KAWASAKI STEEL TECHNICAL REPORT
No.5 (May 1982)

Introducing Composite Structures Using Newly Developed Checkered Steel Pipe and Deformed Flange H-shapes

Masakatsu Sato, Michihiko Hara, Masao Ishiwata, Eisuke Yamanaka

Synopsis :
For a steel-concrete composite structure, a fail-safe mechanism of stress transmission in the steel-concrete interface is of primary importance. The authors have developed H-shapes with deformed flange surfaces and steel pipes with checkered projections on their surfaces as a means of increasing bond resistance with concrete. The composite new steel pipes and the encased new H composite beams have been subjected to several kinds of tests including pull-out, push-out and bending, and the following points are confirmed: (1) Checkered projection is found to be significantly effective in resisting push-out and bending loads. (2) The mechanical properties of the encased deformed flange H composite gbeams are found to be at most equivalent to that of reinforced concrete beams using large-diameter deformed bars.

The body can be viewed from the next page.

KAWASAKI STEEL TECHNICAL REPORT No. 5 May 1982

Newly Developed Checkered Steel Pipe and Deformed Flange H-shapes*

Masao ISHIWATA** Eisuke YAMANAKA***

For a steel-concrete composite structure, a fail-safe mechanism of stress transmission in the steel-concrete interface is of primary importance. The authors have developed H-

is negligible when it is not less than 50°. In the present

2.2 Bond Strength between Concrete and Lugged Steel Plates

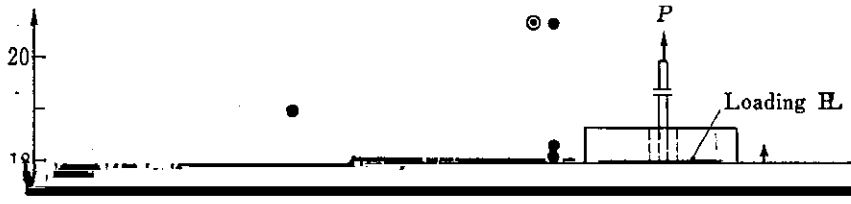
The relationship between τ_b and δ_f in pull-out tests is shown in Fig. 3.

2.3 Shapes of Projection on H-shapes and Checkered Plates

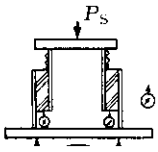
On the basis of the results of these experiments, as shown in Figs. 4 and 5, and studies regarding lugged

inherent adhesion functioning on the steel-concrete interface, such as agglutination and friction. Much of it is on the latter. Consequently, as the steel plates begin

as lateral projection height and the space on deformed flange surface of H-shapes, respectively.


20
P
Loading H.

sponding to $\delta_f = 0.05$ and 1.00 mm and maximum



Range of average bond stress (MPa)

τ_{br}	2.0	1.5	1.0
τ_{bmax}	2.1	1.6	1.1
	0.1	0.1	0.1

· Initial loading

P_S (kN) τ_b (MPa) δ_f (mm)

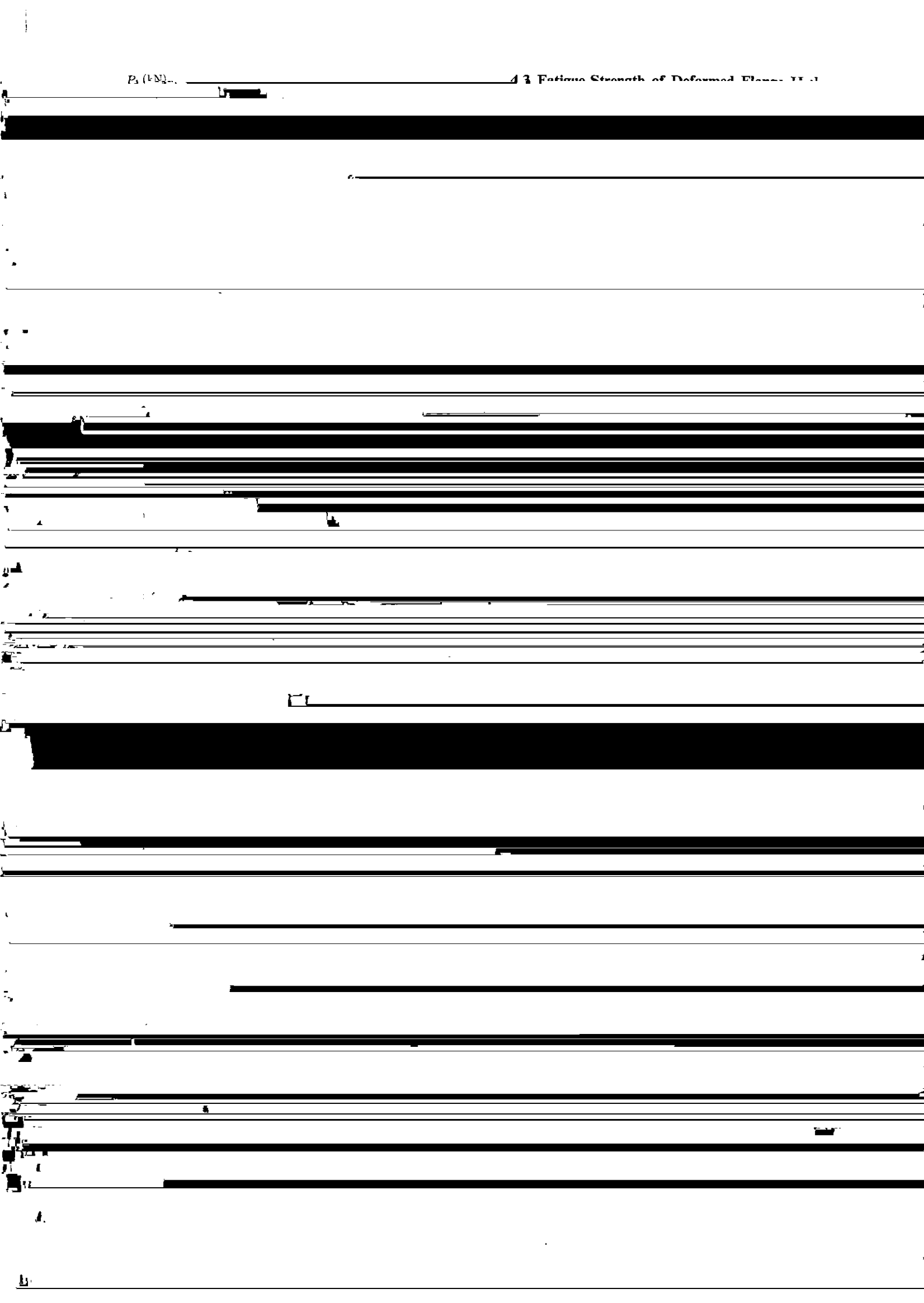
steel pipe begins to yield, the ratio of bending strength gradually rises to over 1.5 times that of the steel pipe in the final analysis, probably because of local buckling of the steel pipe being constrained by concrete.

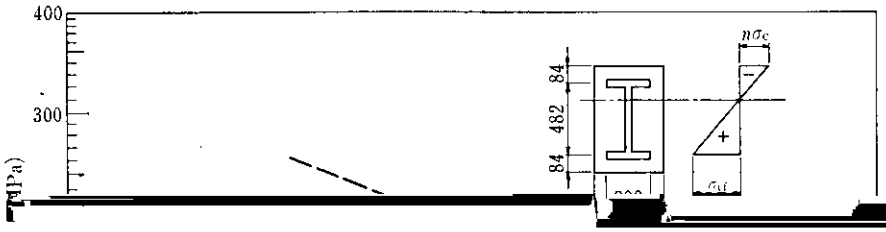
3.2.3. Flexural rigidity

stress conditions can not be obtained, and also con-

calculation in which the tensile stress of concrete is

[illegible] ormed bar [illegible]





Applied

184 MPa

Experimental values