WATER TREATMENT

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us sodium silicate, Fig. 5. The higher the feedwater's silica content, however, the stronger the boiler water's alkalinity has to be to restrain the silica from reacting with the hardness to produce scale.

Alkalinity Restraint. The stronger the boiler water alkalinity, the greater the driving force exerted behind the above desired reactions and, therefore, the better the results. But we also have to prevent alkalinity concentrations from developing too high. Otherwise, foaming starts and a severe carryover of solids with the steam follows. With a package boiler, alkalinities yielding a pH value of 11.3 are generally a safe maximum. By carrying boiler-water alkalinities within the pH range of 10-11.3 the calcium hardness precipitates out completely as phosphate; the magnesium hardness comes down entirely as hydroxide; silica stays safely in solution.

Blowdown. Blowdown rate depends on the boiler water's alkalinity, silica and total solids concentrations. Give a package boiler a minimum of two sludge blows daily as standard practice, one in early morning, the other in late afternoon during relatively light loads to take advantage of any settling out of boiler-water precipitates. When you have to increase blowdown, space the blows equally between these primary two. For a packaged-type unit in particular, frequent short blows prove more effective than several long ones.

Where a high blowdown rate seems in order, put in a continuous blowdown system. Such a boiler-water bleed can connect through the surface blowoff tapping in upper side of shell. But even with a continuous blowdown in operation, keep up the minimum two bottom blows daily.

Chemical Feed. Also feed internal treatment chemicals as a daily routine, too, but not by shot-feeding methods because package units are too sensitive. Rather the correctives can be drip-fed into the receiving tank to maintain uniform chemical balances. But, better still, pump the treatment separately and continuously into the boiler through a continuous feed connection made at the cross fitting of the return line just outside the boiler shell.

Control Tests. Day-by-day control is a must for satisfactory internal conditions. Where the operating pressure is below 100 psi and conditions are fairly stable, you can establish a definite blowdown practice and regulate chemical treatment feed daily by a simple phosphate colorimetric test of boiler water. But for pressures from 100 to 250 psi,