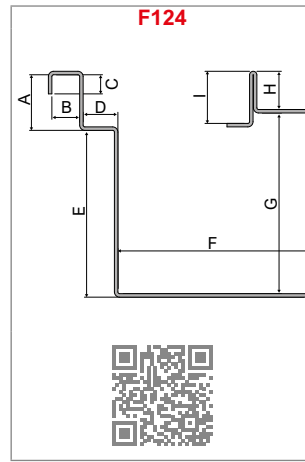
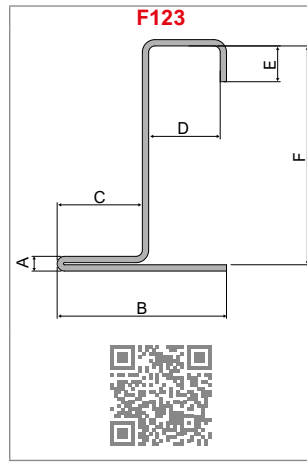
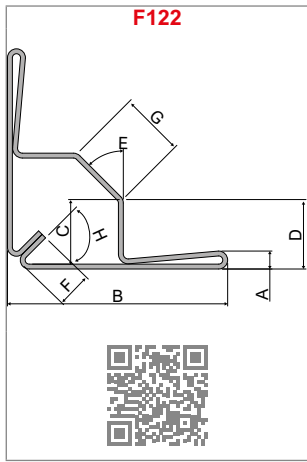
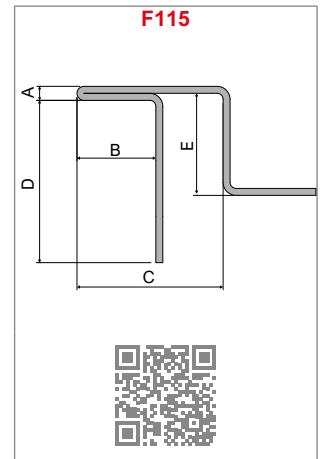
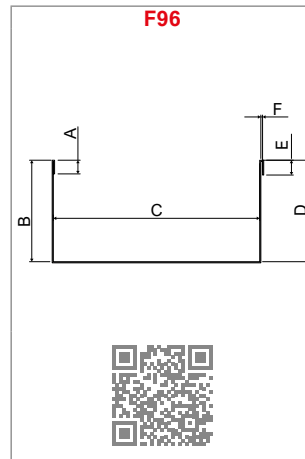
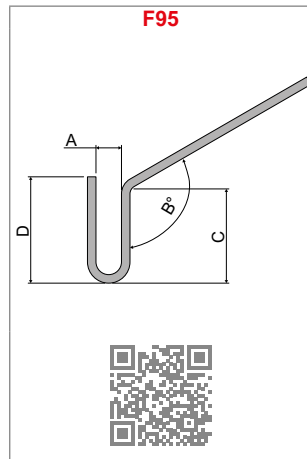
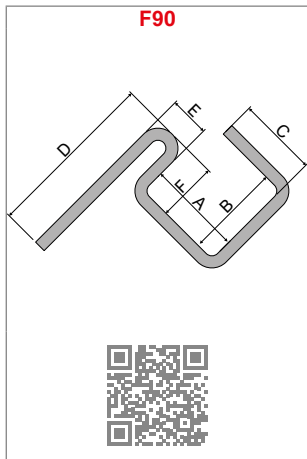
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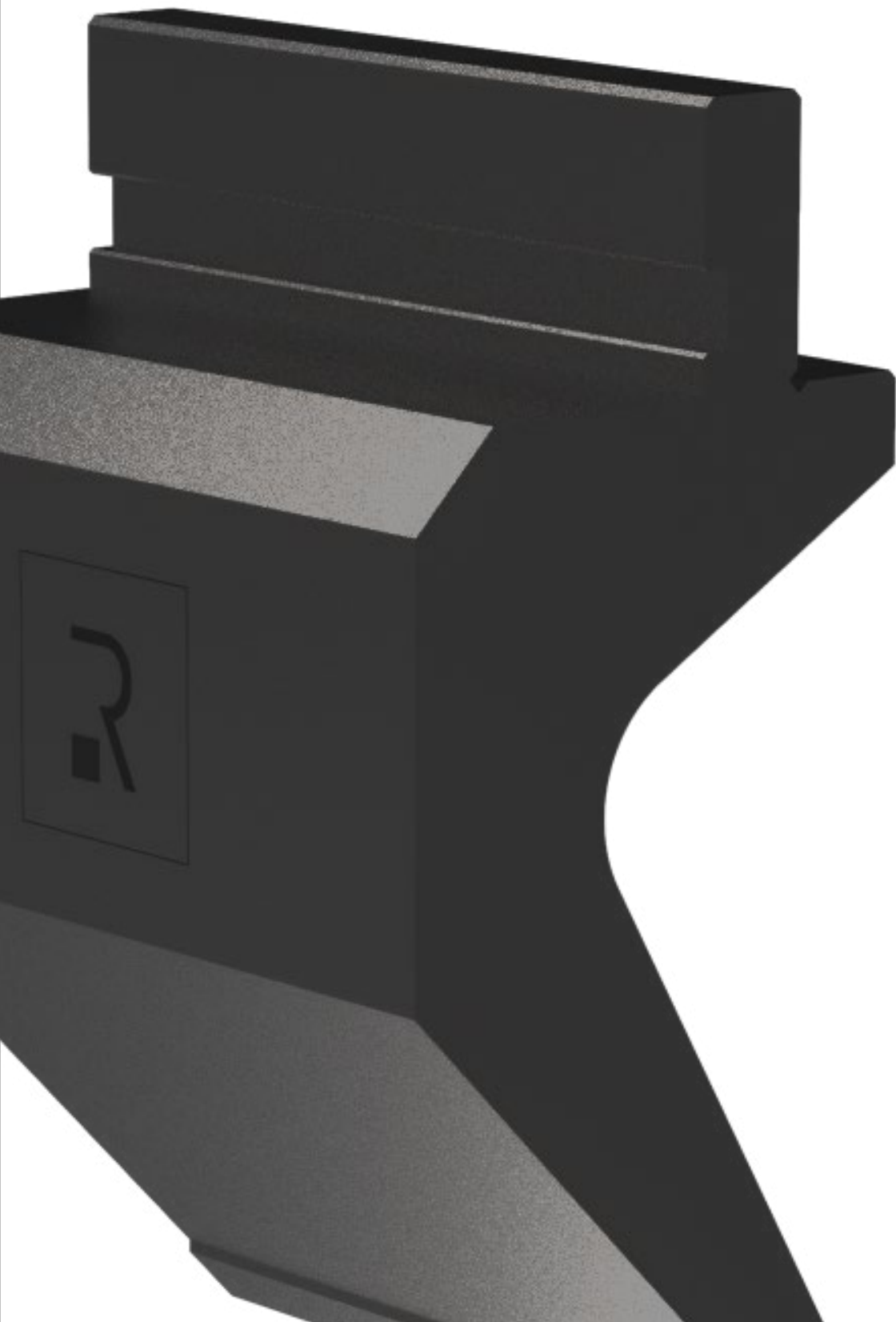


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SERVICES AND SPECIFICATIONS





- Every single tool is traceable thanks to a unique serial number stamped after the first quality control
- All tools with batch number and therefore a complete tool traceability
- All tools induction hardened to 54-60 HRC
- Precision grinding (tolerance of +/-0.01 mm)
- ISO 45001:2018 Certification
- Raw material is provided by qualified suppliers and chemical composition corresponds to international standards. Therefore, raw material yield and tensile strength are guaranteed.

STANDARD TOOLS MATERIAL

Material type	Resistance of the material	Hardness of the material	Hardness of the operating surfaces after induction hardening
42CrMo4	900-1150 N/mm ²	29.1 - 36.9 HRC	54 - 60 HRC
C45	560-710 N/mm ²	12 - 15.5 HRC	54 - 60 HRC

Specifications for the maximum press force kN/m are indicated as such, 1 t = 10 kN.

ROLLA-V DIES MATERIAL

		1	2	2.5	3	3.5	4	XT	Resistance of the material	Hardness of working surfaces
Body	42CrMo4	●	●	●	●	●	●	●	900-1150 N/mm ²	55 HRc
Inserts	LR 606 through hardened and triple tempered to give hardness of 54-56 HRC	●	●	-	-	-	-	●	1450 N/mm ²	54-56HrC
Inserts	D2 through hardened in a Vacuum to 61 HRC	-	-	●	●	●	●	-	1100 N/mm ²	61 HrC (Rockwell)

All measurements using HRc hardness are accurate to within 2 points.

Specifications for the maximum press force kN/m are indicated as such, 1 t = 10 kN.

SPECIAL AND HEAVY DUTY TOOLS MATERIAL

Material type	Mechanical resistance of the material and the tool body	Hardness of the material and the tool body	Hardness of the operating surfaces after induction hardening
42CrMo4	900-1150 N/mm ²	29.1 - 36.9 HRC	54 - 60 HRC
C45	560-710 N/mm ²	12 - 15.5 HRC	54 - 60 HRC
1.2767	1100-1320 N/mm ²	36 - 42 HRC	54 - 60 HRC
C53	610-760 N/mm ²	16 - 19 HRC	60 - 62 HRC

Specifications for the maximum press force kN/m are indicated as such, 1 t = 10 kN.



Rolleri standard tooling are induction hardened.

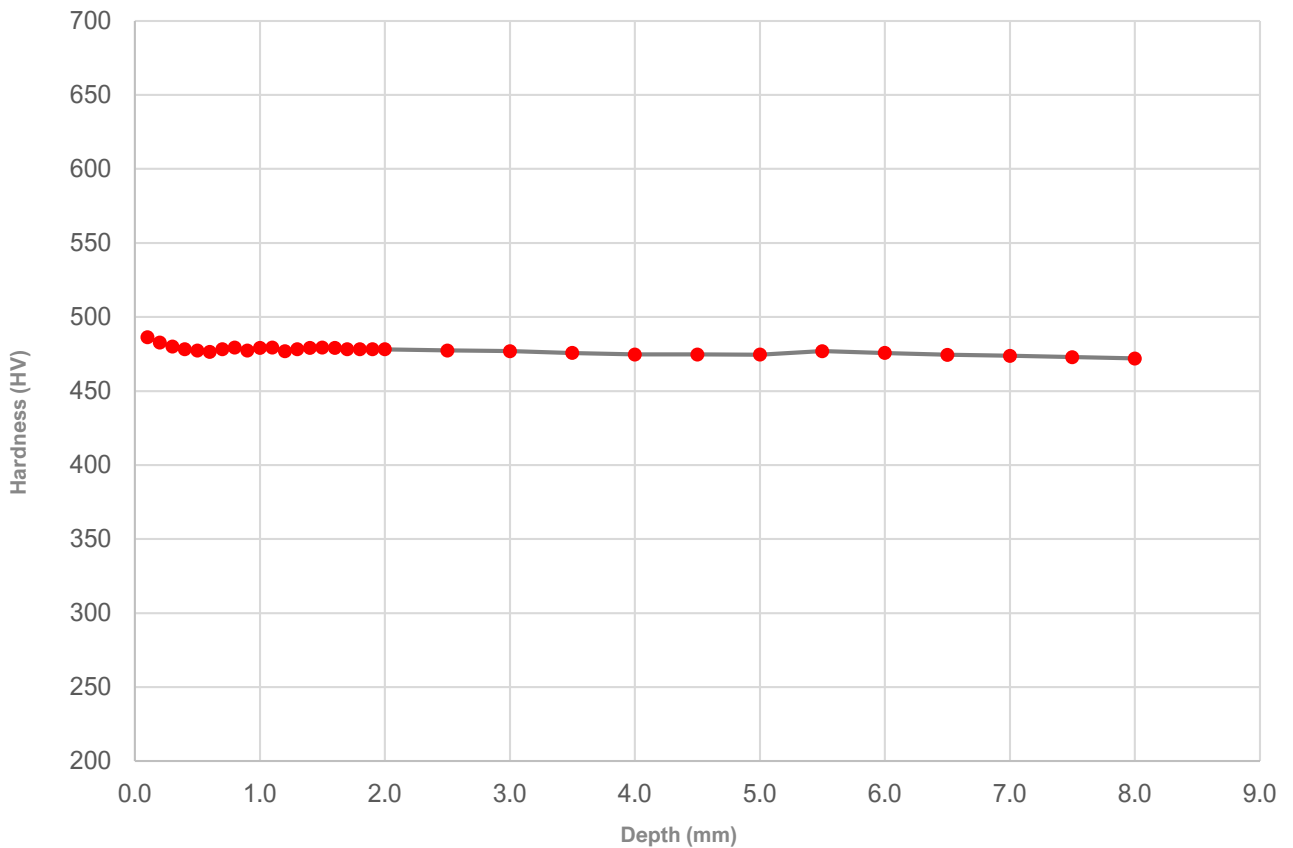
The main features of induction hardening are surface hardness, which can reach 60HRC, and hardening depth, which can be up to 4mm.

To guarantee the same hardness all along the tool, after induction hardening, tools undergo tempering.

Rolleri uses different hardening methods according to the raw material to be hardened and to the tool shape: high-frequency or low frequency hardening.

Thanks to these two techniques, surface hardening is guaranteed and cracks in thin tooling is avoided.

The following graphs show differences between core hardening and Rolleri induction hardening.



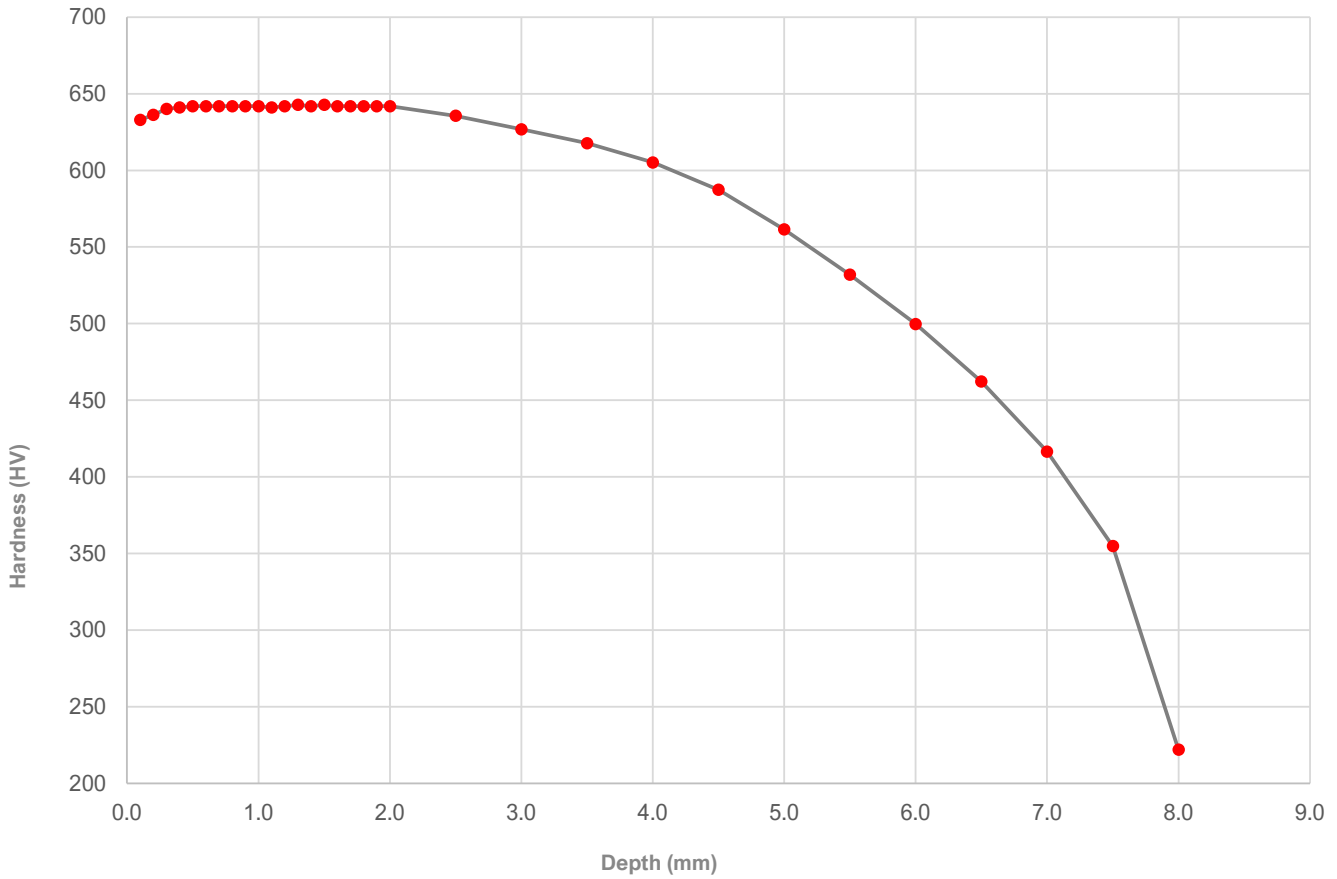
mm	HV	HRC
0.100	486.29	48.14
0.200	482.71	47.89
0.300	480.03	47.70
0.400	478.13	47.55
0.500	477.35	47.49
0.600	476.45	47.72
0.700	478.24	47.56
0.800	479.37	47.65
0.900	477.35	47.49
1.000	479.14	47.63
1.100	479.37	47.65

mm	HV	HRC
1.200	476.89	47.45
1.300	478.13	47.55
1.400	479.14	47.63
1.500	479.37	47.65
1.600	479.14	47.63
1.700	478.13	47.55
1.800	478.13	47.55
1.900	478.24	47.56
2.000	478.13	47.55
2.500	477.35	47.49
3.000	476.89	47.45

mm	HV	HRC
3.500	475.67	47.35
4.000	474.66	47.27
4.500	474.66	47.27
5.000	474.56	47.34
5.500	476.89	48.45
6.000	475.67	47.35
6.500	474.44	47.26
7.000	473.77	47.20
7.500	472.88	47.13
8.000	472.01	47.06



ROLLERI INDUCTION HARDENING



mm	HV	HRC
0.100	632.94	56.95
0.200	636.18	57.11
0.300	640.09	57.30
0.400	640.98	57.35
0.500	641.88	57.39
0.600	641.88	57.39
0.700	641.88	57.39
0.800	641.91	57.40
0.900	641.88	57.39
1.000	641.88	57.39
1.100	640.98	57.35

mm	HV	HRC
1.200	641.88	57.39
1.300	642.77	57.44
1.400	641.91	57.40
1.500	642.77	57.44
1.600	641.91	57.40
1.700	641.88	57.39
1.800	641.88	57.39
1.900	641.91	57.40
2.000	641.88	57.39
2.500	635.62	57.08
3.000	626.8	56.64

mm	HV	HRC
3.500	617.73	56.16
4.000	605.22	55.46
4.500	587.33	54.54
5.000	561.4	53.08
5.500	531.89	51.21
6.000	499.7	49.08
6.500	462.15	46.27
7.000	416.54	42.39
7.500	354.84	36.03
8.000	221.96	15.99

During hardening operations tooling undergo recurrent stress and strain. For this reason, Rolleri tooling are designed and manufactured to resist 1,000,000 working hits.

To reach this target, Rolleri has chosen surface induction hardening. As a matter of fact, tools with low surface hardness tend to deform in the working areas becoming unusable or forcing the operator to replace them or to regrind them.

Why surface induction hardening instead of core hardening?

Induction hardening of metal parts is a selective treatment which hardens tooling working surfaces, improving their wear-resistance. Induction hardened surfaces provides high resistance against damage, deformation, wear and galling. This hardening treatment can harden different surfaces to different depth, in order to improve resistance of different tool areas.

Induction hardening enable the combination of high surface hardness (up to 4mm depth), 54-60 HRc (1980-2200 N/mm²) with mechanical resistance and tenacity of the core (resistance against impacts). Mechanical resistance and tenacity remain the same of raw material, which is supplied normalized in case of carbon steel (for ex. C45) and quenched in case of alloyed steel (for ex. 42CrMo4).

Core hardening reaches 50HRc, whereas induction hardening reaches higher surface hardness and keeps mechanical properties of the tool body unchanged.

This means that working areas undergo less wear and therefore tool operational life is longer.

Induction hardening consists in quick localized hardening to austenization level, followed by rapid cooling by coolant or polymers. Tempering completes the hardening process.

Induction hardening enables good control of deformation, twist and cracks.



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This graph shows that:

- **Rolleri induction hardened tools undergo 0.003mm wear after 12600 hits**
- **core hardened tools undergo 0.014mm wear after 12600 hits**



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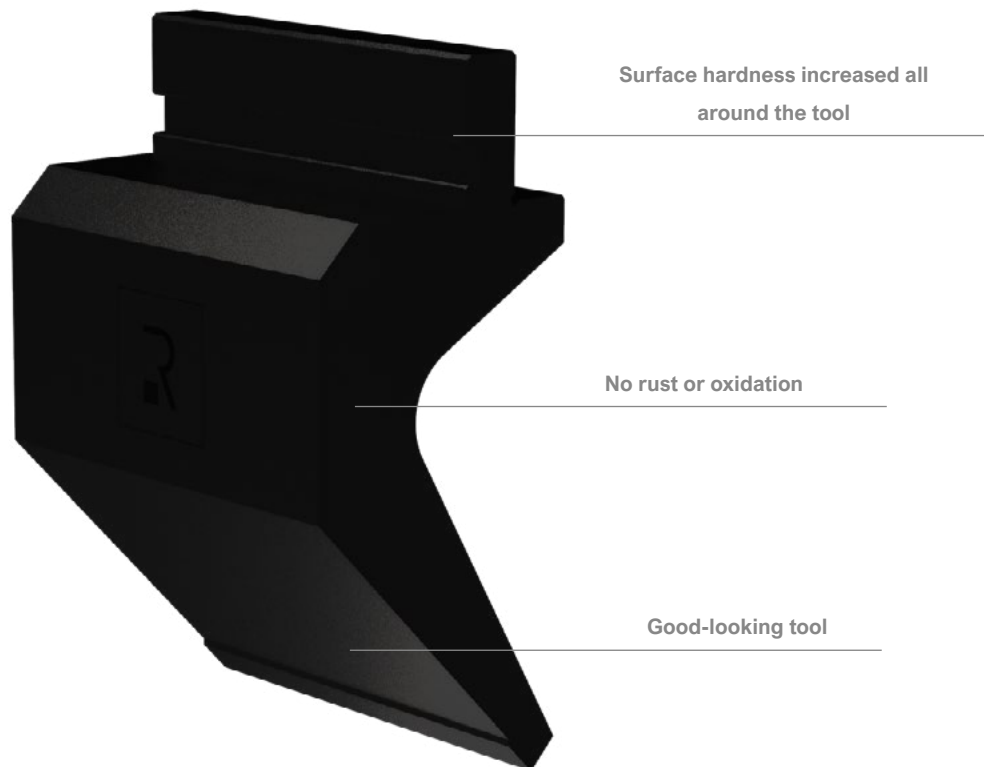
ROLLERI BLACKFIRE

Rolleri BLACKFIRE is a particular tool coating which guarantees corrosion resistance and special design.

This chemical treatment is a long-lasting solution to surface oxidation. During the phosphatising process, the metal surface of tools changes because of phosphatic crystals formation, which are chemically bound to the tool steel. We can take advantage of these chemical compounds to increase corrosion resistance, so that your tools will have longer operational life.

The glossy black colour of BLACKFIRE represents a new technology which combines usage advantages and better aesthetics.

Tools with BLACKFIRE treatment have different delivery time than standard tools.



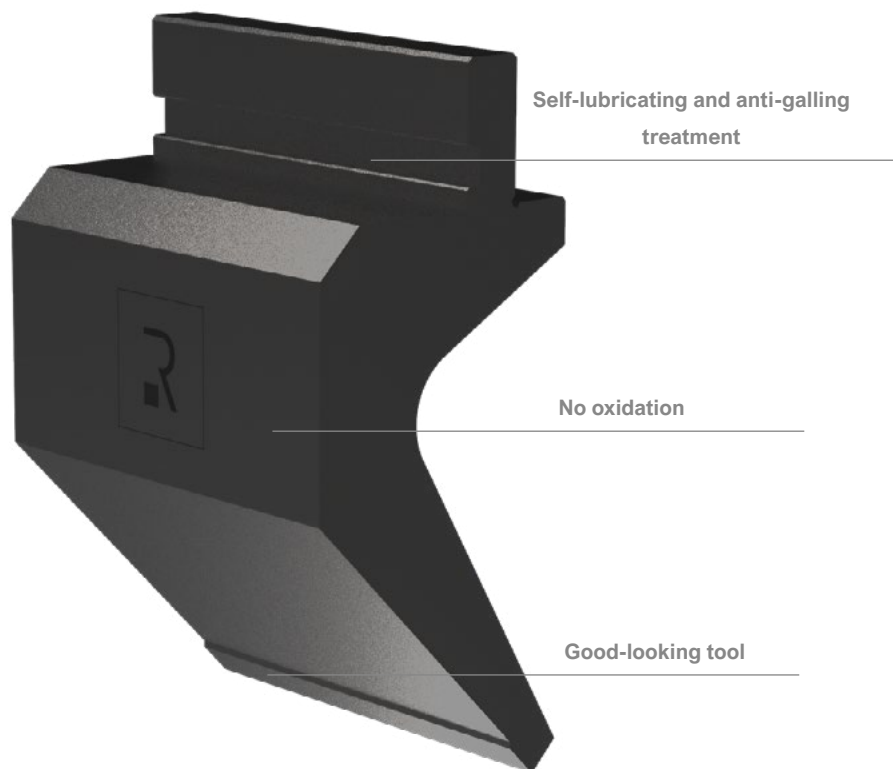
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ROLLERI FREEZINC

Take advantage of Rolleri new and special surface treatment. This new improvement gives you the following big advantages:

- No metal residue left on tools during bending of galvanized sheet metal or other sheet metal that tends to leave residue
- No need to clean tools from residue
- Down-time reduction due to tool cleaning and consequently increase in productivity
- Tool protection from oxidation
- Tools aesthetically stand out
- Reduced tool wear and consequently longer operational life
- Lower chances to damage the sheet metal
- Lower risk that the sheet metal gets stuck in the V die opening.



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One of the challenges of bending is preventing the profile from having bending marks, such as scratches and abrasions on the surface areas. Especially profiles made of:

- Stainless Steel
- Aluminium
- Painted metal panels

Often because of friction between sheet metal and die, after bending process, you could see some marks on material.

In order to avoid this inconvenience, Rolleri suggests you some possible solutions:

- Bending Foil
- Polyurethane inserts
- Synthetic Dies
- Rolla-V
- Roll Prime
- Enlarged radius on the V opening of a die

ROLL PRIME

Rolleri's constant research for innovation brought us towards the 3D printing world, the future of manufacturing. Roll Prime is the solution for applications which require mark-free sheet metal, reduced delivery time and dimensional precision: thanks to FDM technology (Fused Deposition Modelling) we are able to produce tools and inserts made of special plastic material, completely adaptable to customer's needs with halved production lead time compared to traditional technology.

- Totally Mark-free bending
- Halved production lead time
- 30-40% lower costs than a classic special tool
- Ideal for Rapid Prototyping
- Ideal for small production batches
- Bending result repeatability
- Easy handling thanks to 85% lower weight

TOOLS

Thanks to an infinite choice of shapes, we are able to study specific solutions for every customer, with the possibility of rapid prototyping. Roll Prime tools are the right solution to produce small batches or samples, as they have between 30% and 40% lower costs and shorter delivery time than conventional tools.

INSERTS

Roll Prime inserts are an innovation in mark-free bending: thanks to their special composition they can guarantee total absence of marks on sheet metal, giving repeatable and long-lasting results, removing all the annoying problems of classic bending foils.

With our technology we are able to propose highly customizable solutions, so it is possible to design inserts which are fully adaptable to your tools.



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PROTECTIVE FOILS (ROLFILM)

One of the most common ways to avoid sheet metal marks during bending is the use of ROLFILM. Rolfilm is a foil available with different thickness, which is positioned between sheet metal and die.

The choice of one rolfilm thickness or the other depends on the sheet metal thickness to be bent and in order to find out more about it, we recommend you write to tecnico@rolleri.it.

Minimum thickness is 0.4mm (0.02") whereas maximum thickness is 2.0mm (0.08").

Such film is also available with different width: 100mm, 150mm and 200mm (3.94", 5.90" and 7.87").

By shifting Rolfilm along X axis, you can use its whole surface; if for example you use a V20 die, you have at least 15-20 bending positions in the same film portion before moving the foil forward. Rolfilm rolls are available of 3m, 10m, 20m and 30m. Thanks to this possibility you can buy the length you need.

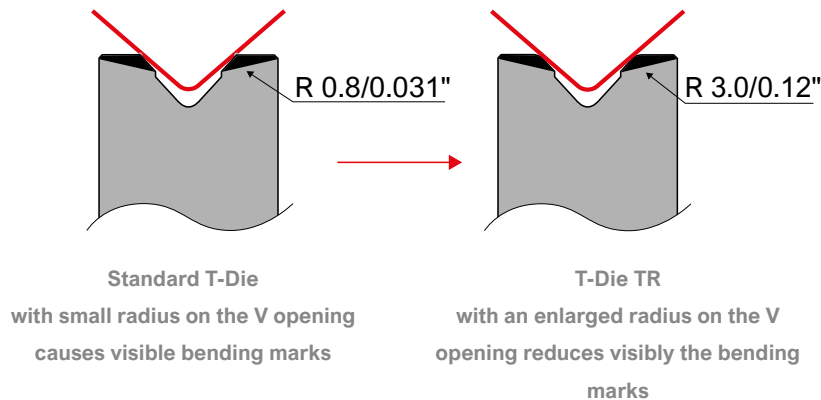
A very useful accessory to use the whole Rolfilm width is CT, a pair

of tensioners. Each tensioner is mounted at one end of dies with a clamp tightened to die stem. In the upper part of CT you can insert Rolfilm.

Both tensioners mounted opposite to each other are fundamental to set the proper foil tension for correct use.

ROLFILM has very good elastic and compression properties. For this reason CNC setup correction needed are limited.

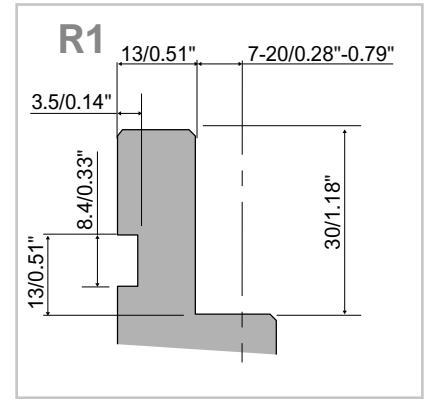
In order to improve foil operational life by bending on the same foil portion, you can use Rolfilm with dies with bigger radius (for example T dies CLASSIC - TR dies).



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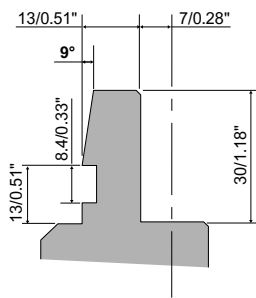
Rolleri Punches Type R1, R2, and R3 can be used on other press brake machines by modifying the tang

- Precision ground (Tolerance of +/-0.01 mm)
- Exact parallelism



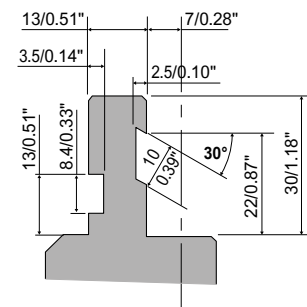
OT

835 mm 32.87 in → For Amada fast clamping system
 415 mm 16.34 in
 805 mm 31.69 in



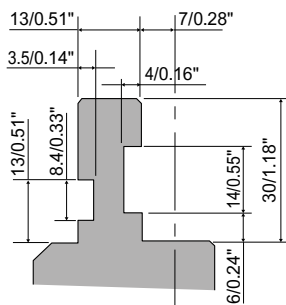
A1

Groove in addition to 8.4 x 3.5 mm (0.33 x 0.14 in) groove for pneumatic clamping system ←
 835 mm 32.87 in
 415 mm 16.34 in
 805 mm 31.69 in



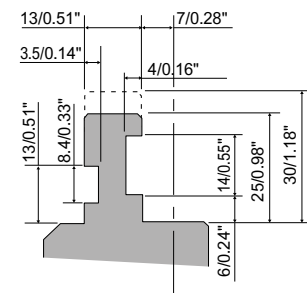
A6

835 mm 32.87 in → Groove in addition to 8.4 x 3.5 mm (0.33 x 0.14 in) groove for:
 415 mm 16.34 in
 805 mm 31.69 in
 • R3
 • Bystronic-Beyeler Euro
 • Safan



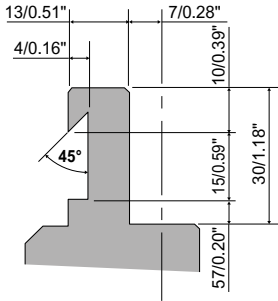
A7

Groove in addition to 8.4 x 3.5 mm (0.33 x 0.14 in) groove and shortened tang for: ←
 835 mm 32.87 in
 415 mm 16.34 in
 805 mm 31.69 in
 • R3
 • Bystronic-Beyeler Euro
 • Safan



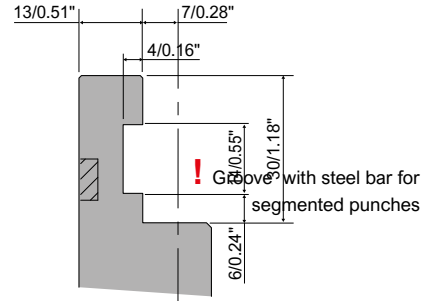
A8

835 mm 32.87 in → Groove for hydraulic clamping system
 415 mm 16.34 in
 805 mm 31.69 in Gasparini



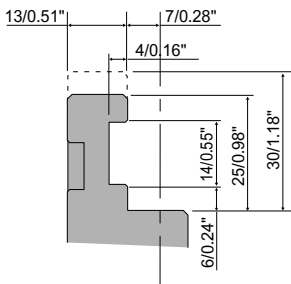
A41

835 mm 32.87 in
 415 mm 16.34 in
 805 mm 31.69 in



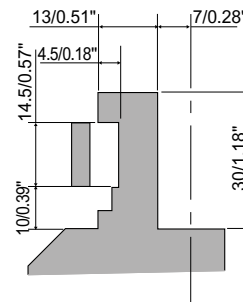
A42

835 mm 32.87 in
 415 mm 16.34 in
 805 mm 31.69 in



A43

Groove with steel bar for segmented punches ← 835 mm 32.87 in
 415 mm 16.34 in
 805 mm 31.69 in

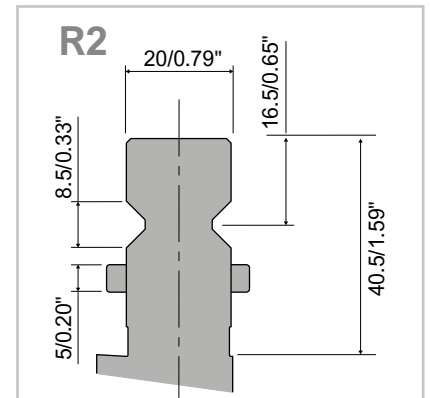


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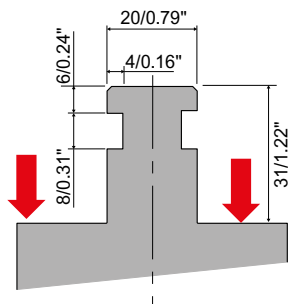


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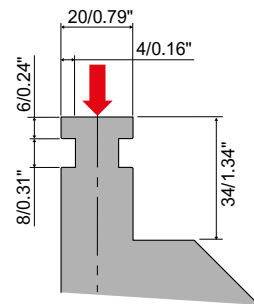
Example 1

Modifications of R2 punch with shoulder bearing

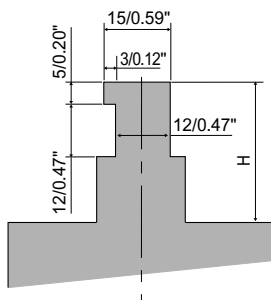


Example 2

Modifications of R2 punch with head bearing

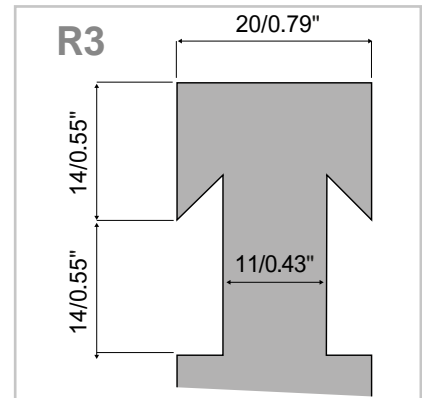


Example 3

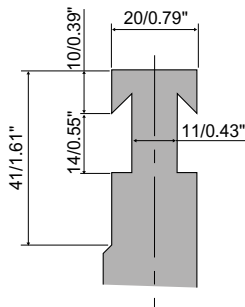


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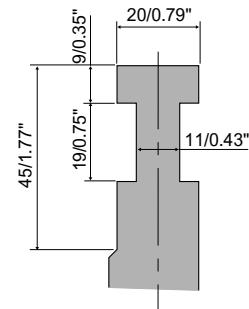
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Example 1



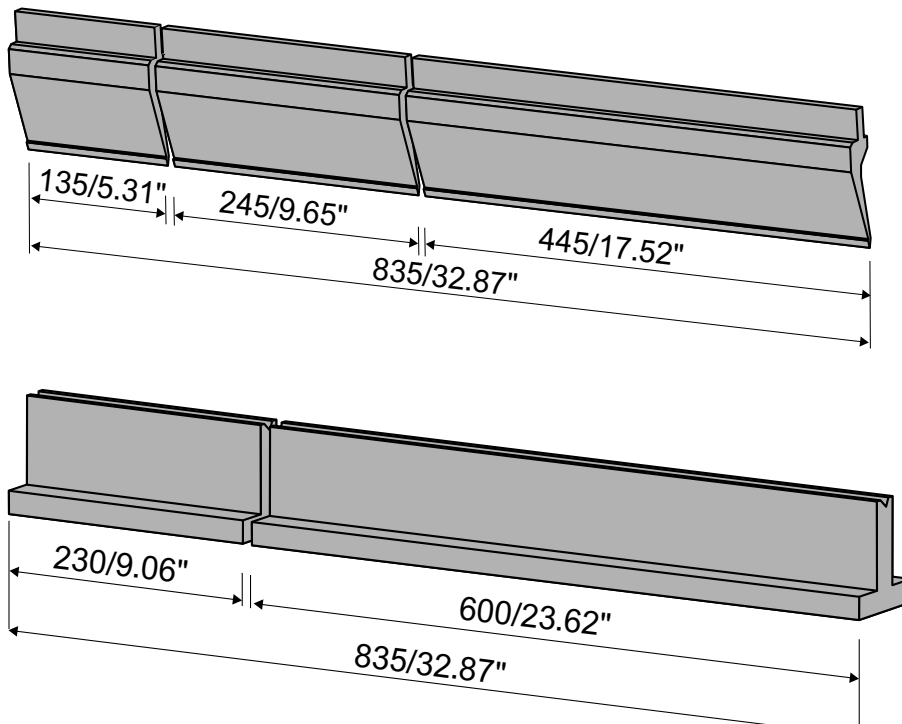
Example 2



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- Customized sectioning available on request
- For each cut you lose 3mm material
- Possibility to cut your existing upper and lower tools

Example



There are several standard sectioning types but you can ask for customized sectioning too for special applications.

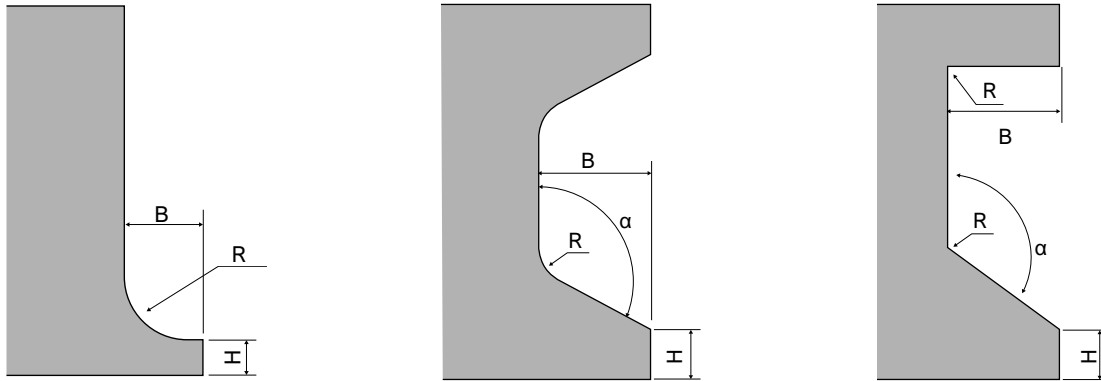
After cutting operations, tools are ground to guarantee perfect section match.



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- Single horns for upper and lower tools
- Horns on one side or on both sides



Horns are always left and right.

They can have different shape, length and depth.

B and H dimensions are fundamental to calculate max. capacity and horn tip deflection.



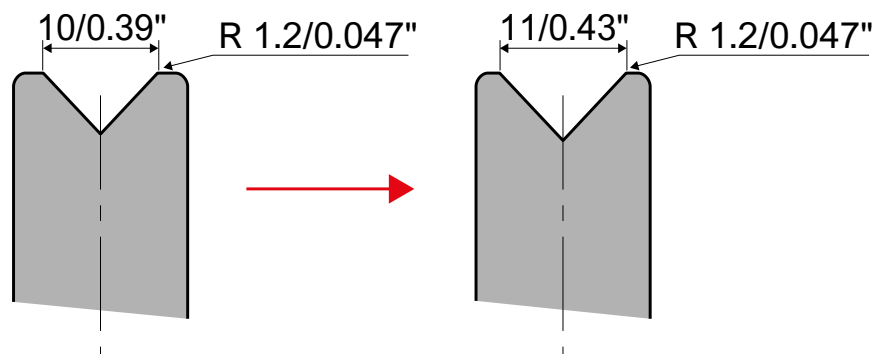
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A die with a standard V opening can be modified to have a wider V opening.

This modification is possible and thanks to induction hardening depth, the mechanical die properties don't change.

Production according to customer's specifications.

Example



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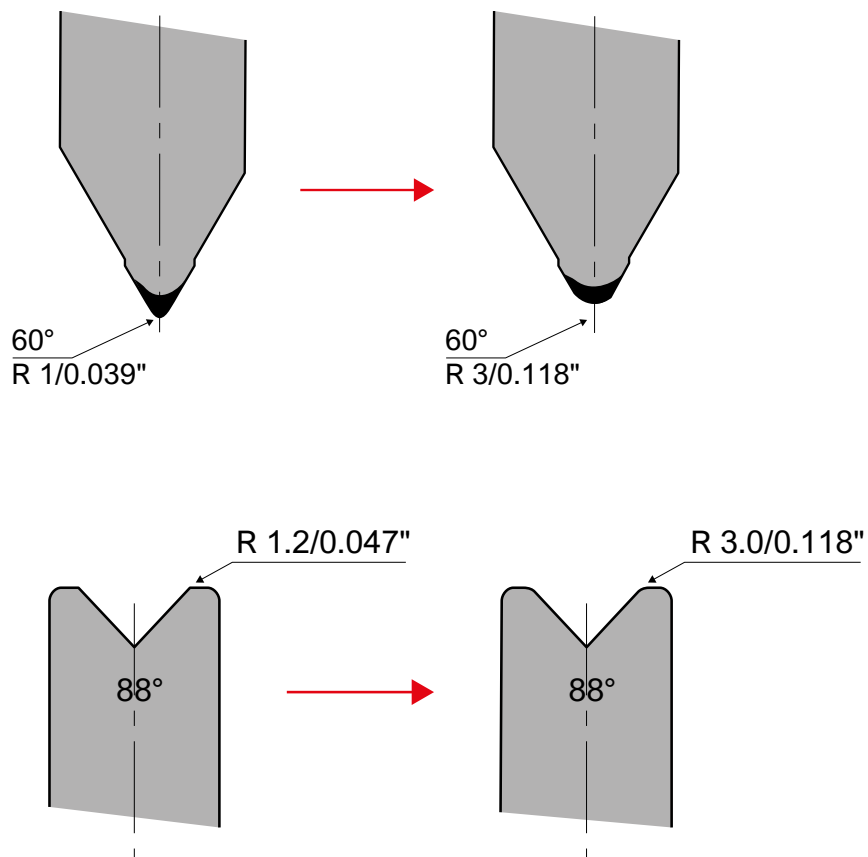
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Punch tip radius and die radii can also be modified. Some applications require a bigger punch tip radius in order to distribute bending force evenly and avoid creating a groove into the sheet metal. Dies may also require bigger V radii in order to avoid bending marks.

Production according to your specifications.

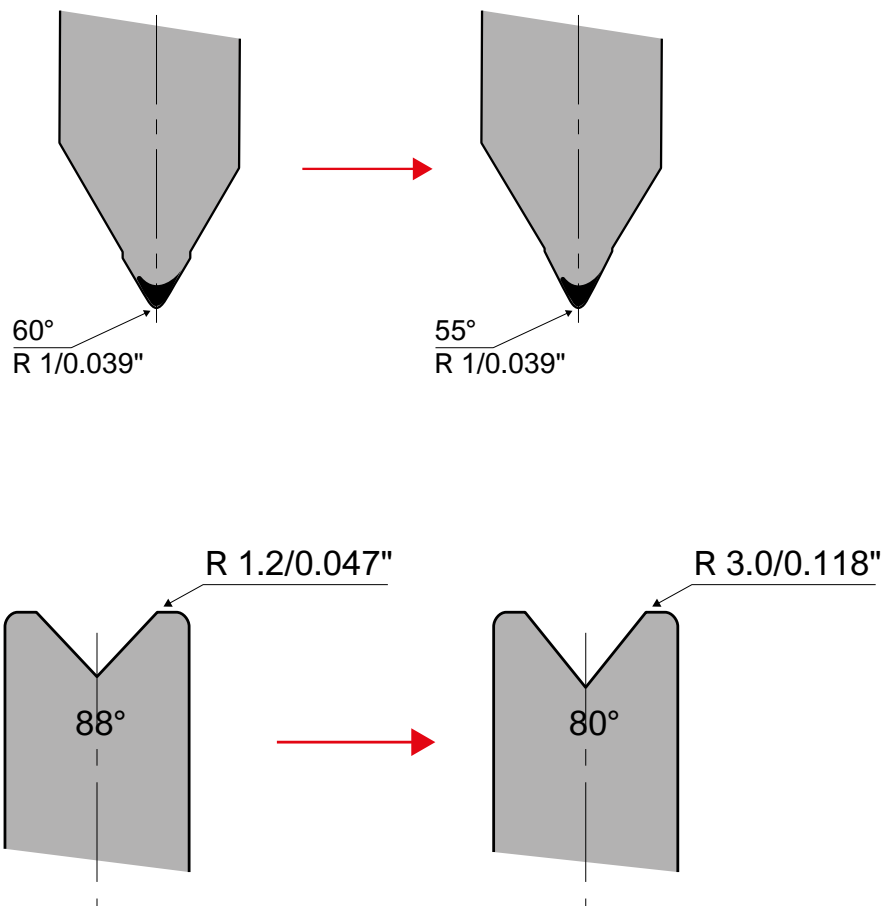
Example



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In order to control better springback and bending process, you may need to vary punch and die angle.
Production according to your specifications.

Esempio



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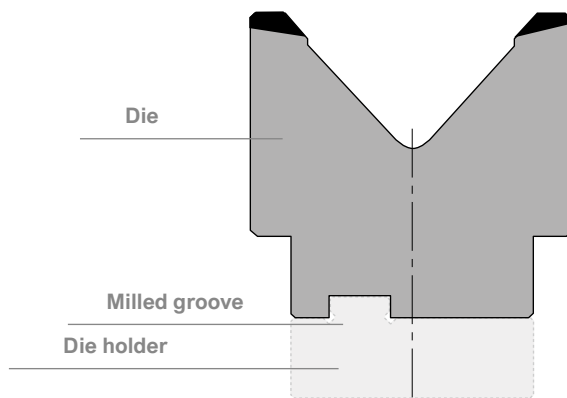
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Some dies may be modified with a groove on their base in order to modify their tang.

We can mill a groove in R1 type dies to mount them onto holders usually used for self-centering dies.

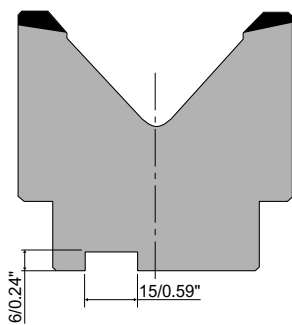
Thanks to this modifications, modified dies will perfectly match punch.

Example



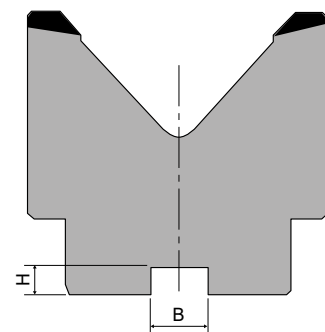
A28

835 mm 32.87 in → Groove for die holders
 415 mm 16.34 in
 805 mm 31.69 in



A29

Groove production ← 835 mm 32.87 in
 according to your 415 mm 16.34 in
 specifications 805 mm 31.69 in



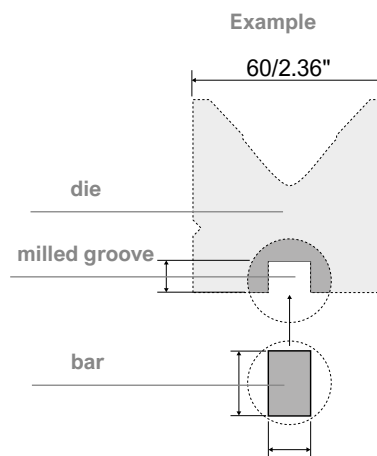
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Dies may be modified with grooves in order to screw an inserts which works as a tang.

Thanks to this solution, you can avoid the purchase of special dies because you have to possibility to choose a R1 die with a different tang.

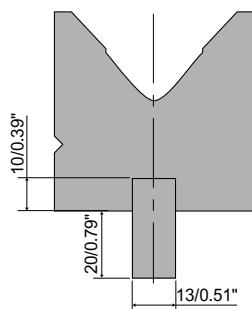
Bending axis is perfectly centered in V die and tang and you can use this modified dies as a single-body die.



A30

835 mm 32.87 in
415 mm 16.34 in
805 mm 31.69 in

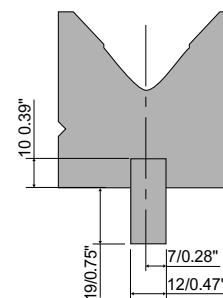
→ Groove bars 13 x 30 mm (0.51 x 1.18 in) for R2 and R3



A31

Groove bars 12 x 29 mm (0.47 x 1.14 in) for R4

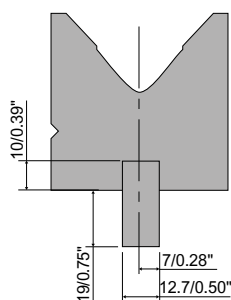
← 835 mm 32.87 in
415 mm 16.34 in
805 mm 31.69 in



A32

835 mm 32.87 in
415 mm 16.34 in
805 mm 31.69 in

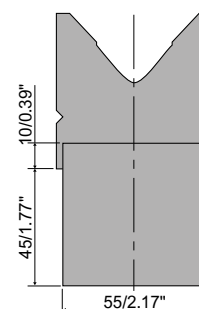
→ Groove bars 12.7 x 29 mm (0.50 x 1.14 in) for R4



A44

Groove bars 55 x 55 mm (2.17 x 2.17 in) for RX EHT

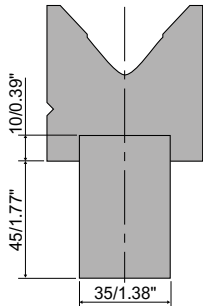
← 835 mm 32.87 in
415 mm 16.34 in
805 mm 31.69 in





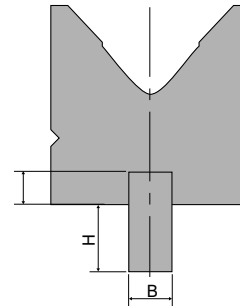
A45

835 mm 32.87 in → Groove bars 35 x 55 mm (1.38 x 2.17 in) for Rx Weinbrenner
 415 mm 16.34 in
 805 mm 31.69 in



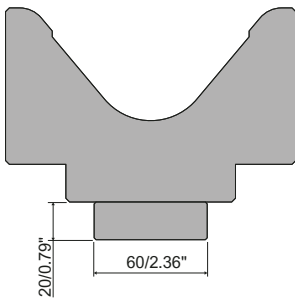
AX

Individual groove bars for ← 835 mm 32.87 in
 other systems 415 mm 16.34 in
 805 mm 31.69 in



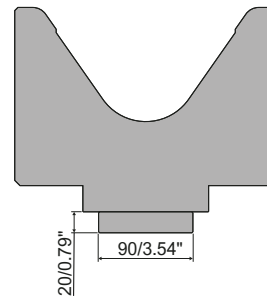
A60

835 mm 32.87 in → 60 mm (2.36 in) plate for R1
 415 mm 16.34 in following dies: M103.80.125,
 805 mm 31.69 in M130.80.160, M195.70.200



A90

90 mm (3.54 in) plate for: ← 835 mm 32.87 in
 M195.70.200 and 415 mm 16.34 in
 RVM90-4 (Rolla-V) 805 mm 31.69 in



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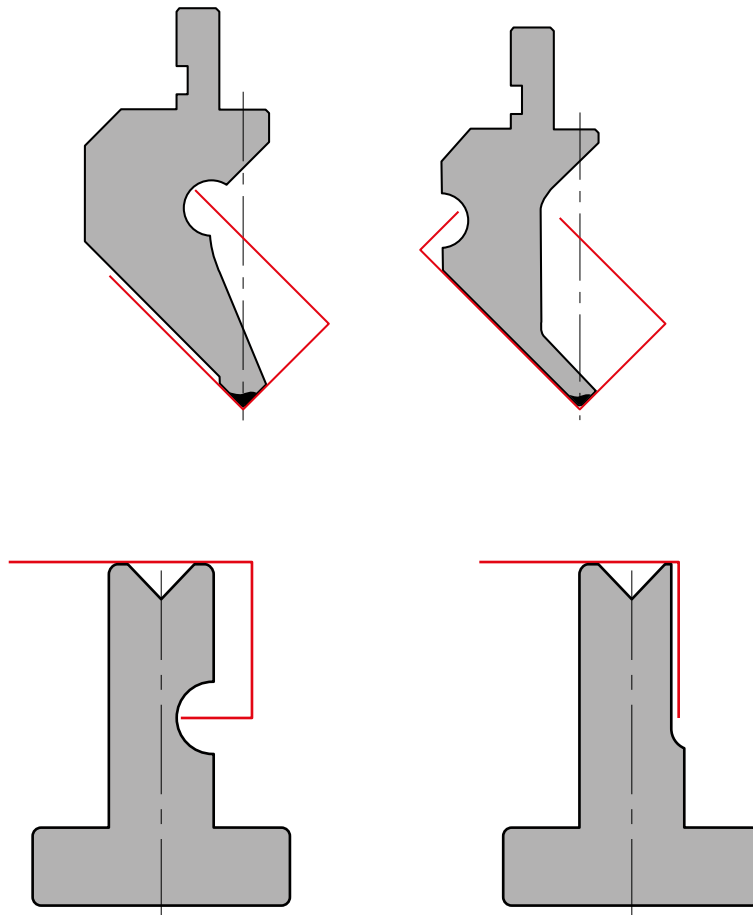
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All standard tools may be modified in their shape in order to bend without collision. Such modifications can be carried out in punches and dies and it is fundamental to re-calculate tool capacity after the modification.

Production according to your specifications.



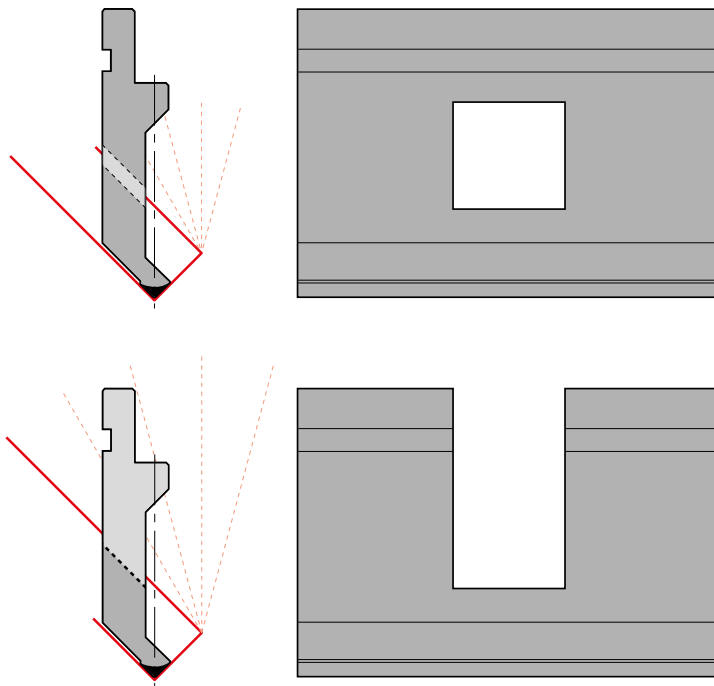
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To bend some short U channels, we may mill a relief in the shape of a window in a standard punch in order to bend without collision.

According to window width and height, we calculate tool deflection in order to get profiles with constant angle.

Production according to your specifications.

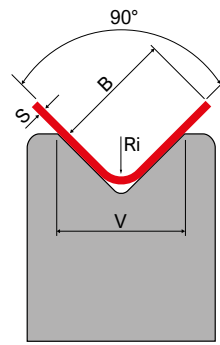


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Bending force table works like the bending ruler and it is a very useful tool for anybody involved in sheet metal working, from profile design, to technical construction, tool purchase and profile bending.

In the first column on the left you find sheet metal thickness (S), in the 3 rows above you find V opening (V), minimum internal edge (B) and ideal internal radius (Ri). When you match sheet metal thickness and V opening, you can find the necessary force to bend 1 meter.

Each sheet metal thickness can be bent in 5 different V die openings. Below the table you can find correction factors.



S = thickness
 V = V die opening
 B = internal edge
 Ri = profile internal radius

420 N/mm ²																				
S (mm)	4	5	6	8	10	12	16	20	25	32	40	50	63	80	100	125	160	200	250	V
	3.0	3.5	4.0	5.5	6.5	8.0	10.5	13.0	16.5	21.0	26.0	32.5	41.0	52.0	65.0	81.5	104.0	130.0	163.0	B
	0.5	0.7	0.8	1.0	1.3	1.5	2.0	2.5	3.2	4.4	5.0	6.5	8.0	10.0	12.0	15.0	20.0	25.0	37.0	Ri
0.6	60	50	30	20																
0.8	120	90	70	50	40															
1.0		150	110	80	60	50														
1.2			180	120	90	70	50													
1.5				210	150	120	80	60												
2.0					300	230	160	120	90											
2.5						390	270	200	140	110										
3.0							430	310	230	160	120									
4.0								600	440	320	230	180								
5.0									760	540	390	290	220							
6.0										850	620	450	330	250						
8.0											1210	880	700	460	350					
10.0												1510	1090	790	580	440				
12.0													1730	1240	910	660	500			
15.0														2130	1550	1130	810	620		
20.0															3020	2200	1580	1150	890	
25.0																3780	2690	1970	1440	

F
kN/m

Stainless steel R 700 N/mm² F x 1.7
 ALU - Aluminium R 200 N/mm² F x 0.5
 (R = tensile strength)

30°	B x 1.6	R=200 N/mm ²	r x 0.8	ALU
60°	B x 1.1			
90°	B x 1.0	R=420 N/mm ²	r x 1.0	mild steel
120°	B x 0.9			
150°	B x 0.7	R=700 N/mm ²	r x 1.4	stainless steel



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Bending force calculation per meter:

$$T/m \text{ (kN/m)} = \frac{(\text{sheet metal thickness})^2 \times 1,65 \times \text{sheet metal tensile strength}}{10 \times V \text{ opening}}$$

Coining force calculation:

$$T/m \text{ (kN/m)} = \frac{(\text{sheet metal thickness})^2 \times 1,65 \times \text{sheet metal tensile strength}}{10 \times V \text{ opening}} \times 4,5$$

V selection for air bending and bottoming:

$$V = \text{thickness} \times 8$$

To bend sheet metal thicker than 3mm, we recommend $V = \text{thickness} \times 10$

V selection for coining:

$$V = \text{sheet metal thickness} \times 5$$

Punch tip radius for coining:

$$\text{Radius} = \text{thickness} \times 0,4$$

Internal radius calculation:

$$r = V/8$$

Stainless steel – $R = V/8 \times 1.4$

ALU – $R = V/8 \times 0.8$

(R = tensile strength)

Min. internal edge calculation:

To bend 90°:

min. internal edge = $V \times 0,67$

120° bending: $V \times 0,67 \times 0,9$

60° bending: $V \times 0,67 \times 1,1$

30° bending: $V \times 0,67 \times 1,4$

Punch tip radius calculation:

$$\text{Ideal punch radius} = (\text{profile internal radius}) \times (2/3)$$



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MIN. BENDING ANGLE

For each sheet metal thickness, the table indicates the narrowest angle you can reach by bending that thickness with the selected die model.

NEEDED PRESS FORCE

The table indicates the necessary press force to bend the selected mild steel thickness with the selected die. The formula to calculate the necessary press force in kN/m is:

$$FN \text{ (kN/m)} = \frac{Rm \times (\text{thickness})^2 \times C}{C} \times \left(1 + \frac{4 \times \text{thickness}}{C}\right)$$

Aluminium: Rm=200-300 N/mm²

Steel: Rm=370-450 N/mm²

Stainless: Rm=650-700 N/mm²

Example: 2 mm aluminium with model 2

$$FN \text{ (kN/m)} = \frac{300 \times 2^2}{13.16} \times \left(1 + \frac{4 \times 2}{13.16}\right)$$

Needed press force = 146.62 kN/m

MIN. OUTSIDE FLANGE

For each sheet metal thickness, the table indicates the minimum outside edge you can bend by using the selected die model.

$$BEM \text{ (kN/m)} = \sqrt{B^2 / 2}$$

Example: calculation of the min. outside flange with model 1

$$BEM \text{ (kN/m)} = \sqrt{7.17^2 / 2}$$

Minimum edge = 5.07 mm

MAX. OUTSIDE RADIUS

For each sheet metal thickness, the table indicates the maximum outside radius you can produce by bending that thickness with the selected die model. If you deduct the sheet metal thickness value from the max. outside radius, you will obtain the max. inside radius and therefore the max. punch tip radius you can use. Bear in mind that during the bending process, the sheet metal is wrapped around the punch tip and tends to produce the internal bending radius equal to the punch tip radius used if its features enables this.

$$\text{Rule 1: } RE \text{ (mm)} = \sqrt{(C^2 / 2)} - (s+Z)$$

Rule 2: if OUTSIDE RADIUS > B/2.2, ER=B/2.2

despite sheet metal thickness, max. outside radius is the result of rule 2. You cannot get a bigger radius than that.

Example: 3 mm with model 2.5

Rule 1: 17.8 - 5 = 12.8

Rule 2: 26.34 / 2.2 = 11.97

MAX. OUTSIDE RADIUS = 11.97

PUNCH TIP RADIUS

To calculate the correct punch tip radius to use according to the outside radius, use the following formula:

Model 1 and 2

$$pR = (\text{outside radius} - \text{sheet metal thickness}) \times 0.9$$

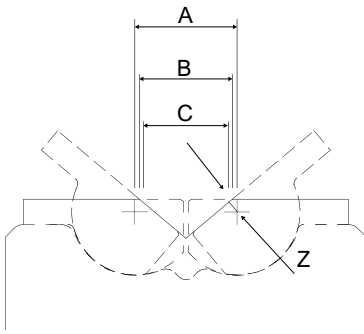
Model 2.5, 3, 3.5 and 4

$$pR = (\text{outside radius} - \text{sheet metal thickness}) \times 0.8$$



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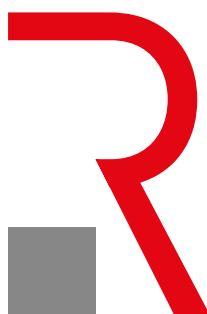


Model	A		B		C		Z	
	mm	in	mm	in	mm	in	mm	in
XT1	5.7	0.22	5.04	0.2	4.57	0.18	0.8	0.03
XT2	10	0.39	9.21	0.36	8.66	0.34	0.95	0.04
Model 1	8	0.31	7.17	0.28	6.59	0.26	1	0.04
Model 2	15	0.59	13.92	0.55	13.16	0.52	1.3	0.05
Model 2.5	28	1.1	26.34	1.04	25.17	0.99	2	0.08
Model 3	38	1.5	33.44	1.32	30.22	1.19	5.5	0.22
Model 3.5	60	2.36	57.1	2.25	55.05	2.17	3.5	0.14
Model 4	85	3.35	80.03	3.15	76.51	3.01	6	0.24

	with V		Max. tool load (kN/m)	Material Thickness		Min. bending angle	Needed press force mild steel with max. 450 N/mm ² (kN/m)	Needed press force stainless steel with max. 700 N/mm ² (kN/m)	Min. outside flange		Max. outside radius	
	mm	in		mm	in				mm	in	mm	in
Model XT1 Max. recommended thickness = 1.2 mm 0.05	5.7	0.22	500	0.5	0.02	60°	50	75	2.7	0.11	1.7	0.07
				1.0	0.04	60°	180	260	4.0	0.16	1.3	0.05
Model XT2 Max. recommended thickness = 2.3 mm 0.09	10	0.39	500	1.2	0.05	60°	120	170	4.9	0.19	3.3	0.13
				2.0	0.79	60°	320	450	6.0	0.24	2.4	0.09
Model 1 Max. recommended thickness = 1.5 mm 0.06	8	0.31	1000	0.7	0.03	40°	50	70	3	0.12	3	0.12
				1.1	0.04	35°	130	200	3.9	0.15	2.6	0.1
				1.5	0.06	35°	270	410	4.2	0.17	2.2	0.09
Model 2 Max. recommended thickness = 3.2 mm 0.12	15	0.59	1500	2	0.08	59°	210	320	8.5	0.33	6	0.24
				3	0.12	47°	550	850	9.3	0.37	5	0.2
				3.2	0.13	47°	650	1000	9.3	0.37	4.8	0.19
Model 2.5 Max. recommended thickness = 6.3 mm 0.25	28	1.1	2500	2	0.08	46°	100	150	18.6	0.73	13.2	0.52
				4	0.16	46°	470	730	18.6	0.73	12	0.47
				6	0.24	55°	1270	1960	18.6	0.73	9.8	0.39
Model 3 Max. recommended thickness = 6.3 mm 0.25	38	1.5	2500	2	0.08	68°	70	110	22.5	0.89	13.9	0.55
				4	0.16	47°	340	500	22.5	0.89	11.9	0.47
				6	0.24	50°	900	1300	22.5	0.89	9.9	0.39
Model 3.5 Max. recommended thickness = 8 mm 0.31"	60	2.36	2500	6	0.24	75°	440	610	39	1.53	20	0.79
				8	0.31	75°	850	1190	39	1.53	20	0.79
Model 4 Max. recommended thickness = 16 mm 0.63	85	3.35	3000	6	0.24	78°	260	440	56.6	2.23	36.4	1.43
				8	0.31	76°	500	840	56.6	2.23	36.4	1.43
				12	0.47	73°	1290	2150	56.6	2.23	36.4	1.43



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