THERMABAR PVC Splash Fill

The THERMABAR PVC crossflow tower splash bar cooling media is the result of extensive research and testing using star of the art technology to obtain maximum crossflow tower cooling efficiency in the most effective way yet devised....

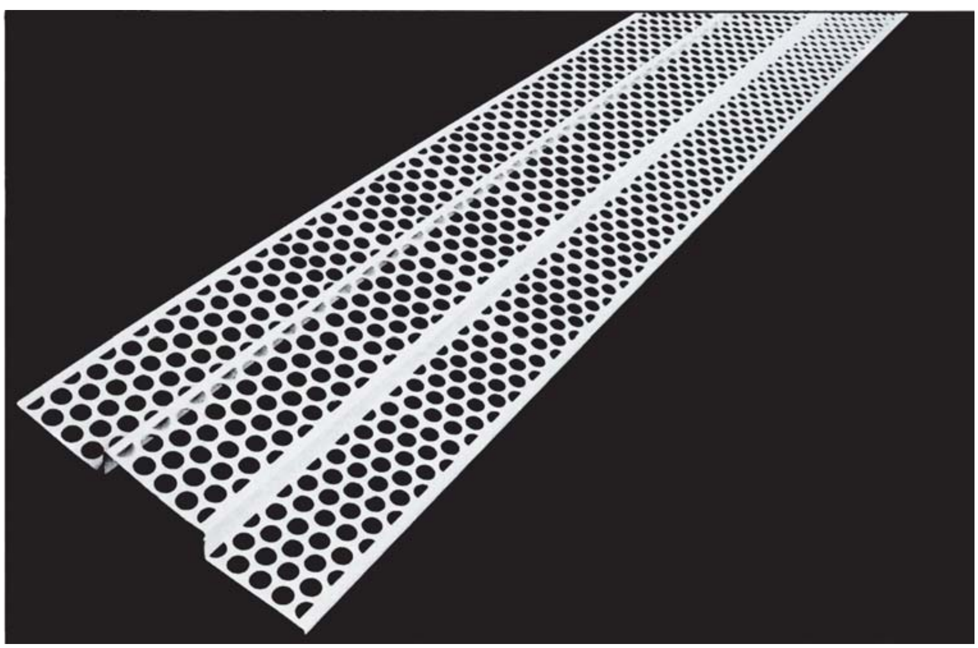
Most crossflow tower splash bar and film type cooling media designs used today do a pretty good job in promoting the removal of heat from your cooling water, but ... with today's high equipment and energy costs and the need to obtain maximum plant output and efficiency, it becomes essential that you obtain the coldest water possible from existing or new cooling equipment.

The key to how well a cooling tower will perform is tied to the effectiveness of the cooling media in promoting the generation of liquid serface area. This occurs in the cooling section of your tower where the water is brought into direct contact with atmospheric air. The greater the liquid-air contact area, the greater the heat transfer. This is closely coupled to the ability of the cooling media to yuniformly distribute the water under a wide variety of operating/atmospheric conditions and it's ability to slow the fall of water. An effective cooling media must also ofer minimun resistance to air flow to keep fan energy use to a minimum.

Film type cooling media promote liquid surface area by causing the liquid to flow as thin flims on the surfaces of a cellular structure. Film type cooling media are composed of a number of thin, specially formed sheets assembled in such a way that air may flow through the passages of the sellular structure. While a large liquid-air surface area may be genereated by this type of cooling media, great care must be taken to obtain uniform liquid distribution throughout the media and cooling section as a whole. Water and air contaminants normally found in an anround large cooling tower systems may cause obstructions in air flow passages. Film type media also generally creates a higher resistance to air flow. This combination of factors limits their suitability for large industrial crossflow cooling towers.

Splash bar type cooling media promote liquid surface area by creating a multitude of small droplets as water falls through the cooling section. This is accomplished by placing the splash bars in a staggered spaced-apart pattern where falling liquid impacts and shatters on the surfaces of the splash bars. Most modern designs have a multiple-hole pattern in certain sections of the splash bar surface. These holes also promote liquid break-up by fragmenting the droplets as they are sheared while passing through these holes. While some of these designs offer improved cooling compared to some of the older configurations, most are still limited in their ability to provide highly uniform liquid distribution, maximum water break-up and dispersion and minimal resistance to air flow... all of which are of utmost importance in achieving the maximum crossflow tower cooling efficiency available.

THERMABAR overcomes these limitations by putting the right splash bar surface and the right hole pattern in the right place. This simple, yet unique design eliminates the build-up of liquid on horizontal surfaces, in corners, etc., whic can impair splash effectiveness. Water distribution uniforiity is assured by proper attention to hole patters and their positioin. In addition, three horizontal surfaces, adgacent to one another, with the center section higher than those on either side, creates a unique improvement in splash and dispersion effectiveness. Droplets that hit a horizontal section for the first time bounce and shatter producing smaller drops with an upward and outward trajectory from the impact point. The unique THERMABAR design makes it possible for a larger potion of these secondary droplets to again impact on the SAME splash bar before they continue their fall down through the balance of the splash bar array.



PROJECT NAME AND LOCATION:			
MODEL NO.			
DWG NAME:			
DRAWING NUMBER: A-100	JOB NUMBER:	SHEET 1 of 1	REV: 0
SCALE: NO SCALE	COMMENTS		

REVISIONS

REV.	DESCRIPTION	DESIGNED BY:	CHECKED BY:	APPROVED BY:	DATE:
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COOLING TOWER DEPOT, INC
651 CORPORATE CIRCLE, STE. 206
GOLDEN, CO 80401
720-746-1234

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COOLING TOWER DEPOT
The Depot of All Cooling Towers
www.coolingtowerdepot.com

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Mechanical Properties		**RIGID PVC**
Rockwell Hardness "R"	ASTM-D-785	114R
Durometer Hardness "D"	ASTM-D-785	80D
Physical Properties		
Specific Gravity	ASTM-D-792	1.50
Tensile Strength at 73°F. (psi)	ASTM-D-638	6,300
Modulus of Elasticity in Tension (psi)	ASTM-D-638	415,000
compressive Strength (psi)	ASTM-D-695	9,200
Flexural Yield Strength (psi)	ASTM-D-650	12,100
Izod Impact Strength 72°F. (ft. lbs./in notch 1/8 in. bar)	ASTM-D-256	1.8
Heat Defl. Temp. at 264 psi ("F.)	ASTM-D-648	167
Coefficient of Linear Expansion, k/°C.xl0-6	ASTM-D-696	57 °C.
Flammability	ASTM-D-635	Self-extinguishing
Flame Spread	ASTM-E-84-70	25
U.V. Inhibited with Titanium Dioxide		5 Parts/100

PVC [Type I - Grade 2]

	30 Day Immersions At -				
	Room Temperature		60° C.		
Chemical Reagent	Tensile Strength [psi]	Weight Change [%]	Original Tensile [psi]	Tensile Strength [psi]	Weight Change [%]
Acetic Acid (80%)	7700	+ 0.8	7700	7600	+ 1.62
Calcium Hypochlorite	8000	+ 0.21	7900		
Chromic Acid (10%)	7600	+ 0.20	7800	8700	+ 0.22
Crude Oil (Pennsylvania)	8000	+ 0.17		8900	0.00
Fluboric	8000	+ 0.23	8100	8200	+ 0.62
Hydrochloric Acid (30%)	7800	+ 0.20	7700	8000	+ 1.26
Hydrofluoric AcId (70%)	5200	+ 3.90	7200	5300	+ 5.24
Lead Nitrate	7300	+ 0.23	7400	8100	+ 0.63
Manganese Chloride	7400	+ 0.24	7400	8100	+ 0.36
Mercuric Sulfate	7500	+ 0.28	7400	8000	+ 0.71
Natural Gas	7600	+ 0.64	7700		
Nitric Acid (30%)	7500	+ 0.13	7700	8400	+ 0.89
Potassium Bisulfate	7700	+ 0.24	7400	8500	+ 0.53
Sodium Bichromate	7500	+ 0.27	7400	8200	+ 0.73
Sodium Hydroxide (50%)	8024	+ 0.04	7458	8738	- 0.02
Sulfuric Acid (60%)	7400	- 0.08	7700	8600	- 0.23
Water (Distilled)	7695	+ 0.27	7458	9048	+ 0.79

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As part of the extensive research and test work done during the development of THERMABAR, we tested most of the other designs commonly used and on the market today. Chances are that one of these designs, or one with an even lower performance capability is in active service in your cooling tower right now.

We employed performance testing and evaluation techniques and instrumentation consistent with the Cooling Tower Institute ATP-105 and ASME PTC 23 test codes and standards. All designs were tested under identical operating conditions over the full range of water and air flow rates found in practice. Care was taken to insure stable operating conditions at each of the 25 liquidlgas ratio test points chosen as part of one test series on one splash bar configuration.

In presenting the data in Figure I., we take -.I into account both the actual heat transfer coefficient, KaYIL, as determined by test, -, and apply a pressure drop adjustment factor to this coefficient to account for differences in pressure drop characteristics. As our reference splash bar, we chose 3/8" by 1/2" wood lath splash bars which was the most commonly used crossflow splash bar design for over 25 years. This design had bars spaced vertically on 4 inch centers, and horizontal centers of 8 inches in a staggered, offset pattern, with lath oriented transverse to the direction of air flow. This configuration is commonly referred to as "4/8 wood lath': where the number designation 4/8 indicates vertical and horizontal bar center spacing in inches respectively. This designation system has been used to describe the other designs in Figure 1. as well. Thus 8/12 indicates the test spacing was 8 inch vertical centers and 12 inch horizontal centers as an example.

All of the designs shown in Figure 1., other than 4/8 wood lath, were oriented with the splash bar axis parallel to the direction of air flow consistent with modern design practice and manufacturers recommendations.

The differences in pressure drop characteristics for the designs shown was accounted for by applying a pressure drop adjustment factor to the actual test determined heat transfer coefficient using 4/8 wood lath test data as the base design. This was accomplished by the formula;

Kay/Lc = KaY/L (test) divided by (Pressure Ratio Coefficient)$^{1/2}$

where;

$$\text{Pressure Ratio Coefficient} = \frac{\text{Pressure drop of new fill}}{\text{Pressure drop of wood lath}}$$

where these pressure drop values are determined at the same test liquid/gas ratio; all other parameters remaining constant.

With this adjustment, all the designs shown in Figure 1. are compared on an **identical** bask and in a way reflecting the **true** performance differences that will result in actual practice.

You be the judge.

THERMABAR®

A new standard of excellence in crossflow tower cooling efficiency.

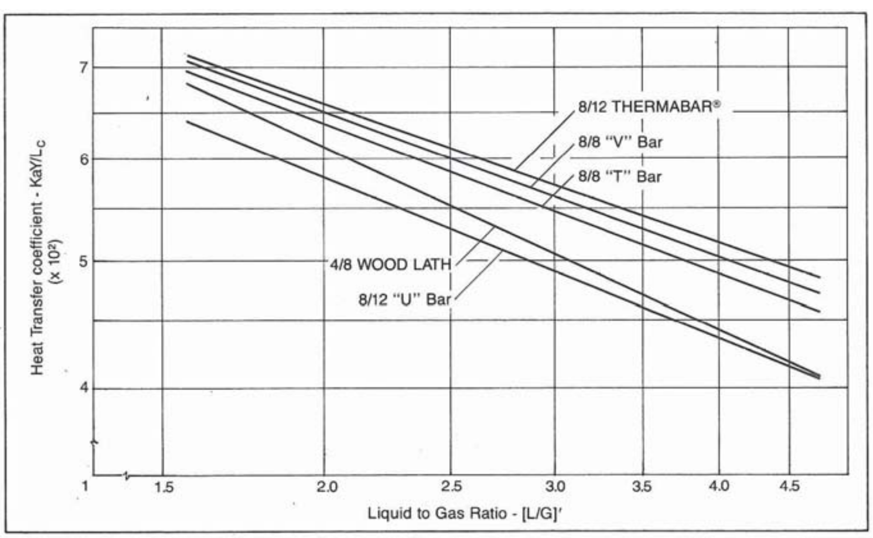

FIGURE 1

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