How to get Vespel® CR-6100 in a new pump?

Just Ask

Frequently Asked Question:
"Are the OEMs using Vespel® CR-6100?" is a question we hear every month. The answer is definitely, "yes." All of the major API pump manufacturers use Vespel® CR-6100 for both new pumps and aftermarket upgrades.

A related question: "If Vespel® CR-6100 is so great, why don't the OEMs include it as a standard material?"

To answer that, we need to look at how pumps are usually purchased...

Most pumps are sold into projects. The EPC contractor generally selects the pump with the lowest price which meets the bid specification. Therefore, if the bid spec allows bronze or cast iron wear rings, the OEM will probably quote bronze or cast iron because they are the cheapest materials. These materials might result in a higher life cycle cost, but procurement personnel will not care if their decision is driven by the initial price.

Put it in the Bid Spec
If you want to maximize your pump reliability and efficiency, specify Vespel® CR-6100 for the stationary wear components in your next project. When it is part of the specification, the OEMs are happy to quote and supply Vespel® CR-6100.

If your company does not allow using brand names in the project specification, you can use the generic description for Vespel® CR-6100 from API610, Table H.3: *PFA/CF reinforced composite, 20% mass fraction random X-Y oriented carbon fiber.* For clarity, you can add the note "one example of which is DuPont™ Vespel® CR-6100."

Direct Questions to Boulden
If there are any questions from the Project Engineer, EPC contractor, or OEM, please ask them to contact Boulden. We will be happy to answer any questions they have and make sure that the Vespel® CR-6100 is used correctly throughout the project.

In short, if you want Vespel® CR-6100 wear rings, vertical pump shaft bearings, or throttle bushings in your new pumps, all you have to do is ask--i.e. spell it out in the bid spec. Until next time, if you need any material for your pumps, we have a wide range of sizes in stock and ready for immediate shipment.

Helpful Links:

Boulden Installation Guide for Vespel® CR-6100

Standard Stock Sizes of Vespel® CR-6100

Vespel® CR-6100 Product Data Sheet

Vespel® CR-6100 Machining Guide

2MW Boiler Feed Pump Case Study

Amine Stripping Pump Case Study

Case Study: Repeat Failures of Boiler Feed Water Pumps

Boiler Feed Pump Seizing Problems

The low lubricity of boiler feed water along with operational challenges can lead to pump seizures. How do you avoid the problem? Or, if it happens, what is the best way to solve the problem?

This morning, I read a case history regarding repeat seizures of two, new, 1.2 MW boiler feed water pumps operating in a refinery. The pumps were fitted with metal wear parts, ran at 2980 rpm, and experienced failures immediately after commissioning.

The Tale of the Terrible Boiler Feed Pumps

Here is a brief summary of the problems this site faced with their boiler feed pumps:

1. The first failure was due to pump seizure, the original failure analysis suggested the pumps failed due to sand or debris lodging into the close clearance between rotating and stationary wear parts. The filters on the suction strainer were changed to a finer mesh to limit particle size which could enter the pump.
2. Soon after, one of the pumps seized again--this time, the metal parts had galled before start up and the pump could not be rotated by hand. The clearances at the wear rings, center bushing, and throttle bushing were increased.
3. The pumps seized again.
4. Repeated start-up attempts against seized pumps had also damaged the pump motors.

The failure analysis led the engineers to re-check the entire design and installation of the pumps:

- Re-checking he design basis of the pumps
- Re-checking the materials of construction
- Re-checking assembly and rotor run-out
- Re-balancing the rotor
- Performing a new pump rotordynamic analysis
- Verifying soundness of foundation and that pipe strain within limits
- Evaluation of operational practices and function of the minimum control valve

They Found A Problem

Ultimately, the site realized the minimum flow valve was not functioning properly, leading to low flow rates at start up. The low flow rates caused localized flashing inside the pump and the metal parts would seize.

Their corrective action was to change the minimum flow valve, increase the clearance at the center bushing, throttle bushing, and wear rings, and "upgrade" to a "non-seizing" metal alloy. Because they increased the clearance at all of the internal parts, they ran a new rotor dynamic analysis to verify that the rotor would remain stable.

How Much Did It Cost?

Between repeated pump repairs, motor overhauls, engineering resources to troubleshoot and re-verify the design, the problem undoubtedly cost hundreds of thousands of dollars. If start up was delayed or the site lost production, the losses were probably in the millions.

The solution was also extremely expensive. The clearance at the pump wear parts was permanently increased. We'll generously assume the increased clearance resulted in a 2% efficiency loss. Assuming a power price of $0.12/kw-hr, this loss of efficiency will cost about $50,000/year. Over the life of the pumps, the site will lose another million dollars or more!

It Could Have All Been Avoided

If the site had specified Vespel® CR-6100 wear parts when the pump was ordered, the pump would not have seized. Most likely, the pumps would have made it through the low flow transients without issue and all of the efforts above could have been avoided. The motors would not have been damaged, and they would not have had to increase the internal clearances. Even after the first seizure occurred, they could have easily converted to Vespel® CR-6100 and saved time, effort, and cost. The small adder to specify Vespel® CR-6100 would have saved several hundred thousand dollars at a minimum.

Furthermore, because Vespel® CR-6100 does not seize, clearance at the wear rings, center bushing, and throttle bushing could have been reduced, resulting in an efficiency gain instead of an efficiency loss. So, instead of losing $50,000 per year in operating costs, the site could have saved at least $50,000 per year--a net $100,000 annual savings from using Vespel® CR-6100. Combined with the Boulden PERF-Seal® design, the pump would be more reliable, easier to operate, and more efficient than a pump with metal parts and increased clearance.

Conclusion

If you are buying or overhauling a boiler feed water pump, specify Vespel®CR-6100 for all of the stationary wear parts (the rotating parts will remain metal). You'll have a better pump that is easier to operate with a lower life cycle cost due to higher efficiency. If you have an existing pump that seizes, contact Boulden today. We can help you solve this problem in just about any pump service.

If you simply have an urgent repair and need a great material fast, we have a large inventory of material in stock and can supply raw material or machined parts with very short lead times. If you have dimensions, quantities, and basic service conditions, simply request a quote. We are here to help you.

Until next time, stay safe and healthy. And don't use metal parts in your boiler feed water pumps.