

Snap In Aluminium Electrolytic Capacitors



Features:

- 105°C high temperature resistance and ripple current resistance, high reliability.
- Suitable for wave filtering return circuit for power of equipment, such as computers.

Specifications:

Items	Characteristics										
Capacitance Tolerance	± 20% (120Hz, 20°C)										
Operating Temperature Range	-40°C to +105°C						-25°C to +105°C				
Rated Voltage Range	10 ~ 250V						350 ~ 450V				
Leakage Current	$I \leq 3\sqrt{CV}$ or 3000 (µA), which is greater. (After 5 minutes application of working voltage)										
Dissipation Factor (tan δ)	Measurement Frequency: 120Hz. Temperature: 20°C										
	Rated Voltage(V)	10	16	25	35	50	63	80	100	160~250	350~450
	tan δ(Max)	0.45	0.4	0.35	0.3	0.25	0.25	0.2	0.20	0.15	0.20
Low Temperature Stability Impedance Ratio(Max)	Measurement Frequency: 120Hz.										
	Rated Voltage(V)	10	16	25	35	50	63~100	160~250	350~450		
	Z(-25°C) / Z(20°C)	6	6	4	4	4	4	4	4	8	
	Z(-40°C) / Z(20°C)	16	15	10	10	8	6	15	-		
Load Life	2000 hours, with application of working voltage at 105°C										
	Capacitance Change	Within ±20% of Initial Value									
	tan δ	200% or less of Initial Specified Value									
	Leakage Current	Initial Specified Value or less									
Shelf Life	1000 hours, no voltage applied, at 105°C. After Test : U _R to be applied for 30 minutes, 24 to 48 hours before measurement.										
	Capacitance Change	Within ±15% of Initial Value									
	tan δ	200% or less of Initial Specified Value									
	Leakage Current	Initial Specified Value or less									
Standards	JIS C 5141 and JIS C 5102										

Permissible Ripple Current


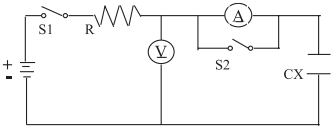
TEMP. (°C)	45	60	85	105
Coefficient	2.5	2.2	1.65	1

WV (V)	Frequency (Hz)				
	50	120	1K	10K	100K
10~100	0.88	1	1.15	1.15	1.2
160~250	0.85	1	1.15	1.2	1.2
350~450	0.88	1	1.1	1.15	1.2

Scope

This specification applies to aluminium electrolytic capacitor, used in electronic equipment

Electrical Characteristics

Item	Test Method	Specification															
Rated Voltage		Voltage range, capacitance range, see specification of this series.															
Capacitance	Measuring frequency : 120 ±12Hz	Voltage range, capacitance range, see specification of this series. Dissipation factor, leakage current, see specification of this series.															
Dissipation factor	Measuring voltage : ≤0.5Vrms + 0.5 ~ 2V DC Measurement circuit : 																
Leakage current	DC leakage current shall be measured after 1~2 minutes application of the DC rated working voltage through the 1000Ω resistor at 20°C  R : 1000 ±100Ω S1 : Switch A : DC current meter S2 : Switch for protect of current meter V : DC voltage meter CX : Testing capacitor	Dissipation factor leakage current, see specification of this series.															
Temperature characteristics	<table border="1"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Storage Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>20 ±2°C</td> <td>30 minutes</td> </tr> <tr> <td>2</td> <td>-40 ±3°C</td> <td>2 hours</td> </tr> <tr> <td>3</td> <td>20 ±2°C</td> <td>15 minutes</td> </tr> <tr> <td>4</td> <td>105 ±2°C</td> <td>2 hours</td> </tr> </tbody> </table> <p>Step 1. Measure the capacitance and impedance. (Z_0) (Z, 20°C, 120Hz ±10%) Step 2. Measure the impedance at thermal balance after 2 hours. (Z, 20°C, 120Hz ±10%) Step 4. Measure the capacitance and leakage current at thermal balance after 2 hours.</p>	Step	Temperature	Storage Time	1	20 ±2°C	30 minutes	2	-40 ±3°C	2 hours	3	20 ±2°C	15 minutes	4	105 ±2°C	2 hours	Step 2. Impedance ratio (Z_r / Z_0) less than specified value. Step 4. Capacitance change : within ± 20% of the initial measured value. Leakage current : Less than 10 times of initial specified value .
Step	Temperature	Storage Time															
1	20 ±2°C	30 minutes															
2	-40 ±3°C	2 hours															
3	20 ±2°C	15 minutes															
4	105 ±2°C	2 hours															

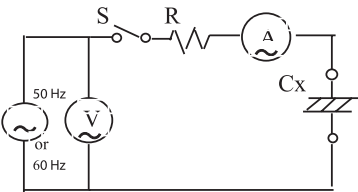




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Item	Test Method	Specification
Surge test	Rated surge voltage shall be applied (switch on) for 30 ±5 seconds and then shall be applied (switch off) with discharge for 5 ±0.5 min at room temperature . This cycle shall be repeated for 1000 cycles. Duration of one cycle is 6 ± 0.5 minutes .	Capacitance change : within ± 20% of the initial specified value. Dissipation factor : less than 200% of the initial specified value. Leakage current : within initial specified value.
Applicable Ripple Current	The maximum A.C. current having frequency of 100k Hz which can be applied to the capacitor at 105 ±2°C continuously. Peak voltage not to exceed rated D.C. voltage.	

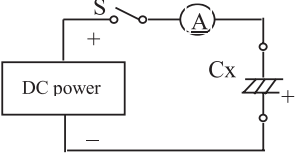
Mechanical characteristics

Lead strength	<p>(A) Tensile strength : wire lead terminal :</p> <table border="1"> <tr> <td>d (mm)</td> <td>≤0.45</td> <td>0.5 ~ 0.8</td> <td>0.8<d ≤1.25</td> </tr> <tr> <td>Load (kg)</td> <td>0.51</td> <td>1</td> <td>2</td> </tr> </table> <p>Snap-in terminal</p> <table border="1"> <tr> <td>d (mm)</td> <td>snap-in terminal</td> </tr> <tr> <td>Load (kg)</td> <td>2</td> </tr> </table> <p>The capacitor shall withstand the constant tensile force specified between the body and each lead for 10 seconds without damage either mechanical or electrical.</p> <p>(B) Bending strength : wire lead terminal :</p> <table border="1"> <tr> <td>d (mm)</td> <td>≤0.45</td> <td>0.5 ~ 0.8</td> <td>0.8<d ≤1.25</td> </tr> <tr> <td>Load (kg)</td> <td>0.25</td> <td>0.51</td> <td>1</td> </tr> </table> <p>Snap-in terminal</p> <table border="1"> <tr> <td>Cross section area of terminal</td> <td>Force (kg)</td> </tr> <tr> <td>0.5<S≤1</td> <td>1</td> </tr> <tr> <td>S>1</td> <td>2.5</td> </tr> </table> <p>With the capacitor in a vertical position apply the load specified axially to each lead. The capacitor shall be rotated slowly from the vertical to the horizontal position, back to the vertical position. The 90° in the opposite direction and back the original position. Performance of capacitor shall not have changed and leads shall be undamaged</p>	d (mm)	≤0.45	0.5 ~ 0.8	0.8<d ≤1.25	Load (kg)	0.51	1	2	d (mm)	snap-in terminal	Load (kg)	2	d (mm)	≤0.45	0.5 ~ 0.8	0.8<d ≤1.25	Load (kg)	0.25	0.51	1	Cross section area of terminal	Force (kg)	0.5<S≤1	1	S>1	2.5	<p>When the capacitance is measured, there shall be no intermittent contacts, or open- or short-circuiting.</p> <p>There shall be no such mechanical damage as terminal damage etc.</p>
d (mm)	≤0.45	0.5 ~ 0.8	0.8<d ≤1.25																									
Load (kg)	0.51	1	2																									
d (mm)	snap-in terminal																											
Load (kg)	2																											
d (mm)	≤0.45	0.5 ~ 0.8	0.8<d ≤1.25																									
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Cross section area of terminal	Force (kg)																											
0.5<S≤1	1																											
S>1	2.5																											
Vibration resistance	<p>The frequency of the vibration shall vary uniformly within the range 10 to 55 Hz with the amplitude of 1.5mm, completing the cycle in the interval of one minute.</p> <p>The capacitor shall be securely mounted by its leads with hold the body of capacitor. The capacitor shall be vibrated in three mutually perpendicular directions for a period of 2 hours in each direction .</p>	<p>Capacitance : no unsteady. Appearance : no abnormal. Capacitance change : within ± 5% of initial measured value .</p>																										
Solderability	<p>The leads are dipped in the solder bath of Sn at 260 ±5°C for 2 ±0.5 seconds . The dipping depth should be set at 1.5 ~ 2mm .</p>	<p>The solder alloy shall cover the 95% or more of the dipped lead's area .</p>																										

Reliability

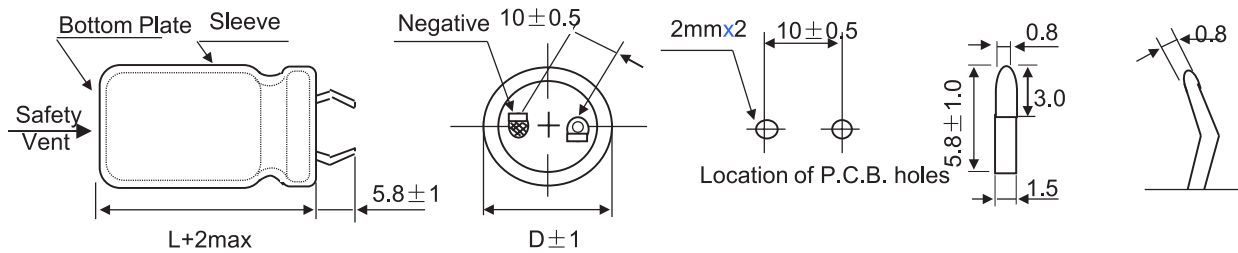
Item	Test Method	Specification														
Soldering heat resistance	The leads immerse in the solder bath of Sn at $260 \pm 5^\circ\text{C}$ for 10 ± 1 seconds until a distance of 1.5 ~ 2mm from the case.	No damage or leakage of electrolyte. Capacitance change : within $\pm 10\%$ of the initial measured value. Tan δ : less than specified value. Leakage current : less than specified value.														
Damp heat (Steady state)	Subject the capacitors to $40 \pm 2^\circ\text{C}$ and 90% to 95% relative humidity for 240 ± 8 hours.	Capacitance change : within $\pm 10\%$ of the initial measured value. Tan δ : less than specified value. Leakage current : less than specified value.														
Load life	After X hours continuous application of DC rated working voltage at $105 \pm 2^\circ\text{C}$, the measurements shall meet the following limits. Measurements shall be performed after 2 hours exposed at room temperature.	Standard of judgement is according to requirement of this series.														
Shelf life	After storage for Y hours at $105 \pm 2^\circ\text{C}$ without voltage application , the measurements shall meet the following limits. Measurements shall be performed after exposed for 1 to 2 hrs at room temperature after application of DC rated voltage to the capacitor for Z minutes .															
Storage at Low Temperature	The capacitor shall be stored at temperature of $-40 \pm 3^\circ\text{C}$ for 240 ± 8 hours, during which time no voltage shall be applied. And then the capacitor shall be subjected to standard atmospheric conditions for 16 hours or more, after which measurements shall be made.	Capacitance change : within $\pm 10\%$ of the initial value. Tan δ : less than specified value. Leakage current : less than specified value Appearance : no abnormal.														
Pressure relief	<p>AC test Applied voltage : AC voltage not exceeding 0.7 times of the rated direct voltage or 250 V AC whichever is the lower. Frequency : 50Hz or 60Hz Series resistor : refer to the table below</p> <table border="1"> <thead> <tr> <th>Capacitance (C)</th> <th>Series resistor</th> </tr> </thead> <tbody> <tr> <td>$C \leq 1\mu\text{F}$</td> <td>1000Ω</td> </tr> <tr> <td>$1\mu\text{F} < C \leq 10\mu\text{F}$</td> <td>100$\Omega$</td> </tr> <tr> <td>$10\mu\text{F} < C \leq 100\mu\text{F}$</td> <td>10$\Omega$</td> </tr> <tr> <td>$100\mu\text{F} < C \leq 1000\mu\text{F}$</td> <td>1$\Omega$</td> </tr> <tr> <td>$1000\mu\text{F} < C \leq 10000\mu\text{F}$</td> <td>0.1$\Omega$</td> </tr> <tr> <td>$10000\mu\text{F} < C$</td> <td>*</td> </tr> </tbody> </table> <p>* Resistance is equivalent to a half impedance by test frequency.</p>	Capacitance (C)	Series resistor	$C \leq 1\mu\text{F}$	1000 Ω	$1\mu\text{F} < C \leq 10\mu\text{F}$	100 Ω	$10\mu\text{F} < C \leq 100\mu\text{F}$	10 Ω	$100\mu\text{F} < C \leq 1000\mu\text{F}$	1 Ω	$1000\mu\text{F} < C \leq 10000\mu\text{F}$	0.1 Ω	$10000\mu\text{F} < C$	*	<p>AC test circuit</p>  <p>  : AC power  : Switch  : AC voltage meter  : AC current meter R : Protection Resistor Cx : Testing Capacitor </p>
Capacitance (C)	Series resistor															
$C \leq 1\mu\text{F}$	1000 Ω															
$1\mu\text{F} < C \leq 10\mu\text{F}$	100 Ω															
$10\mu\text{F} < C \leq 100\mu\text{F}$	10 Ω															
$100\mu\text{F} < C \leq 1000\mu\text{F}$	1 Ω															
$1000\mu\text{F} < C \leq 10000\mu\text{F}$	0.1 Ω															
$10000\mu\text{F} < C$	*															

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Item	Test Method	Specification
Pressure relief	<p>DC test</p> <p>Send the following electricities while applying the inverse voltage .</p> <p>Where case size (D diameter)</p> <p>$D \leq 22.4 \text{ mm} : 1 \text{ A DC max.}$</p> <p>$D > 22.4 \text{ mm} : 10 \text{ A DC max.}$</p> <p>Note : 1. This requirement applies to capacitors with a diameter of 6 mm or more .</p>	<p>DC test circuit</p>  <p>S : Switch A : DC current meter Cx : Testing Capacitor</p>

MCKLZ Series

Dimensions:



Standard Ratings

$D \times L$ (mm) ; R.C.(A rms) at 105°C, 120Hz; IMP (Ω max)

Cap (uF)	WV (V)	10			16			25			35			50		
		Item	D×L	R.C.	IMP	D×L	R.C.	IMP	D×L	R.C.	IMP	D×L	R.C.	IMP	D×L	R.C.
1500														22×25	1.2	0.268
1800														22×30	1.4	0.222
2200														22×30 25×25	1.6	0.182
2700											22×25	1.21	0.174	22×35 25×30	1.73	0.148
3300											22×30	1.36	0.142	22×40 25×30	1.97	0.123
3900								22×25	1.35	0.137	22×30	1.57	0.12	22×45 25×35	2.23	0.104
4700								22×30	1.58	0.114	22×35 25×25	1.77	0.098	22×50 25×40	2.45	0.086
5600								22×30 25×25	1.75	0.096	22×40 25×30	1.99	0.083	25×45 30×35	2.74	0.074

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Cap (uF)	WV (V)	10			16			25			35			50		
		Item	DxL	R.C.	IMP	DxL	R.C.	IMP	DxL	R.C.	IMP	DxL	R.C.	IMP	DxL	R.C.
6800					22x25	1.8	0.098	22x35 25x30	2.02	0.079	22x45 25x35	2.29	0.069	30x40 35x30	3.31	0.069
8200					22x30 25x25	2.08	0.082	22x40 25x35	2.18	0.066	22x50 25x40	2.58	0.057	30x45 35x35	3.6	0.050
10000		22x25	1.88	0.077	22x35 25x30	2.15	0.062	22x45 25x40	2.48	0.058	25x45 30x40	2.9	0.054	35x40	4.02	0.046
12000		22x30 25x25	2.18	0.068	22x40 25x30	2.31	0.056	22x50 25x45	2.86	0.05	25x50 30x40	3.24	0.046	35x50	4.52	0.039
15000		22x35 25x30	2.27	0.055	22x45 25x35	2.69	0.045	25x50 30x40	3.15	0.04	30x45 35x35	3.65	0.037			
18000		22x40 25x30	2.41	0.048	22x50 25x40	3.2	0.042	30x45 35x35	3.55	0.038	35x40 30x50 35x50	4.13	0.03			
22000		22x45 25x35	2.68	0.045	25x45 30x35	3.4	0.04	30x50 35x40	4	0.034		4.78	0.025			
27000		25x40 30x35	3.17	0.04	30x40 35x35	3.85	0.035	35x45	4.55	0.03						
33000		25x45 30x35	3.39	0.036	30x50 35x40	4.32	0.025	35x50	5.56	0.024						
39000		25x50 30x40	3.72	0.033	35x40	4.85	0.023									
47000		30x45 35x35	4.22	0.03	35x50	5.56	0.02									
56000		35x40	5	0.019												
68000		35x50	5.21	0.016												

Standard Ratings

DxL(mm) ; R.C.(A rms) at 105°C, 120Hz; IMP (Ω max)

Cap (uF)	WV (V)	63			80			100			160			200		
		Item	DxL	R.C.	IMP	DxL	R.C.	IMP	DxL	R.C.	IMP	DxL	R.C.	IMP	DxL	R.C.
150														22x25	0.82	1.05
220											22x25	1.04	0.738	22x30	1.07	0.738
330											22x30	1.26	0.605	22x30 25x25	1.2	0.605
390											22x30 25x25	1.29	0.514	22x35 25x30	1.34	0.514
470											22x35 25x30	1.56	0.426	22x40 25x30	1.48	0.426

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Cap (uF)	WV (V)	63			80			100			160			200		
		Item	DxL	R.C.	IMP	DxL	R.C.	IMP	DxL	R.C.	IMP	DxL	R.C.	IMP	DxL	R.C.
560								22x25	1.02	0.476	22x40 25x30	1.69	0.357	22x45 25x35	1.65	0.356
680								22x30	1.12	0.393	22x45 25x35	1.72	0.294	25x40 30x30	1.75	0.293
820					22x25	1.04	0.326	22x30 25x25	1.32	0.324	22x50 25x40	1.99	0.246	25x50 30x35	2.04	0.245
1000					22x30	1.21	0.275	22x35 25x30	1.45	0.268	25x45 30x35	2.2	0.202	30x45 35x35	2.3	0.202
1200		25x25	1.21	0.276	22x35 25x25	1.29	0.227	22x40 25x35	1.68	0.223	30x40 35x35	2.45	0.168	30x50 35x40	2.65	0.167
1500		22x30 25x25	1.45	0.223	22x40 25x30	1.57	0.186	22x45 25x40	1.98	0.177	30x50 35x40	3.06	0.138	35x45	2.98	0.134
1800		22x35 25x30	1.59	0.187	22x45 25x35	1.72	0.155	25x45 30x35	2.23	0.148	35x45	3.14	0.112			
2200		22x40 22x30	1.84	0.158	25x40 30x30	2.01	0.133	25x45 30x40	2.53	0.123	35x50	3.5	0.093			
2700		22x45 25x35	2.12	0.126	25x45 30x35	2.32	0.099	30x45 35x35	2.82	0.098						
3300		25x40 30x30	2.3	0.102	30x40 35x30	2.62	0.086	30x50 35x40	3.32	0.081						
3900		25x45 30x35	2.42	0.087	30x45 35x35	2.84	0.07	35x45	3.62	0.068						
4700		25x50 30x40	2.91	0.075	30x50	3.29	0.068	35x50	3.8	0.058						
5600		30x45 35x35	3.18	0.06	35x45	3.82	0.048									
6800		30x50 35x40	3.54	0.05	35x50	3.92	0.038									
8200		35x45	3.82	0.042	35x50	4.05	0.033									
10000		30x50	4.5	0.033	35x60	4.2	0.027	35x70	4.8	0.020						
12000					35x95	4.4	0.024									

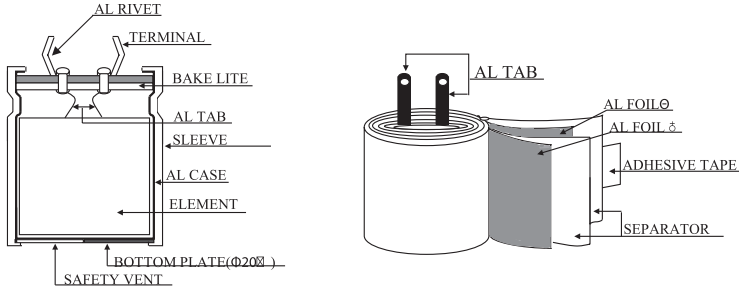
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Standard Ratings

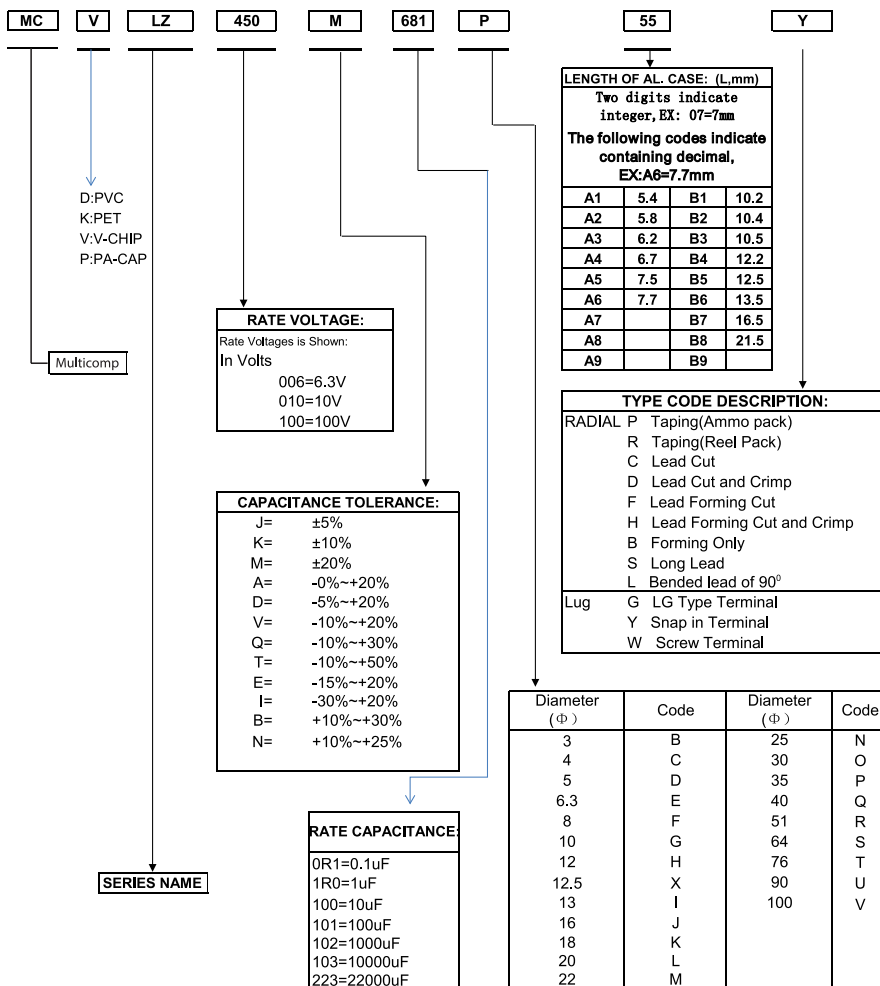
D×L(mm) ; R.C.(A rms) at 105°C, 120Hz; IMP (Ω max)

Cap (uF)	WV (V)	250			350			400			450		
		Item	D×L	R.C.	IMP	D×L	R.C.	IMP	D×L	R.C.	IMP	D×L	R.C.
68								22×25	0.52	4.88	22×35 25×30	0.55	4.88
82					22×25	0.60	3.233	22×30 22×25	0.66	4.047	22×35 25×30	0.65	4.047
100					22×30 22×25	0.69	2.654	22×35 25×25	0.72	3.318	22×40 25×35	0.75	3.318
120					22×35 25×30	0.76	2.215	22×40 25×30	0.75	2.766	22×45 25×40	0.83	2.766
150		22×25	0.76	1.328	22×40 25×30	0.79	1.77	22×45 25×35	0.89	2.214	22×50 25×40	0.95	2.214
180		22×30	0.98	1.106	22×45 25×35	0.88	1.475	22×50 25×40	0.98	1.842	25×45 30×40	1.15	1.842
220		22×30 25×25	1.09	0.905	22×50 25×40	0.98	1.208	25×45 30×35	1.12	1.506	30×45 35×40	1.24	1.506
270		22×35 25×30	1.19	0.738	25×45 30×35	1.1	0.984	25×50 30×40	1.29	1.23	30×50 35×45	1.46	1.23
330		22×40 25×35	1.35	0.605	30×40 35×35	1.22	0.806	30×45 35×35	1.45	1.015	35×40	1.45	1.115
390		22×45 25×35	1.52	0.512	30×45 35×40	1.42	0.681	30×50 35×40	1.59	0.847	35×55	1.78	0.852
470		22×50 25×40	1.63	0.425	35×45	1.62	0.567	35×45	1.75	0.71	35×50	2	0.8
560		25×45 30×35	1.84	0.357	35×50	1.89	0.473	35×50	2.12	0.588			
680		25×50 30×40	2.05	0.294	35×50	2.10	0.420	35×70	2.2	0.485	35×55	2.3	
820		30×45 35×35	2.29	0.246	35×65	2.35	0.352	35×65	2.5	0.412			
1000		35×40	2.49	0.201									
1200		35×45	2.84	0.167									

Structure and Materials



Explanation of parts numbers



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