

WHAT IS DEZINCIFICATION?



WHY ARE JOMAR BRASS VALVES DEZINCIFICATION RESISTANT?

For decades, our industry has been encouraged to specify bronze valves as an alternative to brass valves in applications where dezincification may be a threat. Jomar Valve® and its parent company Fratelli Pettinaroli SpA® have introduced a valve that is hot forged brass and also has dezincification resistance characteristics better than traditional bronze, red brass, or gunmetal valves.

THE PROBLEM

In some areas of the country aggressive water supply can speed up corrosion in metal valves that contain high contents of zinc in their alloy composition. This is called dezincification. Zinc, the more electronegative element in the alloy, is selectively removed by oxygen and carbon dioxide rich water. This leaves a deposit of the more noble metal copper in the form of an inconsistent porous layer compromising the integrity of the valve.

THE CURRENT MARKET SOLUTION

For decades, manufacturers have been encouraging engineers to specify bronze alloy components over forged brass components, unreasonably citing dezincification as a rampant problem in plumbing systems everywhere. Although this periodic tendency is real, Jomar has a stronger and better performing solution to these claims.



THE JOMAR SOLUTION



Jomar Valve has worked to create a brass alloy with the appropriate molecular structure as well as inhibitors that prevent de-alloying, while still using traditional zinc levels.

1 CREATING AN ALLOY WITH DE-ALLOYING INHIBITORS

Jomar engineered a brass alloy with de-alloying inhibitors. The chemical composition can be seen in Figure 1. In addition, this brass alloy is certified to the new NSF 61-8 and 372.

CW602N [*] CuZn36Pb2As		CW511L [*] CuZn38As	
Cu	61.0% - 63.0%	Cu	61.5% - 63.5%
Al	≤ 0.05%	Al	≤ 0.10%
Pb	1.70% - 2.80%	Pb	<0.20% (lead free)
Fe	≤ 0.10%	Fe	≤ 0.10%
Sn	≤ 0.10%	Sn	≤ 0.10%
Zn	(≈ 36%)	Zn	38%
Ni	≤ 0.30%	Ni	≤ 0.30%

*OTHER ELEMENTS ≤0.05%

FIGURE 1



FIGURE 2

2 CONTROLLING THE VALVE'S MOLECULAR STRUCTURE

In any standard brass alloy there are two molecular structures or phases, α (Alpha) and β (Beta), that form when the metal is forged and cooled. Figure 2 depicts a mixture of both phases in a standard brass valve (α being gold and β being brown). The mixture of these two phases can be controlled by the rate at which the metal is cooled.

Controlling the rate of cooling allows for an alloy with a molecular structure that is predominantly Alpha phase. Dezincification of a standard brass alloy begins with the Beta Phase. Furthermore, de-alloying inhibitors work best with high Alpha Phase alloys. Therefore, the challenge is controlling the formation of the Alpha and Beta Phase in the forging and cooling process.

3 JOMAR VALVE'S CONTROLLED ANNEALING AND COOLING PROCESS

Figure 3 indicates how the Alpha and Beta structure change by controlling annealing temperatures and slow cooling. Using this unique annealing process, Jomar is able to achieve the desired Alpha structure. Then by slow cooling the valve, Jomar ensures the least amount of the Beta phase structure formed in the alloy. This process alongside the de-alloying inhibitors ensures a more dezincification resistant alloy structure.

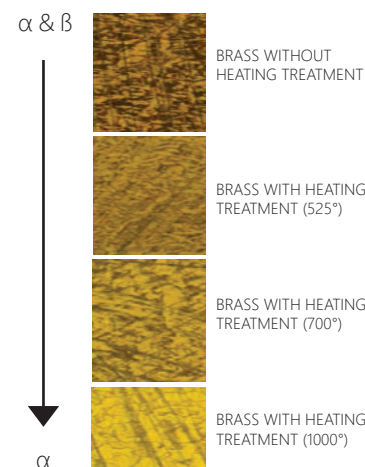


FIGURE 3

4 THE RESULTS OF THE JOMAR DZR VALVE ALLOY

Dezincification occurs as the zinc in the alloy leeches or pulls away from the surface of the valve, leaving a porous structure. The images in Figure 4.1 and 4.2 are taken at 10X magnification, comparing their dezincification depth. Figure 4.1 shows standard brass in a dezincified state, and the depth indicators at which zinc has been stripped. Figure 4.2 is a close up of the Jomar DZR Alloy. The results indicate exceptional de-alloying resistance. This resistance is attributed to the alloy that contains de-alloying inhibitors that work exceptionally well with Alpha structure brass along with annealing and slow cooling the brass to achieve primarily Alpha phase structure.

DEZINCIFICATION DEPTH TEST



STANDARD BRASS: 290 MICRON

FIGURE 4.1



CW511L: 0 MICRON

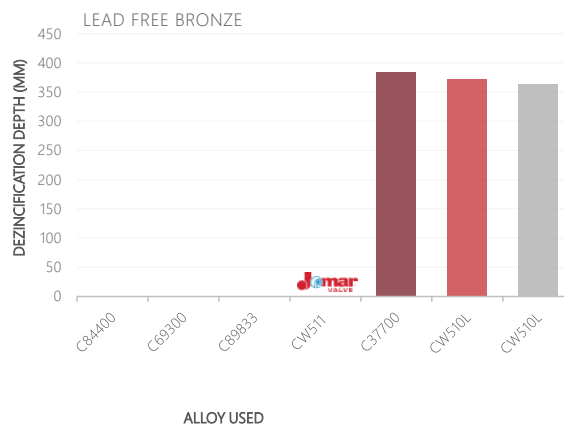
FIGURE 4.2

WHAT IS DEZINCIFICATION?



5 HOW 'THE JOMAR SOLUTION' COMPARES TO EXISTING ALTERNATIVES TODAY

For many years bronze valve manufacturers have maintained that the only way to avoid dezincification is to specify alloys with less than 15% zinc, even in environments where dezincification issues are not present. But now, a brass valve designed by Jomar has better dezincification resistance while using traditional zinc levels. The chart in Figure 5 indicates the different dezincification resistance properties of several common alloys, including bronze, and the Jomar T-100CG / CW511L solution. The Jomar T-100CG Solution delivers the benefits of a traditional forged brass valve, Lead Free Law Certification, and unsurpassed dezincification performance.



6 THE BEST VALVE PLATFORM IN THE INDUSTRY

Jomar has continuously improved the features and benefits of the T-100 valve platform. Today the T-100 valve line includes the following benefits as a standard, making it the best valve in the industry.

Hostaflon® Seats

Hostaflon® (TFM) has a slightly different chemical make-up than traditional Teflon (PTFE), as shown in Figure 6.1. This slight variation in chemical composition provides better seat performance, wider operating temperature ranges, and the highest cycle life of any valve in the industry.

The graph in Figure 6.2 illustrates TFM's superior molecular 'memory.' TFM's deformation under load is very low relative to PTFE. Figure 6.2 also depicts TFM's reduced void characteristic, leaving the seats with a more uniform and a stronger structure. Therefore, a TFM seated valve will retain a more secure seal around the ball compared to a PTFE seated ball valve.

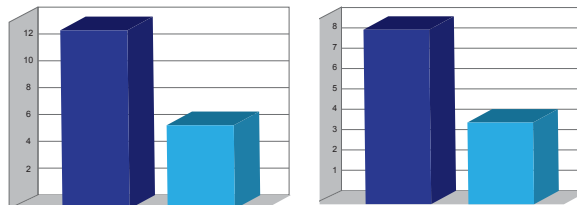


TFM AND PTFE HAVE THE SAME CHEMICAL COMPOSITION (CARBON AND FLUORINE), BUT WITH ONLY 1% PPVE.

FIGURE 6.1

DEFORMATION UNDER LOAD REDUCED VOID CONTENT*

RESULTS = % PERMANENT DEFORMATION AFTER 100 HOURS UNDER LOAD



PTFE TFM PTFE TFM

THE BETTER PARTICLE COALESCENCE, A CONSEQUENCE OF THE REDUCED MELT VISCOSITY, REDUCES THE VOID CONTENT OF MODIFIED TFM BY A FACTOR OF 2:1

*IR-SPECTROSCOPICALLY DETERMINED VOLUME OF HOLES

FIGURE 6.2

Triple Stem Seal

All T-100 Valve platforms come standard with our Triple Stem seal, as shown in Figure 7. Two Viton® O-rings and a Hostaflon® packing gland provide the basis the T-100 Life-Time Warranty for leakage through the stem packing. Our traditional T-100NE, equipped with this triple stem seal, was cycle tested by IAPMO yielded tremendous performance results, up to 600 PSI, when compared to other valves platforms in the industry.



FIGURE 7

BRAND COMPARISON

		JOMAR	COMPETITORS						
		T-100	70-100	FBV-3	T-585	8901	5044F	1001	58
Approvals	UL 125	✓		✓		✓	✓		
	UL 842	✓				✓	✓	✓	
	UL C	✓				✓			
	FM	✓		✓		✓	✓	✓	✓
	CSA	✓		✓		✓	✓	✓	✓
	Delta C	✓							
Specs	Stem Seal	Triple	Double	Double	Double	Double	Double	Double	Double
	Ball	TEA	Chrome	Chrome	Chrome	Chrome	Chrome	Chrome	Chrome
	Seats	Hostaflon	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE
Tests	Cycle Test Average** (1/2" - 1")	12,011	1,054	5,907	2,174	3,575	4,776	-	-

** Results are from IAPMO Research and Testing, Inc. to determine the number of on-off cycles the valves could withstand at 600PSI before leakage occurred at the stem.

CERTIFICATIONS

The T-100 platform has more ratings than any valve on the market. This platform can be used in almost any application, making it the valve of choice by many design engineers.



VQGU - Trim & Drain
MHKZ - Manual Valves
YQNZ - Compressed Gas
YRBX - Flammable Liquid
YRPV - Gas
YSDT - LP Gas

7 CONCLUSION

Why settle for a valve that has inferior valve performance characteristics?
The T-100 outperforms them all in:

- ✓ DEZINCIFICATION RESISTANCE
- ✓ OPERATING TEMPERATURES & PRESSURES
- ✓ APPROVALS & CERTIFICATIONS

- ✓ LIFE CYCLE
- ✓ SAFETY
- ✓ STRENGTH

- ✓ PURITY
- ✓ QUALITY
- ✓ VALUE

ACTION

Convert existing specs and specify 'The Jomar Solution', the T/S-100CG.



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