I. Perforated sheets to customer specifications

Specification or description of perforated sheets

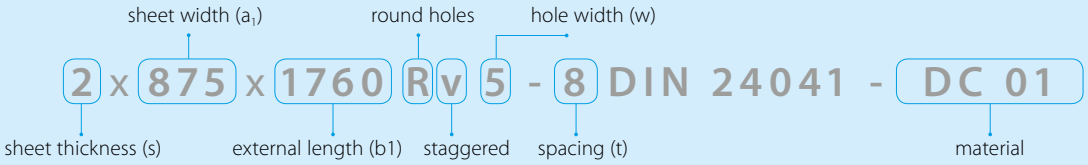
1. The following standards are used as a base:

DIN 4185 T2: Terms and symbols for perforated bottom plates, perforated sheets

DIN 24041: Perforated sheets, dimensions

2. Abbreviated specification of a perforated sheet

with perforation Rv in acc. with DIN 24041 e.g. :



3. For enquiries and orders:

Queries can be avoided if you provide the following data (no. 1 – 10) or provide a drawing or sketch, as shown in the example below (fig. 1): In the event of missing data, we will select the best alternative for production.

1. **Quantity**
2. **Material type,** in acc. with DIN and/or material no.
3. **Sheet external dimensions:** thickness · width · length (mm)

   (s · a1 · b1)
4. **Tolerances:**

   a) In acc. with **DIN 24041**

   b) Acc. to **fixed dimension** in acc. with **DIN 24041**

   c) Acc. to **customer tolerances**, which must be expressly confirmed by us, otherwise according to b)
5. **Specification of perforation** acc. to **DIN**....
6. For staggered perforation Rv, the **"direction of feed" or "direction of perforation".**
7. **Width of the unperforated edges** acc. to diagram below (e_1, e_2, f_1,f_2). Please note: perforation field dimensions a_2 and b_2 must correspond to the master gauge for holes; therefore always check whether x and y are whole numbers. See figs. 2, 3, 4 and 5. Only then determine the edges. The edge width is always given as a measurement between the edge of the sheet and the external edges of the perforations in the rows of perforations on the outer edge of the field of perforations. (Never relate dimensions e and f to the centre of the perforation!)
8. **Raw edge** (always at the bottom if not given). For unusual sheet shapes it is absolutely essential to indicate the raw edge.
9. **Surface** (low-grease, oiled, coated, etc.)
10. **Delivery details** (date, method of dispatch, etc.)

4. Calculating the weight of perforated sheets

a) For sheets with the least unperforated edges (see 4.):

$$G \approx \frac{100 - A_0}{100} \cdot \underset{[mm]}{s} \cdot \underset{[m]}{a_1} \cdot \underset{[m]}{b_1} \cdot \underset{[kg/dm^3]}{\gamma} \qquad [kg]$$

b) For normal perforated sheets with larger edge widths:

$$G \approx \left(\frac{100 - A_0}{100} + \frac{a_1 \cdot b_1}{a_2 \cdot b_2} - 1\right) \cdot s \cdot a_1 \cdot b_1 \cdot \gamma \qquad [kg]$$

c) For relatively small perforated areas:

$$G = \frac{[a1 \cdot b1 - (\text{area of a hole} \times \text{number of holes})]}{[m^2]} \cdot \underset{[mm]}{s} \cdot \underset{[kg/dm^3]}{\gamma} \quad [kg]$$

Examples:

1.) Perforated plate 1.5 · 1370 · 3000 Rv 5 - 8 DIN 24041 St 1203 least unperforated edge on all sides according to formula a)

$$G = \frac{100 - 35.4}{100} \cdot 1.5 \cdot 1.37 \cdot 3 \cdot 7.85 = 31.26 \text{ kg}$$

2.) The same sheet but with the following edges:
long edge, left $e_1 = 100$ · front edge, top $f_1 = 40$
long edge, right $e_2 = 80$ · front edge, bottom $f_2 = 119$
according to formula b)

$$G = \left(\frac{100 - 35.4}{100} + \frac{1.37 \cdot 3}{1.19 \cdot 2.841}\right) - 1 \cdot 1.5 \cdot 1.19 \cdot 2.841 \cdot 7.85 = 34.30 \text{ kg}$$

G = weight in kg
s = sheet thickness in mm
a_1 = sheet width in m
b_1 = sheet length in m
a_2 = width of perforation field in m
b_2 = length of field of perforation in m
γ = gross density of material in kg/dm³
for steel $\gamma = 7.85$
for stainless steel $\gamma = 7.85$
for aluminium $\gamma = 2.7$

according to formula c)

$$G = \left[1.37 \cdot 3 - \left(\frac{0.005^2 \cdot \pi}{4} \cdot 355 \cdot 172\right)\right] \cdot 1.5 \cdot 7.85 = 34.28 \text{ kg}$$

Note:
Formula c) provides the theoretically exact value, as opposed to formula b) where the deviation is less than 0.1 %, however. Easier to handle, formula b) therefore provides suffi ciently precise values, especially since the sheet thickness tolerances lead to substantially higher deviations. Formula a) leads to even greater discrepancies because it does not take the unperforated edges into consideration. In the example shown opposite the deviation is 3.02 kg ≙ 8.8 %, if example 2) is calculated according to formula a).

Perforated metal – the basics

Glossary

"Narrowest unperforated edge" (least unperforated edge)
This depends on the type of perforation, the thickness of the sheet, the tolerances of the external dimensions of the sheet and the manufacturing tolerances in perforation. It is kept as narrow as technically tenable.

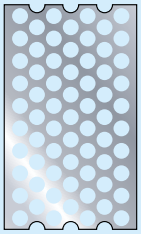
"Cut through the perforation"
means that the trimming cut is directed through the field of perforation, thus creating an outer edge of the sheet which is not smooth but interrupted by perforation cuts, thus presenting no unperforated edge (see diagramm right).

Beginning and end of field of perforations
If no specific agreement has been made, the field of perforations may begin and also end with incomplete rows of perforations for technical reasons (see diagramm right).

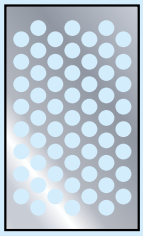
Perforation profile
The perforations on the top of the sheet become slightly rounded in the process and on the bottom a small ridge on the edges of the holes is unavoidable. The hole extends downwards slightly and the narrowest part of the perforation profile is counted as hole width w.

"Direction of feed" of perforation; "direction of perforation"
For perforations in staggered rows (Rv) the position of the master gauge for holes in relation to the sheet dimensions must be determined by the "direction of feed". Direction of feed means the direction of a perforation whose rows of holes are obviously straight and where the distances between the holes are always equal to the spacing. The direction of perforation is at an angle to the direction of feed (see diagramm 1).

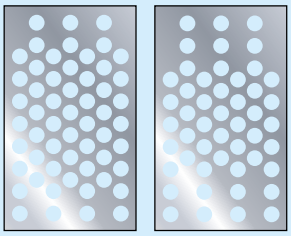
"Relative open area A_0", also called "freespace sectional area" "free clearance" or "open screen surface" is defi ned by DIN as "proportion of perforation in %, related to a hole with half margin widths". This means that this theoretical value does not represent the proportion of the open perforation surfaces related to the whole sheet area including unperforated edges and zones. This must be borne in mind when calculating sheet weights, air permeability, etc..



cut through the perforation



complete or "closed master gauge for holes"



"open master gauge for holes" or incomplete rows of holes on beginning and end of sheet

Symbols and terms used

(also refer to calculation documents)

a_1	= Sheet width, external dimension	(mm)	u	= Distance between rows	(mm)
a_2	= Width of fi eld of perforation	(mm)	v	= Hole misalignment	(mm)
b_1	= External length of sheet	(mm)	w	= Hole width	(mm)
b_2	= Length of fi eld of perforation	(mm)	x	= Number of spaces between rows "u" or "g"	
c	= Width of margin	(mm)	y	= Number of hole misalignment measurements "v" or "g"	
e_1	= Width of long edge, left	(mm)			
e_2	= Width of long edge, right	(mm)			
f_1	= Width of front edge, top	(mm)	A_0	= Relative perforation clearance face $\left(= \frac{\text{open area}}{\text{perforation field area}} \cdot 100\right)$	(%)
f_2	= Width of front edge, bottom	(mm)			
g	= Spacing between rows with Rd, Qd	(mm)			
m	= Number of rows of perforations				
n	= Number of perforations per row		N_A	= Number of holes in perforated field ($N_A = m \cdot n$)	
s	= Sheet thickness	(mm)			
t	= Spacing	(mm)	N	= Number of holes per m^2	

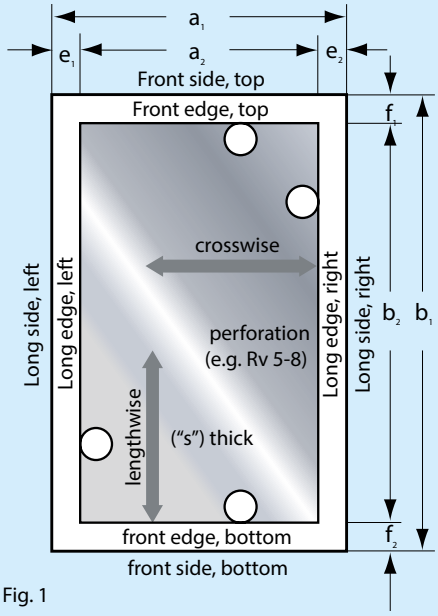


Fig. 1