More PLANT PROBLEMS

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set up by the graphite flakes and the metallic base, cast iron corrodes rapidly when in contact with sea water. But the products of corrosion, principally iron oxides, mat with the graphite and, if not mechanically dislodged, remain in place as the casing retains its original form. *MC* may have disturbed the mat when removing his impeller for coating with neoprene.

Formation of the mat is known as *graphitization. As the layer thickens* it acts as a protective coating and progressively decelerates attack. When a thickness of about ⅛ in. has formed, further attack is slow.

The graphitized coating is relatively soft and under high or eddying velocities may be eroded away as rapidly as it forms. When this happens, the iron deteriorates rapidly. This explains why iron impellers fail more rapidly than the casing and why impellers are usually made of bronze. The bronze resists the attack, because the couple action *with the graphitized surface is relatively* low.

In large units, where the velocities are low, all-iron pumps may, under favorable conditions, stand up well enough in sea-water applications to justify their use. However, when replacement parts become necessary, the new ones become anodic and may deteriorate rapidly.

MC should take a cue from these facts. Perhaps two large, low-velocity pumps would serve his plant as well as four small, high-velocity units. Enlarging *his suction line may be another* answer to his problem.

C K PARKER *New York, N. Y.*

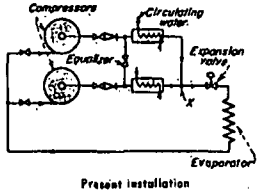
Question No. 2: What's Best Hookup for Refrigerating Units?

HERE ARE THE FACTS: We have two 5-ton refrigerating machines in parallel for creamery service. Suction pressure is 25 psi, discharge 170 psi. There's *only one expansion valve for both machines.*

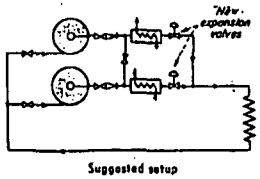
When either of the machines runs alone we are able to maintain the right suction and discharge pressures. But when both units are in use, the suction pressure drops to 15 psi no matter what the load may be.

Is change in suction pressure a result of using only one expansion valve? We have an equalizing line on *the high-pressure side of each condenser, and* the electric hookup is OK. What can we do to maintain a 25-psi suction pressure with both of our refrigerating machines running?—*EK, Sept Power*

Here Are the Answers



Present installation



Suggested setup

TWO EXPANSION VALVES are needed for *EK's* system to run properly. If he checks the capacity of his present valve he'll find that it is sufficient to handle *only one compressor. Flow from* the second compressor is restricted by the valve orifice, causing suction pressure to fall when two machines run.

First sketch shows present installation. One way to improve system operation is to increase the pipe size, beginning at point *X*. Valve size must also be made larger to accommodate full flow from the two compressors. New valve should be able to handle flow from one or both compressors at the same pressure ratio of 170/25 at either flow.

Second sketch shows how two expansion valves may be used, the discharge of each running to a common line. This hookup allows closer regulation than one having a single valve. Also, by using shutoff valves, one machine can be run while it or its expansion valve is down for maintenance.

A J BREUCKELMANS *New York, N. Y.*

COMBINED TONNAGE appears to be about 40% greater than actually needed because suction pressure drops from 25 to 15 psi when second machine starts. Or the evaporator may be too small for the capacity required. It looks as though cooling needs were originally over-estimated or load was underestimated. Then a second machine was added in hopes of improving the situation.

If evaporator and refrigerating machines are properly sized, the expansion valve may be too small. If it is, replace it with two valves with equal-size orifices. Consult expansion-valve manufacturer for best hookup and control of the system. If one or both compressors short-cycle after installation of two expansion valves, a single-outlet expansion tank is needed in the suction line.

If tonnage is too great, try eliminating one water-cooled condenser. A 50% reduction in condenser surface would

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For this month's two new questions from Power readers, turn to page 140

Wherever Drip, Splash or Squeeze-out Is a Problem

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