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SUBJECT: HRP - Comparison of Several Line Connectors for High Pressure and/or High Temperature Disconnects.
TO: J. C. Bresee
FROM: C. C. Haws, Jr.

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0.0 Summary

A description is presented, including the advantages as compared to flanged joints, of two couplings which might find application to HRP or other high pressure and/or high temperature uses. From examination and limited experience, both the Graloc and the EGA couplings appear simple, durable, reproducibly leak tight, and easy to install. There does not appear to be any simple modification for either coupling which would permit use of the HRT type of leak detector system.

1.0 Introduction

Two line connectors which have been in use, or under test, in the Chemical Technology Division (one for several years) should be of interest to other divisions. These connectors are the Graloc (Fig. 1) and the EGA (Fig. 2). Both couplings were developed for oilfield and chemical processing uses and have been successfully employed therein. Oak Ridge National Laboratory has enjoyed excellent service from the Graloc in a few applications in the REED loops and in the X-10 Pilot Plant. No operating experience has been obtained with the EGA coupling; however, Unit Operations tests show that the coupling should be useful under HRT service conditions.

The purpose of this memo is to describe these couplings for any who might be interested, with the thought that sufficient applications may be found (and experience obtained) which will permit these couplings to replace flanged joints for smaller line sizes in the future.

2.0 Graloc Coupling

Manufactured by Gray Tool Company
Box 2291
Houston, Texas

This coupling is made in two styles. The smaller (1/2 in. to 1 in.) resembles a pipe union while the larger (1-1/2 in. to 12 in.) is the clamp style shown in Fig. 1. Both styles employ the same type of ring gasket with conical sealing surfaces. The parallel faces of the hubs and the ring gasket meet at full gasket engagement, providing immense strength against bending moments. The heavy cross sections of either the pipe union type or the clamp rings offers considerably more strength than is available in conventional flanged joint bolting. Both the hubs and the gaskets are offered in the usual materials including stainless steels over a range of high pressure ratings.

Unit Operations tests on the 1-1/2 in. size have shown this coupling to be pressure tight under HRT-CP conditions. The joint is easily assembled and can be re-assembled leak tight repeatedly without difficulty. Efforts to adapt a leak test cavity to this joint, similar to the one now in use in the HRT, were not successful owing to the unusually close tolerances required. For applications not requiring leak detection, however, this coupling is highly recommended.

3.0 EGA Coupling

Manufactured by Dresser Industries
Bradford, Pennsylvania

A cross-section of the EGA coupling is shown in Fig. 2. This unit has been hydro-stability tested in Unit Operations up to 5000 psi at room

temperature. In addition thermal cycling tests at normal HRT-CP conditions have failed to produce a leak.

This fitting is also extremely rugged and can be used advantageously in limited space applications. The seating surfaces are machined by a special hand operated lathe costing about \$200. If the seating surfaces are scratched, they can be re-faced in place by this same lathe. The joints can be re-assembled leak tight several times before refacing is necessary. No means for leak detection is available. Note that the liquid to be handled is in contact with only the interior of the pipe and therefore that the threaded portion of the coupling need not be of stainless steel. This fitting is available for all sizes of pipe and tubing. In tubing application, the manufacturer recommends its use for down to 0.040 in. thick walls. Welding is not required, and this coupling appears very promising for joining dissimilar metals such as stainless steels to titanium, Carpenter 20, or tantalum.

4.0 Costs

Either of the couplings described above compare well with the HRT-CP flanged (2500 psi) joint judging from the limited cost data available. The following table gives a rough cost comparison between these two joints, an HRT-CP flanged closure and a standard stainless steel screwed union.

Information and a limited number of closures in several sizes and materials are available to anyone interested.

Table 1 Comparative Line Closure Costs

Size	EGA Coupling		Graloc	HRT-CP ³	Pipe Union-Screwed
	Nodular ¹ Iron	Stainless ^{1,2} Steel	Stainless Steel	Flanged Joint	Stainless Steel
1/2 in.	\$2.50	\$11.00		~\$60.00	\$ 3.53
1 in.	\$3.25	\$22.00			\$ 5.91
1-1/2 in.	\$4.70	\$36.75	\$100.00		
2 in.	\$6.60	\$53.50			\$14.66

¹ Threaded portions of material indicated. Fluid handled does not contact these portions.

² Lots of 100 or more. Does not include set-up charge.

³ Commercially available components. These do not meet present HRT-CP specifications.

CLAMPS

HALF - COUPLING

GASKET

STD "GRALOC" FITTING

FIGURE 1

OFNLI-LR-DWG.-24617
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EGA FITTING ILLUSTRATION

FIGURE 2