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# SPL Evaporative Condensers

Authorised Channel Partner



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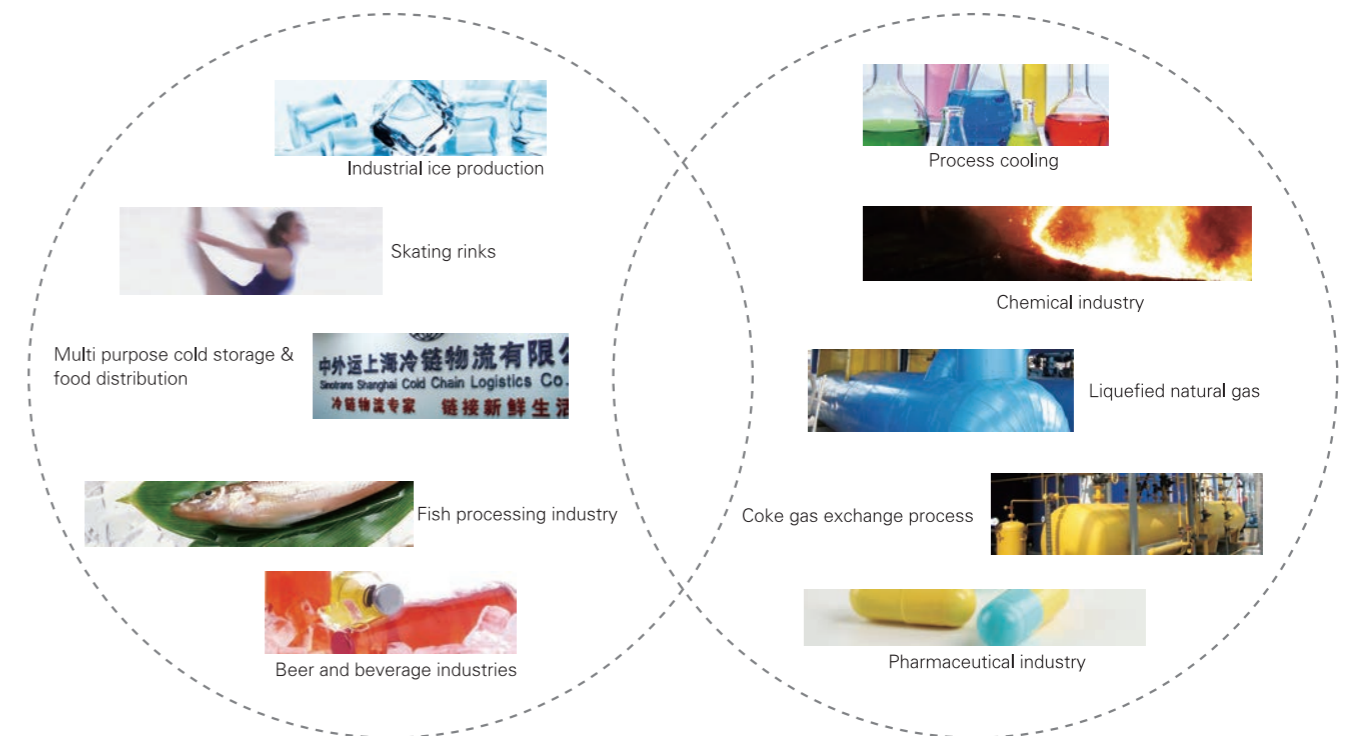
## Company Introduction

SPL is 100% owned by listed company Lianhe Group with national resources and solutions for worldwide heat transfer application located in Shanghai China. SPL is dedicated to designing and manufacturing the highest quality products for the evaporative cooling and industrial refrigeration markets around the globe. Since its founding in 2001, SPL Incorporated has become an industry leader in the engineering and manufacturing of quality heat transfer products in China.

## Industry Sectors

The SPL range of condensers are suitable for applications in a variety of industries from the Food Industry to the Petrochemical industry. Their range includes both counter flow and combined flow technologies.

SPL's powerful combination of financial strength and technical expertise has established the company as a recognized manufacture of market leading products on a nationwide basis. SPL is also recognized for the superior technology of their environmentally friendly products, innovation in sound reduction and water management. SPL has a strong emphasis on research and development and modern manufacturing plants.





## SPL Series Features

### Advanced Technology

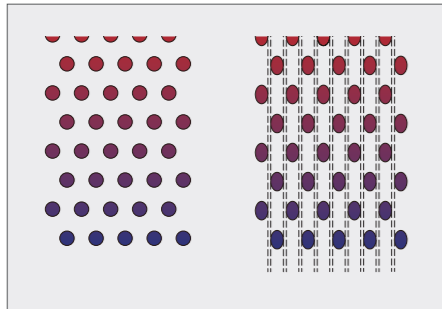
SPL's exclusive condensing coils are manufactured at SPL from high quality steel tubing following the most stringent quality control procedures. Each circuit is inspected to assure the highest material quality.

All SPL coils are formed in one continuous piece using a unique automatic coil production line, this process limits welding slag, increases production efficiency and factory lead times.

The coils are hydrologically tested 3 times during the manufacturing process to 2.5Mpa to ensure they are leak free.

To protect the coil against corrosion, coils are placed in a heavy steel frame and then the entire assembly is dipped in molten zinc (hot-dip galvanized) at a temp of 427°C. The tubes are pitched in the direction of fluid flow to provide good liquid drainage.

### Advanced Technology-Elliptical Coil



### Super Galum Wall Structure

Super Galum is the brand name for 55% aluminum-zinc coated steel sheet. Super Galum is highly heat and corrosion resistant, combining the properties of aluminum which renders increased durability, excellent heat resistance, formability, and those of zinc which offers high heat resistance and excellent corrosion protection. Super Galum is three to six times more corrosion resistant than regular zinc coated steel sheet.

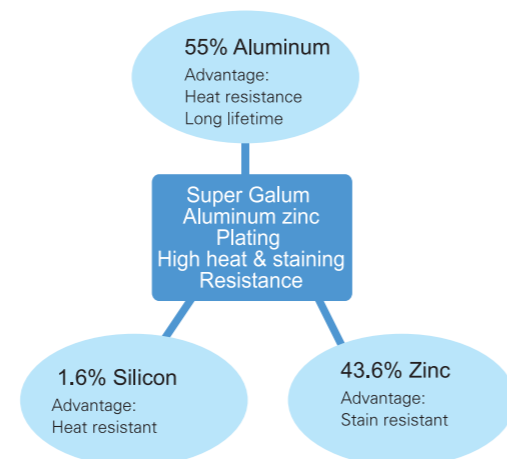
## PERFORMANCE EFFICIENCY UP



### SPL-S Coil Technology

SPL's standard coils offer the most effective performance of heat transfer with the coil technology and fill combination to avoid the dry spot and dirt forming on the coils.

SPL's coils feature an exclusive design which assures maximum cooling capacity. The airflow through the coil is parallel to the fluid flow, providing the most efficient heat transfer process. A special coil design is utilized to reduce the air pressure drop through the unit while maximizing tube surface area and increasing its heat transfer capabilities. The uniquely shaped tubes of the coil are staggered in the direction of airflow to obtain a high film coefficient.



## SPL Series Features

### Advanced Technology-De-scaling cleaner

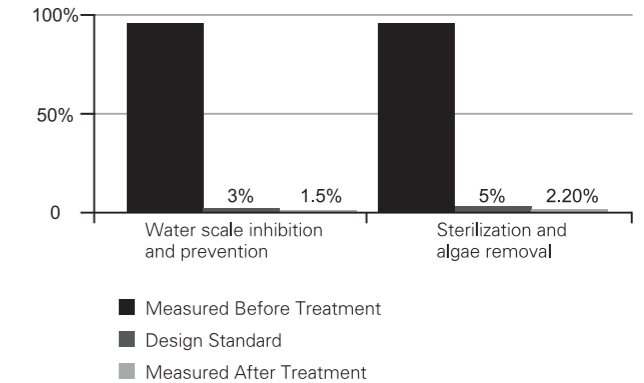
The electronic De-scaling cleaner offers 98% increased effectiveness over of water scale inhibition and over 95% increased sterilization & algae removal over high-frequency electronic technology. Designed especially for closed loop cooling towers and evaporative condensers with low power consumption.



### Patented Air Inlet Louver

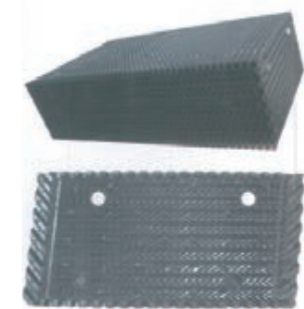
With the SPL two pass louver system, the water droplets are captured on the inward sloping pass, minimizing splash-out problems. SPL's unique louver design for all SPL's N lines completely encloses the basin area. Direct sunlight is blocked from the water inside the condenser and cooling tower, thereby reducing the potential of algae formation. Water treatment and maintenance costs are substantially reduced. While effectively containing the re-circulating water and blocking sunlight, the louver design has a low pressure drop. The low pressure drop results in lower fan energy consumption, which reduces the operating costs of the cooling tower.

## PERFORMANCE EFFICIENCY UP



### Patented Fill Technology

SPL fill design used in the S line evaporative condensers and cooling towers and is specially designed to induce highly turbulent mixing of the air and water for superior heat transfer. Special drainage tips allow high water loadings without excessive pressure drop. The fill is constructed of inert polyvinyl chloride, (PVC). It will not rot or decay and is formulated to withstand water temperatures of 54.4°C. Due to the unique way the cross-fluted sheets are bonded together in the honey-comb structure of the fill and the bottom support of the fill section, the structural integrity of the fill is greatly enhanced, making the fill usable as a working platform. The fill selected for the condenser and cooling tower has excellent fire resistant qualities.





## SPL Series Features

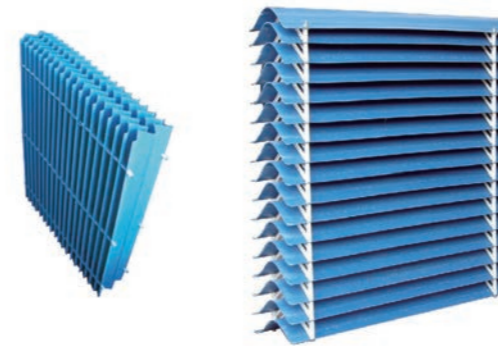
### Patented Drift Eliminator

SPL's detachable drift eliminator is made from specially designed non-corroding PVC material. The patented eliminators comply with AS/NZS 3666, 1:20116 with a maximum drift loss of 0.001%.

Eliminators are designed for ease of maintenance making them extremely easy to clean.



## PERFORMANCE EFFICIENCY UP



### Pressurized Water Distribution System

SPL's exclusive patented maintenance free spray nozzle remains clog-free while providing even and constant water distribution for reliable, scale-free evaporative cooling under all operating conditions. Furthermore, the nozzles are mounted in the corrosion-free water distribution pipes and have threaded end caps.

Together, these elements combine to provide unequalled coil coverage and scale prevention, which makes them industry's best performing non-corrosive, maintenance-free water distribution system.



### Patented Metal Air Deflector

With the SPL adjustable air deflector system, the water droplets are captured on the inward sloping pass, minimizing splash-out problems. SPL's unique design for all SPL's S lines completely encloses the basin area.

Adjustable function keeps direct sunlight away from the water inside the condenser and cooling tower, thereby reducing the potential of algae formation. Water treatment and maintenance costs are substantially reduced.

While effectively containing the recirculating water and blocking sunlight, the louver design has a low pressure drop. The low pressure drop results in lower fan energy consumption, which reduces the operating costs of the cooling tower.

## SPL Series Features

### Direct Drive Axial Fans

SPL direct drive fans offer following advantages over belt driven fans used by most competitors;

- Low failure rate
- Easy maintenance
- Low noise
- Low transmission loss

The axial fan of SPL lines use specific carbon fiber blades forward curved fan, this offers, high air volume, low noise, perfect performance with high efficiency.

## PERFORMANCE EFFICIENCY UP



### Low Maintenance

The SPL series of evaporative condensers have several key features.

### Sloping Basin

The slope of basin bottom to drain pipe makes for convenient cleaning and removal of debris.

### Large Access Doors

Large access doors and generous inner chamber makes for convenient examination and repair.

The ball cock and filter of SPL series can be examined and repaired without stopping the operation of the condenser due to the same direction for airflow and water flow. The nozzles and coils also can be examined and repaired

### Containerized Design for Low Shipping Cost

The SPL-Series products are designed to be shipped in kit form that fits in 20ft and 40ft containers.

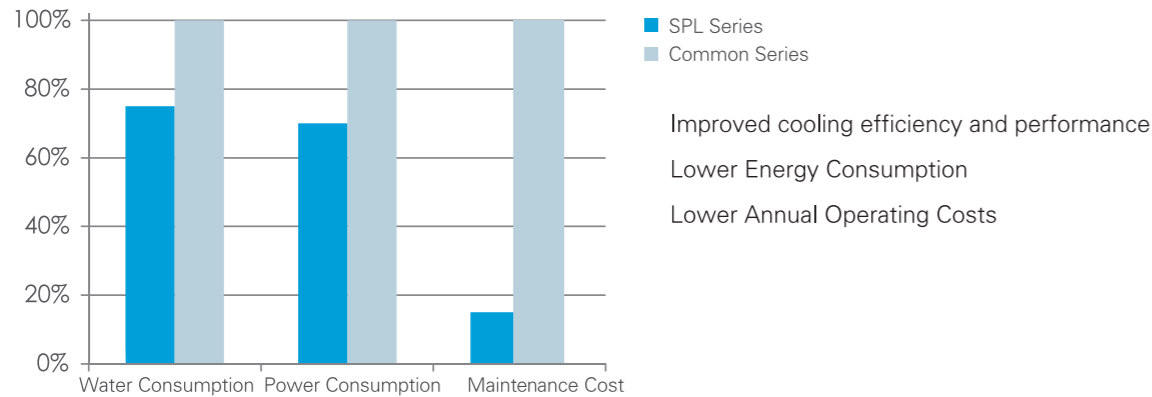
A complete 2.11M x 2.41M unit will fit in a 20' shipping container.

A complete 2.21M x 5.92M unit will fit in a 40' HQ shipping container.





SPL has earned a reputation for technological innovation and superior product quality by featuring products that are designed to offer these operating advantages:



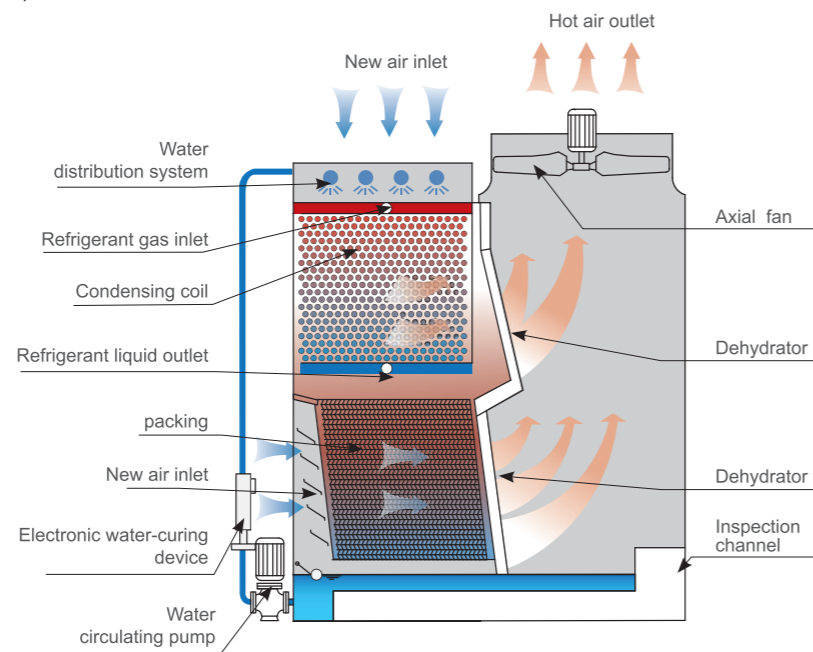
**Principle of Operation for SPL-S Series**

The SPL-S series use combined flow technology. Combined flow technology improves the efficiency of evaporation and cooling while also reducing water wastage.

The refrigerant is circulated through the coil of the evaporative condenser. Heat from the refrigerant is dissipated through the coil tubes.

Water is sprayed in parallel with the fresh ambient air flowing over the outside of the condensing coil. Parallel air and water paths minimize scale producing dry spots that may be found on the bottom of the tubes in other conventional condensers. The condensing coil rejects heat through both evaporative cooling using the fresh air stream and, more significantly, through sensible cooling of the pre-cooled recirculating spray water. Reducing this evaporative cooling component from the coil section helps to minimize the formation scale on the coil surface. A portion of this evaporated heat is discharged sideways to atmosphere by the downward natural induced air.

The warm moist air is drawn sideways by the fan and is discharged to the atmosphere. The remaining water falls from the coil to the fill surface section where it is cooled by a second fresh air stream using evaporative heat transfer and eventually to the sump at the bottom of the condenser where it is recirculated by the pump up through the water distribution system and back down over the coils.



Unique Design Features—SPL-S



**Direct Drive Axial Flow Fan**

Carbon fiber blade, hot dip galvanized casting, high air flow rate, low noise, efficiency.



**Patented Spray Nozzle**

Anti clogging, Scale-free, non-corrosive, unequalled coil coverage, Maintenance free

**Super Galum Wall**

55% Aluminum 43.4% Zinc 1.6% Silicon Coated sheet steel. Positive corrosion resistant, strong tolerance of heat, attractive and durable. 3-6 times more corrosion resistant than regular zinc coated steel sheet.



**Condensing Coils**

Unique design, high efficiency heat exchange process, single run coil reduces welds and leaks.



**Electronic De-scaling**

Anti-scaling, De-scaling, Sterilization & algae removal over 98% of water scale inhibition and prevention and over 95% of sterilization & algae removal.



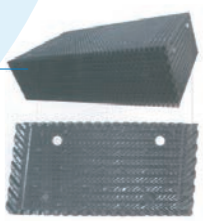
**Detachable Drift Eliminator**

Non corrosive PVC. Patented design.



**Water circulating pump**

High efficiency Siemens drive motor.



**Air Inlet Louver**

Patented design corrosion-free PVC, minimizes splash out and reduces the potential for algae formation inside the condenser.

### Selection Criteria

The following selection procedure is applicable for screw and reciprocating compressors.

**1. Determine the refrigerants**

**2. Determine the plant Saturated Condensing Temperature**

This is the Saturated Condensing Temperature (SCT) that the system has been designed to in °C

**3. Determine the Wet Bulb temperature (We)**

Highest annual wet bulb temperature for the location at which the plant will operate.

**4. Determine the Total Heat of Rejection (THR)**

The Total Heat of Rejection (THR) for a given system is determined by adding the evaporator load in kW and the absorbed power of the compressor kW.

**5. Multiply by THR Correction Index**

Once the THR has been determined multiply it by the factor for the specified operating conditions( condensing temperature and wet bulb temperature) this factor can be obtained from Table 1 for Ammonia R717 and Table 2 for R134a.

**6. Use SPL data tables to identify correct model**

Look up Tables 3 to 9 and choose an evaporative condenser up a capacity greater than the corrected THR

### Example

**Steps 1,2&3**

Refrigerant=R717  
Saturated Condensing Temperature=32°C  
Wet Bulb temperature=23°C  
Evaporator Load=900kW  
Compressor Absorbed Power=223kW

**Steps 5.**

Refrigerant=R717  
Saturated Condensing Temperature=32°C  
Wet Bulb temperature=23°C  
Evaporator Load=900kW  
Compressor Absorbed Power=223kW  
From Table 1 the THR index for 32°C SCT and 23°C WB=1.20  
THR=1123kW × 1.20=1347.6kW

**Steps 4**

Evaporator Load=900kW  
Compressor Absorbed Power=223kW Total  
Heat of Rejection (THR) 1123kW

**Steps 6**

Table 8 evaporative condenser model SPL-1380WS has a THR > 1347.6kW  
Model selected SPL-1380WS

### Notes on Choosing Models

1. The data and specifications mentioned above are for reference only, information may be revised without prior notice.
2. Refrigerant charge refers to the amount of ammonia R717 under standard freezing running conditions, other refrigerants need to be calculated separately.
3. The operating weight in the tables is the weight of equipment, refrigerant charge and the weight of water stored in the basin.
4. Nonstandard specials are available on request.
5. The displayed capacity in the following tables is based standard working conditions of 28°C wet bulb, 38°C condensing.

### THR Correction Index

**Table 1**

Heat Rejection Correction Factors for R717 - Combined Flow SPL-S & SPL-W

CONDENSING TEMPERATURE °C	Destination Wet Bulb Temperature (°C)																	
	10	12	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
29	0.72	0.78	0.86	0.96	1.01	1.09	1.18	1.30	1.43	1.60	1.84	2.16	2.66	/	/	/	/	/
30	0.68	0.73	0.81	0.88	0.94	1.00	1.07	1.15	1.27	1.40	1.59	1.79	2.13	/	/	/	/	/
31	0.64	0.68	0.74	0.82	0.86	0.91	0.97	1.04	1.12	1.22	1.36	1.52	1.74	2.06	/	/	/	/
32	0.61	0.65	0.69	0.74	0.80	0.84	0.89	0.95	1.02	1.10	1.20	1.34	1.49	1.70	2.02	/	/	/
33	0.57	0.61	0.65	0.70	0.73	0.78	0.82	0.87	0.92	0.99	1.07	1.16	1.29	1.45	1.66	1.96	/	/
34	0.55	0.58	0.62	0.66	0.69	0.72	0.76	0.80	0.85	0.90	0.96	1.04	1.14	1.27	1.42	1.63	1.90	/
35	0.52	0.54	0.58	0.62	0.64	0.67	0.70	0.73	0.78	0.83	0.88	0.94	1.02	1.11	1.23	1.37	1.59	1.85
36	0.50	0.52	0.55	0.59	0.61	0.63	0.66	0.69	0.72	0.75	0.81	0.86	0.92	1.00	1.09	1.22	1.35	1.57
37	0.47	0.49	0.52	0.55	0.57	0.59	0.61	0.64	0.67	0.70	0.73	0.79	0.84	0.90	0.97	1.06	1.21	1.33
38	0.45	0.47	0.50	0.53	0.55	0.56	0.58	0.60	0.62	0.65	0.68	0.72	0.76	0.82	0.88	0.96	1.04	1.19
39	0.43	0.45	0.47	0.50	0.52	0.53	0.54	0.56	0.58	0.61	0.63	0.67	0.70	0.74	0.80	0.86	0.95	1.04
40	0.42	0.43	0.45	0.48	0.49	0.50	0.52	0.53	0.55	0.58	0.60	0.62	0.66	0.69	0.73	0.78	0.85	0.93
41	0.40	0.41	0.43	0.45	0.46	0.47	0.49	0.50	0.52	0.54	0.56	0.58	0.61	0.64	0.67	0.71	0.76	0.83
42	0.39	0.40	0.41	0.43	0.44	0.45	0.47	0.48	0.49	0.51	0.53	0.55	0.57	0.60	0.62	0.66	0.70	0.74
43	0.37	0.38	0.39	0.41	0.42	0.43	0.44	0.45	0.46	0.48	0.50	0.51	0.53	0.55	0.58	0.61	0.65	0.69
44	0.36	0.37	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.46	0.47	0.49	0.50	0.52	0.54	0.57	0.60	0.63
45	0.34	0.35	0.36	0.37	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.46	0.47	0.49	0.51	0.53	0.56	0.58

**Table 2**

Heat Rejection Correction Factors for R134A - Combined Flow SPL-S Series

CONDENSING TEMPERATURE °C	Destination Wet Bulb Temperature (°C)																	
	10	12	14	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
29	0.89	0.97	1.07	1.19	1.30	1.35	1.46	1.61	1.77	1.98	2.28	2.68	3.30	/	/	/	/	/
30	0.84	0.91	1.00	1.09	1.17	1.28	1.33	1.43	1.57	1.71	1.97	2.22	2.64	/	/	/	/	/
31	0.79	0.84	0.92	1.02	1.07	1.13	1.20	1.29	1.39	1.51	1.69	1.88	2.16	2.55	/	/	/	/
32	0.76	0.81	0.86	0.92	0.99	1.04	1.10	1.18	1.26	1.36	1.49	1.66	1.85	2.11	2.50	/	/	/
33	0.71	0.76	0.81	0.87	0.91	0.974	1.02	1.08	1.14	1.23	1.33	1.44	1.60	1.80	2.06	2.43	/	/
34	0.68	0.72	0.77	0.82	0.86	0.89	0.94	0.99	1.05	1.12	1.19	1.29	1.41	1.57	1.76	2.02	2.33	/
35	0.64	0.625	0.72	0.77	0.79	0.83	0.87	0.91	0.97	1.03	1.09	1.17	1.26	1.38	1.53	1.70	1.97	2.29
36	0.62	0.64	0.68	0.73	0.76	0.78	0.82	0.86	0.89	0.93	1.00	1.07	1.14	1.24	1.35	1.51	1.67	1.95
37	0.58	0.61	0.64	0.68	0.71	0.73	0.76	0.79	0.83	0.87	0.91	0.98	1.04	1.12	1.20	1.31	1.50	1.65
38	0.56	0.58	0.62	0.66	0.68	0.69	0.72	0.74	0.77	0.81	0.84	0.89	0.94	1.02	1.09	1.19	1.29	1.48
39	0.53	0.56	0.58	0.62	0.64	0.66	0.67	0.69	0.72	0.76	0.78	0.83	0.87	0.92	0.99	1.07	1.18	1.29
40	0.52	0.53	0.56	0.60	0.61	0.62	0.64	0.66	0.68	0.72	0.74	0.77	0.82	0.86	0.91	0.97	1.05	1.15
41	0.50	0.51	0.53	0.56	0.57	0.58	0.61	0.62	0.64	0.67	0.69	0.72	0.76	0.79	0.83	0.88	0.94	1.03
42	0.48	0.50	0.51	0.53	0.55	0.56	0.58	0.60	0.61	0.63	0.66	0.68	0.71	0.74	0.77	0.82	0.87	0.92
43	0.46	0.47	0.48	0.51	0.52	0.53	0.55	0.56	0.57	0.60	0.62	0.63	0.66	0.68	0.72	0.76	0.81	0.86
44	0.45	0.46	0.47	0.481	0.50	0.51	0.52	0.53	0.55	0.57	0.58	0.61	0.62	0.64	0.67	0.71	0.74	0.78
45	0.42	0.43	0.45	0.46	0.47	0.48	0.50	0.51	0.52	0.53	0.55	0.57	0.58	0.61	0.63	0.66	0.69	0.72