# SWEEPOLET®

BUTT-WELD
INSERT REINFORCEMENT

## Background

The piping industry has retained the theory of "area replacement" for adequate and acceptable branch pipe reinforcement. Area replacement has been the only premise outlined by ASME piping codes for adequate reinforcment, standards have not considered the shape of the reinforcement. Some shapes are more efficient than others, and as a result, more replacement area with a poor shape may be less satisfactory than less area with an appropriate shape.

The basic methods of lap type reinforcement outlined in the piping codes are known to have serious drawbacks, namely, that the geometry creats areas of high stress concentrations. They have an inherent crack at the inside edge of the fillet weld as well as points of high stress where the pad joins the run pipe and where the nozzle intersects the pad or run.

These drawbacks are of increasing concern when high yield pipe is used and for other critical service applications such as nuclear. On softer materials such as A106 Gr. A or Gr. B pipe, the localized areas of high stress tend to be relieved by local yielding and generally do not adversely affect the serviceability of the joint unless cyclic loading is involved or there is a propensity for brittle fracture.

## Design

The Sweepolet concept evolved from two premises, namely reinforcement must be sufficient to limit deformations and that an efficient branch construction would result from controlling the geometry of the intersection on all planes.

A Sweepolet provides the required stiffening (reinforcement at the most critical point, the juncture of the branch and header) with essentially no peak stresses. Owing to the aesthetic proportions of a Sweepolet, designers intuitlvely know that it is an efficient branch outlet construction - and tests have proved it.

As a result of experimental stress analyses from brittle lacquer to sophisticated and accurate 3D photoelasticity, it has been shown that the Sweepolet embodies quanitatively all desirable features in their optimum relationship.

## Code Compliance

The ASME code committees anticipated the development of such fittings and approves their use.

ASME B31.8 - *Gas Transmission and Distribution Piping Systems*

**Paragraph 831.3.2 Special Fittings.** When special cast, forged, wrought, or welded fittings are required to dimensions differing from those of regular shapes specified in the applicable ASME and MSS standards, the provisions of paragraph 831.3.6 shall apply.

**Paragraph 831.3.6 Pressure Design of Other Pressure-Containing Components.** Pressure-containing components that are not covered by the standards listed in Mandatory Appendix A and for which design equations or procedures are not given herein may be used where the design of similary shaped, proportioned, and sized components has been proven satisfactory by successful performance under comparable service conditions. In the absense of such service experience, the pressure design shall be based on an analysis consistent with the general design philosophy embodied in this Code and substantiated by at least one of the following:

(a) proof tests, as described in UG-101 of Section VIII, Division 1 of the BPV Code
(b) experimental stress analysis, as described in Annex 5.f of Section VIII, Division 2 of the BPV Code
(c) engineering calculations

ASME B31.4 - *Pipeline Transportation Systems for Liquids and Slurries*

**Paragraphs 404 and 426.** Recognize and approve the use of special piping components.

ASME B31.3 - *Process Piping*

**Paragraphs 304 and 326.** Recognize and approve the use of special piping components.

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INSERT BRANCH

BUTT-WELD