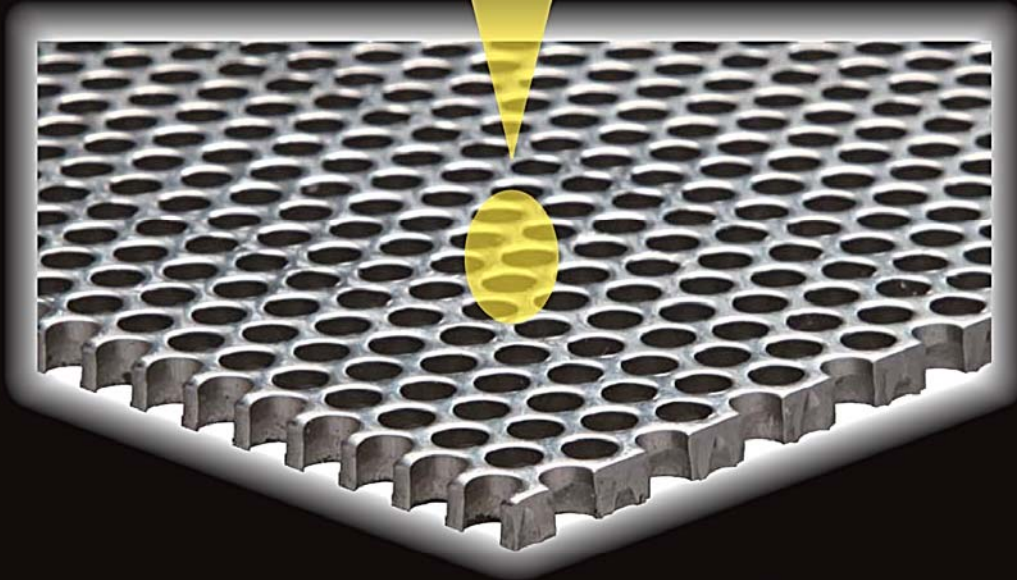
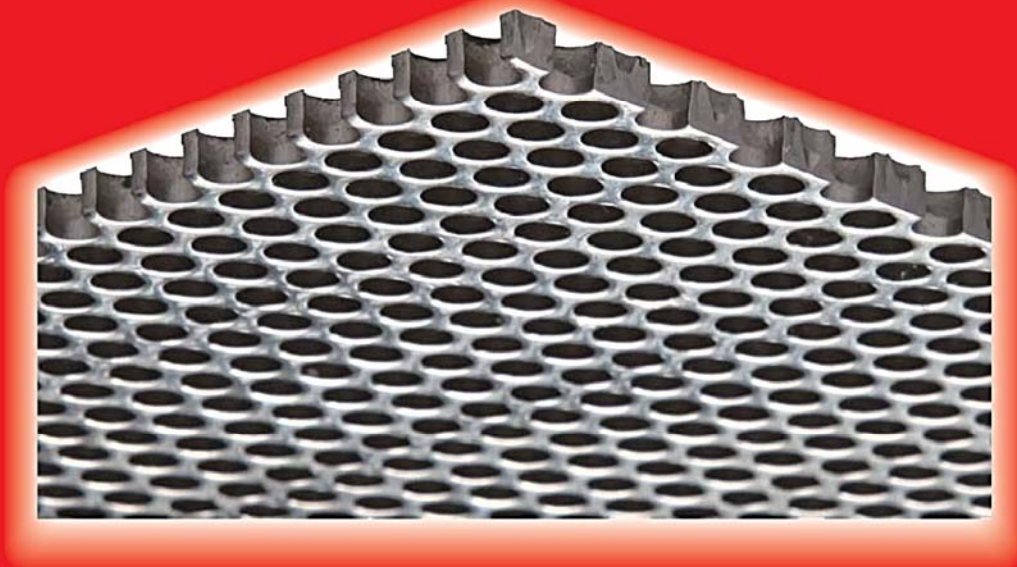




**Going Beyond
The Limits**



SUPER PUNCHING™



KOBE · AKASHI · SAKAI

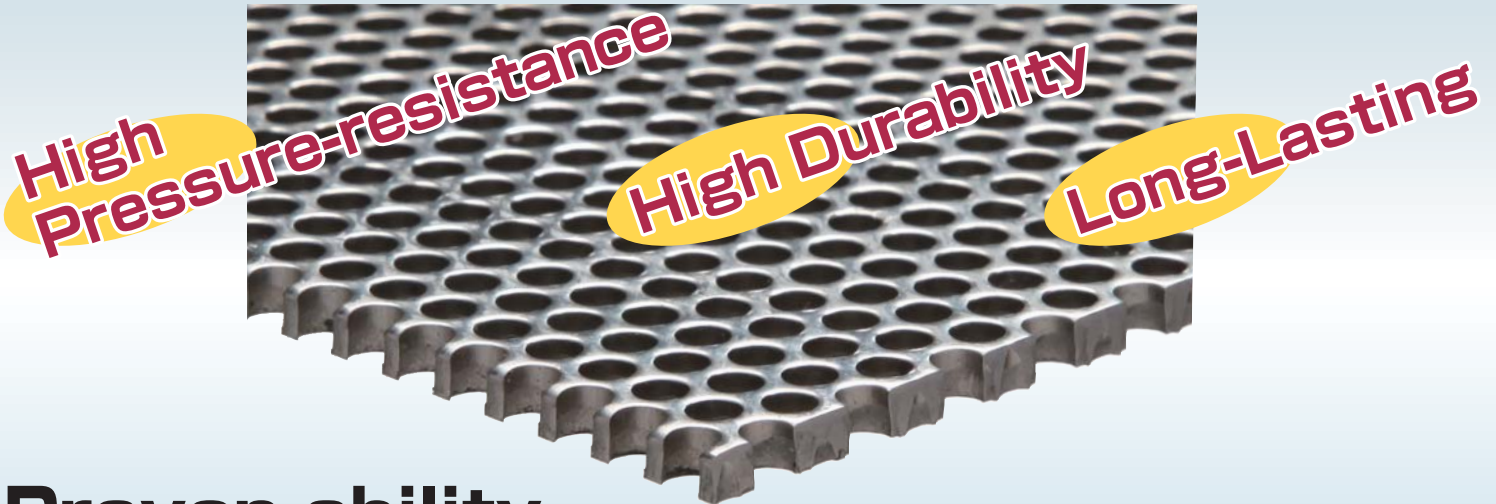
OKUTANI Ltd.

Perforated metal & wire mesh since 1895



Featuring One-of-a-Kind Technology

SUPER PUNCHING™ Debut!!



Proven ability to bore holes with diameters smaller than the thickness of the metal sheet.

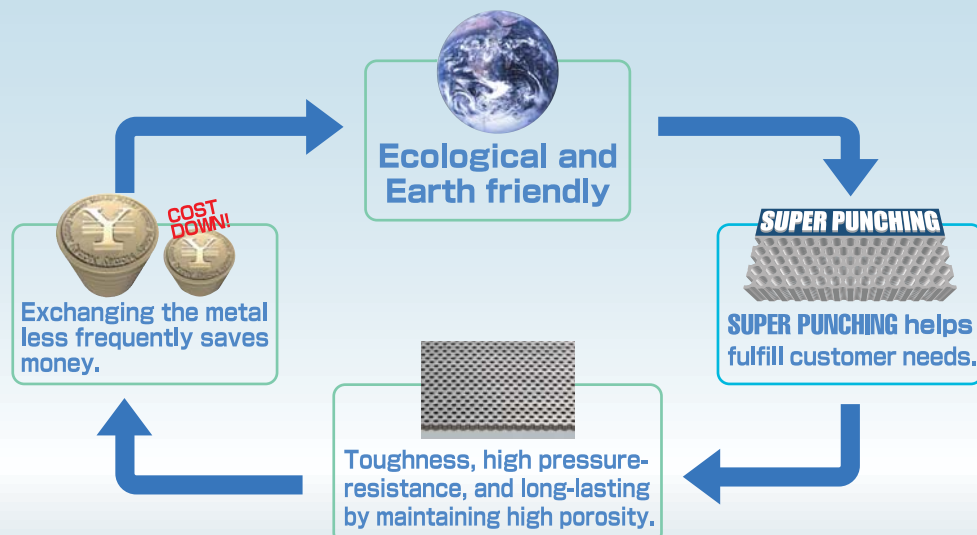
About SUPER PUNCHING™

- Proven ability to bore holes with diameters **smaller than the thickness** of the metal sheet.
- Smaller pitch size than ever before!
Small pitch sizes punch pressed.
- **Strengthen the metal** by thickening the sheet and retaining the hole diameters.

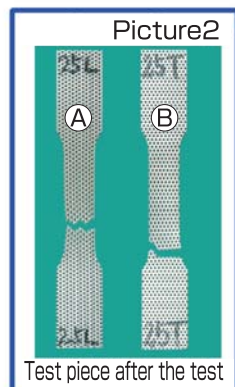
Super Punched workpieces are for :

- Products that need high-pressure resistance, and high durability.
- Situations where standard punched metal workpieces can't be used.
- Nuclear plants, Crude-processing plants, Wastewater treatment plants.
- Aircrafts, Watercrafts, Trains.
- Granulators, Crushers.
- Trommels.

SUPER PUNCHING™ CYCLE



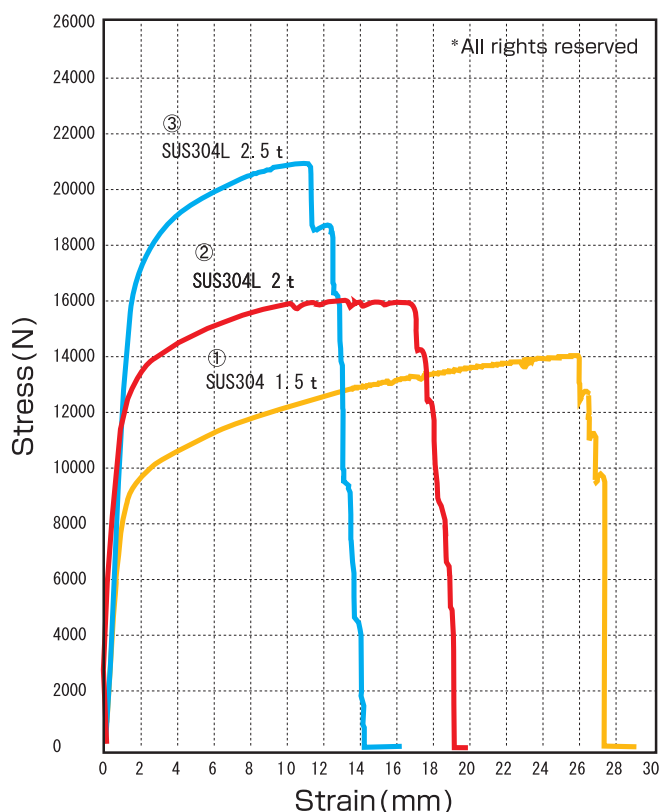
1. Purpose	Tensile strength test for SUPER PUNCHING™ perforated metal
2. Samples to be tested	Stainless steel perforated metal (details as below)
3. Test Method	Tensile Test JIS Z 2201 & Z 2241(98) corresponding to ISO 6892 (1) Testing equipment : Shimazu Universal Tester type : AG-X100kN (2) Test conditions (a) Number of test pieces : 6 pieces (* 1) (b) Environmental temperature : Room temperature (23°C or 73.4°F) (c) Test speed : 30% of width (mm)/min (d) Dimensions of test piece : 25mm width × 210mm length (3) Perforated patterns : D1.5mm × P3.0mm staggered and reverse staggered patterns.



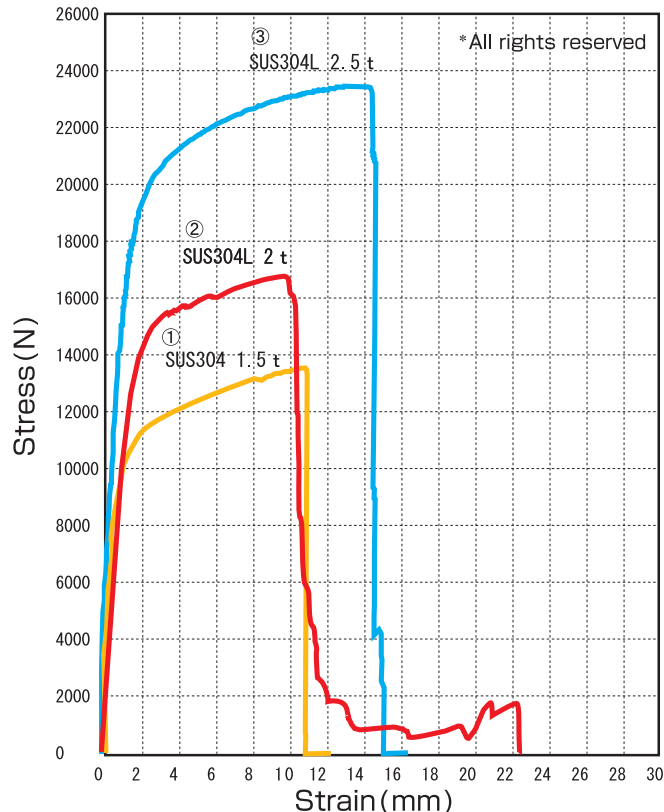
Result of tensile test

Type of patterns	Material (* 2)	Nominal thickness	Actual thickness	Ultimate strength(N)	The ratio against 1.5mmT
Staggered	SUS304	1.5	1.46	13,941	1
	SUS304L	2.0	1.92	16,066	1.16
	SUS304L	2.5	2.44	20,891	1.50
Reverse staggered	SUS304	1.5	1.47	13,513	1
	SUS304L	2.0	1.93	17,054	1.17
	SUS304L	2.5	2.46	23,496	1.74

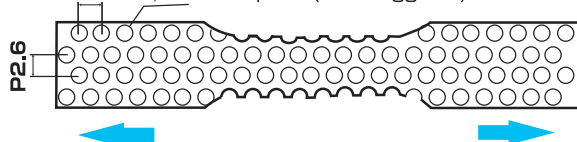
(A) Stress-Strain Curve (Staggered)



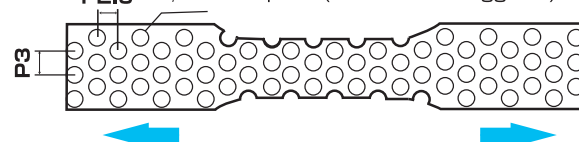
(B) Stress-Strain Curve (Reverse Staggered)



(* 1) Test piece
P3.0 φ1.5 Test piece (60° staggered)

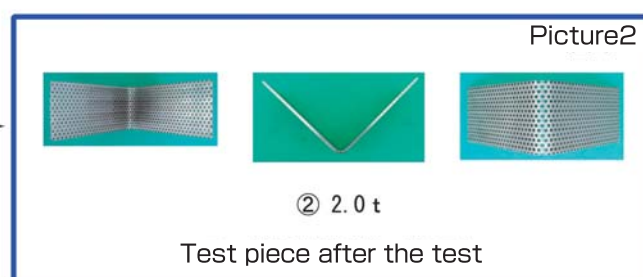
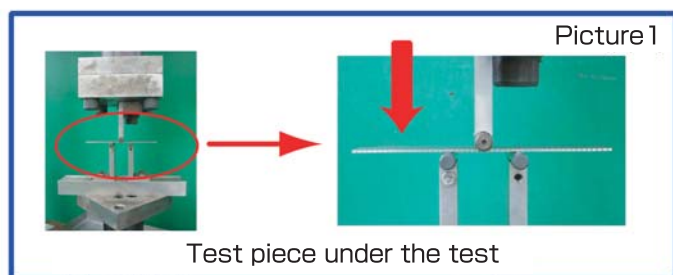


P2.6 φ1.5 Test piece (60° reverse staggered)



(* 2) Material JIS SUS304 : ISO X5CrNi18-10 (EN 1.4301)
JIS SUS304L : ISO X2CrNi18-9 (EN 1.4307)

1.Purpose	Flexural test for SUPER PUNCHING™ perforated metal
2.Samples to be tested	Stainless steel perforated metal (details as below)
3. Test Method	Three point bending flexural test (1) Testing equipment : Shimazu Universal Tester type : AG-X100kN (2) Test conditions (a) Number of test pieces : 3 pieces (* 3) (b) Environmental temperature : Room temperature (23°C or 73.4°F) (c) Test speed : 1 mm/min (d) Dimmensions of test piece : 40mm width × 150mm length (3) Perforated patterns : D1.5mm × P3.0mm staggered (* 3)

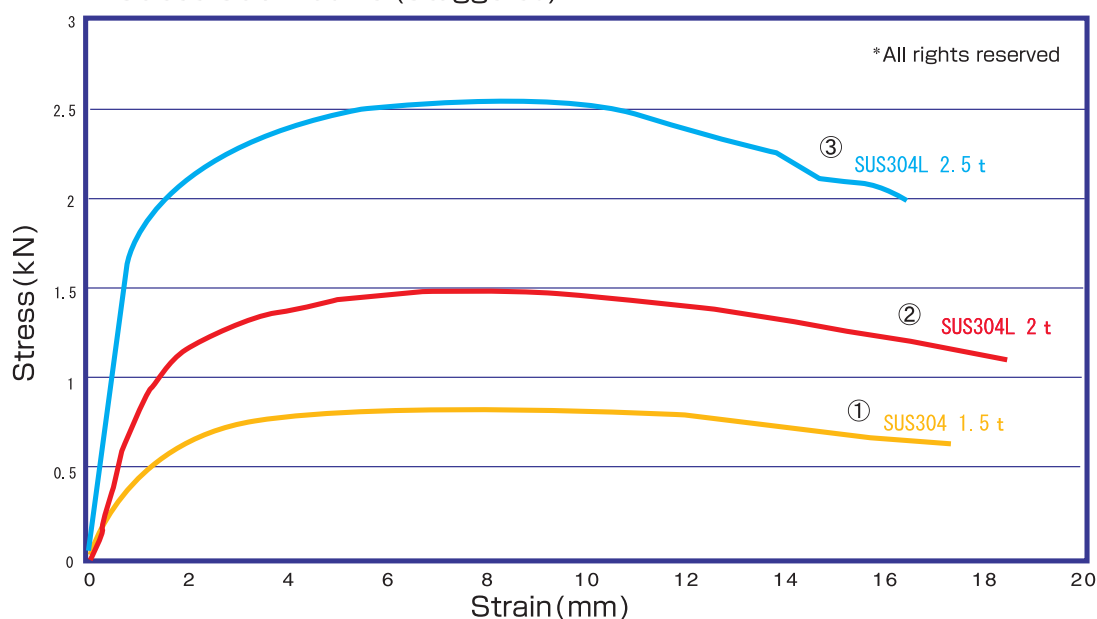


Result of bending test

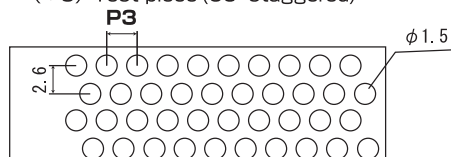
Type of patterns	Material (* 4)	Dimensions of specimen (mm)		Max. flexural load Pmax (kN)	Max. flexural stress σ_{max} (MPa)
		Width (b)	Thickness (h)		
Staggered	SUS304	40.0	1.47	0.848	841
	SUS304L	40.0	1.91	1.485	869
	SUS304L	40.0	2.49	2.553	904

Remarks : Maximum flexural stress (σ_{max}) = $3PL/2b'h^2$, L = 40mm, b' = b - 1.5 × 8

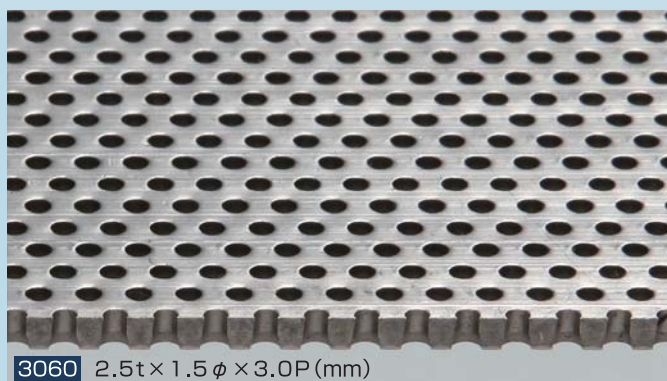
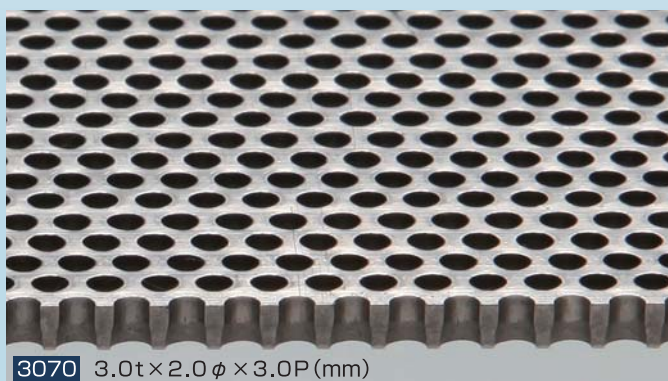
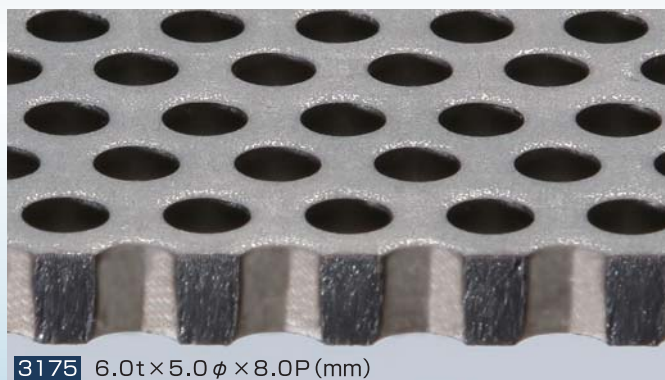
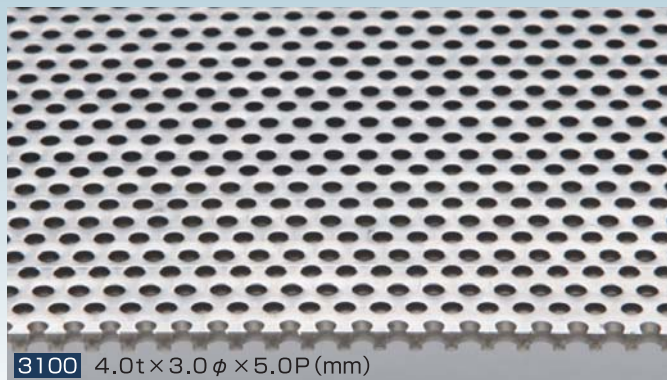
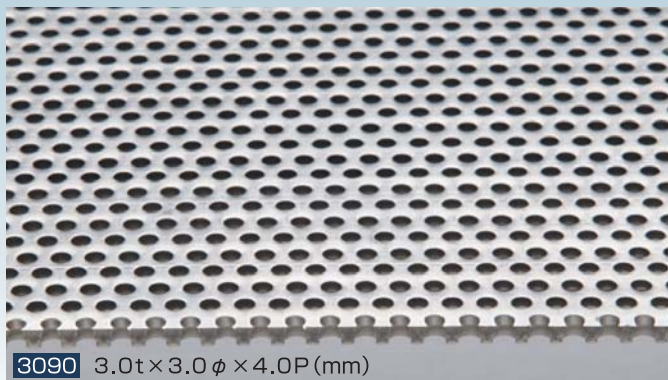
Stress-Strain Curve (Staggered)



(* 3) Test piece (60° staggered)



(* 4) Material SUS304L : ISO X2CrNi18-9 (EN 1.4307) 2.5t × φ 1.5 × P3.0 (mm)
 SUS304L : ISO X2CrNi18-9 (EN 1.4307) 2.0t × φ 1.5 × P3.0 (mm)
 SUS304 : ISO X5CrNi18-10 (EN 1.4301) 1.5t × φ 1.5 × P3.0 (mm)



List of SUPER PUNCHING™ Standard Models

Model	Thickness (mm)	Hole diameter (mm)	Hole pitch (mm)	Open area (%)
3010	1.0t	0.75φ	1.5	22.5%
3015	1.0t	0.75φ	2.0	12.7%
3020	1.0t	0.8φ	1.6	22.5%
3023	1.0t	0.9φ	2.0	18.2%
3025	1.2t	1.0φ	2.0	22.5%
3028	1.2t	1.0φ	3.0	10.0%
3030	1.5t	1.0φ	3.0	10.0%
3033	1.5t	1.0φ	2.5	14.4%
3040	2.0t	1.2φ	2.4	22.5%
3045	2.0t	1.5φ	3.0	22.5%
3050	2.0t	2.0φ	3.0	40.0%
3060	2.5t	1.5φ	3.0	22.5%
3065	2.5t	2.0φ	3.5	29.4%

Model	Thickness (mm)	Hole diameter (mm)	Hole pitch (mm)	Open area (%)
3070	3.0t	2.0φ	3.0	40.0%
3075	3.0t	2.0φ	4.0	22.5%
3080	3.0t	2.5φ	5.0	22.5%
3090	3.0t	3.0φ	4.0	50.6%
3095	3.0t	4.0φ	5.0	57.6%
3100	4.0t	3.0φ	5.0	32.4%
3105	4.0t	3.5φ	6.0	30.6%
3110	4.0t	4.0φ	6.0	40.0%
3150	5.0t	4.0φ	8.0	22.5%
3155	5.0t	4.5φ	9.5	20.2%
3170	6.0t	4.5φ	10.5	16.5%
3175	6.0t	5.0φ	8.0	35.2%
3180	6.0t	6.0φ	9.0	40.0%

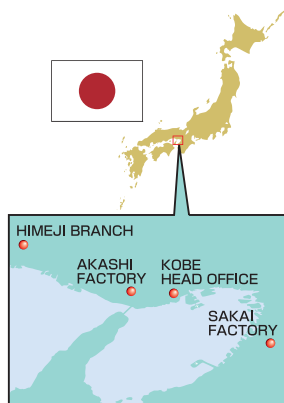
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