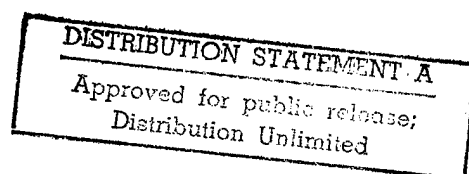


Se rial Number            976,133  
Filing Date                29 September 1997  
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NOTICE

The above identified patent application is available for licensing. Requests for information should be addressed to:

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ARLINGTON VA 22217-5660



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DTIC QUALITY INSPECTED 3

2  
3 VIBRATION ISOLATING FLANGE ASSEMBLY

4  
5 STATEMENT OF GOVERNMENT INTEREST

6 The invention described herein may be manufactured and used  
7 by or for the Government of the United States of America for  
8 governmental purposes without payment of any royalties thereon or  
9 therefor.

10  
11 BACKGROUND OF THE INVENTION

12 (1) Field of the Invention

13 The present invention relates to a novel apparatus for  
14 isolating vibration in a pipe passing into a flooded structure.  
15 More particularly, the invention relates to a flange assembly  
16 useful in sealing the flooded structure and preventing vibration  
17 caused by flow inside the pipe from significantly affecting  
18 acoustic testing occurring within the flooded structure.

19 (2) Description of the Prior Art

20 Large testing structures are often used for military  
21 testing. For example, the acoustic measurement of noise caused  
22 by torpedo drive train systems is sometimes measured in large  
23 fluid filled structures into which the torpedo may be mounted and  
24 tested. During one such acoustic measurement, high pressure  
25 steam is used to power the torpedo drive train. The steam is  
26 transported from a steam generation source, through the testing

1 structure's wall and then to the object or vehicle which is the  
2 focus of the test. In order to accurately measure noises  
3 generated by the vehicle only, vibration of the steam supply pipe  
4 must be isolated. Such vibration is caused by turbulent flow  
5 within the pipe, and may skew accuracy of acoustic measurements  
6 if allowed to effect the testing structure. There is a need to  
7 isolate such vibrations.

8 Various flange assemblies are known in the prior art, such  
9 as described in U.S. Patent Nos. 3,275,346; 4,552,386; 4,620,731;  
10 4,637,641; and 4,667,989. However, such flange assemblies are  
11 replete with shortcomings that detract from their usefulness for  
12 uses as herein contemplated.

#### 13 14 SUMMARY OF THE INVENTION

15 It is a primary object of the present invention to provide a  
16 flange assembly which dampens or isolates vibrational energy.

17 It is a further primary object of the present invention to  
18 provide a flange assembly which dampens or isolates vibrational  
19 energy of a pipe which passes through the wall of an acoustic  
20 testing structure.

21 It is a further object of the present intention to provide a  
22 flange assembly which dampens or isolates vibrational energy and  
23 which is simple in construction and inexpensive to manufacture.

24 The objects are accomplished with the invention which is  
25 directed to a vibration isolating pipe flange assembly for use  
26 with a testing structure, particularly a liquid filled structure

1 used for acoustic testing of submersible objects. The flange  
2 provides a fluid seal and isolates vibration in the pipe by  
3 providing an elastomeric sealing gasket and annular bushings  
4 which prevent any metal to metal contact thereby preventing  
5 significant transmission of mechanical energies from the pipe to  
6 the testing structure.

7 The invention comprises a pipe having a flange having  
8 recesses on one side of the flange filled with vibration damping  
9 material. A vibration damping gasket is placed between the pipe  
10 flange and a wall flange, and the assembly is fastened together  
11 with no metal to metal contact between the flanges or between the  
12 fastener and the pipe flange.

#### 13 14 BRIEF DESCRIPTION OF THE DRAWINGS

15 A more complete understanding of the invention and many of  
16 the attendant advantages thereto will be readily appreciated as  
17 the same becomes better understood by reference to the following  
18 detailed description when considered in conjunction with the  
19 accompanying drawings wherein:

20 FIG. 1 is a perspective view of a test structure;

21 FIG. 2 is a partial sectional view of the flange assembly of  
22 the present invention;

23 FIG. 3 is an enlarged exploded view of the flange assembly  
24 of the present invention;

25 FIG. 4 an end view of the present invention along line 4-4  
26 of FIG. 3.

1                                    DESCRIPTION OF THE PREFERRED EMBODIMENT

2            Referring to FIG. 1, in accordance with the present  
3            invention, a steam pipe 2 passes through a wall 6 via a wall  
4            flange 4 and into a testing structure 8. The testing structure 8  
5            defines a testing chamber, which is often flooded for acoustic  
6            testing of submersible objects. Such a steam pipe 2 often  
7            vibrates from flow occurring therein, with the flange of the  
8            present invention damping such vibration.

9            The invention is shown in cross section in FIG. 2. The  
10           steam pipe 2 passes through the wall flange 4. The wall flange 4  
11           is commonly connected to the wall 6 by a welded connection. A  
12           pipe flange 14 is attached to the steam pipe 2. A gasket 10 is  
13           provided between the pipe flange 14 and the wall flange 4 to  
14           isolate vibration occurring in pipe 2. The preferred gasket  
15           material is compatible with the material of the pipe, possesses  
16           good damping properties, provides a good fluid seal, is easily  
17           moldable, is long term stable, and exhibits very little water  
18           absorption over time. One such material is the polyurethane  
19           compound Hexcel Uralite 3140 which exhibits exceptional  
20           toughness, dimensional stability, and cut resistance thereby  
21           preventing crack propagation through the gasket. Other materials  
22           may be selected according to the temperature, corrositivity,  
23           pressure, etc. of the contents of the testing chamber and the  
24           amount of damping needed.

25           The invention provides a seal as shown in FIG. 3. Gasket 10  
26           is fastened, here by bolt 20, between the pipe flange 14 and the

1 wall flange 4. In order to isolate vibrational energy and  
2 prevent it from traveling through the bolted connection, an  
3 annular bushing 12, preferably of the same material as the gasket  
4 10, is provided. The annular bushing 12 is seated in a plurality  
5 of recesses 15, as in FIG. 4, spaced around the pipe flange 14  
6 with the recesses 15 being on the side of the pipe flange 14  
7 opposite the gasket 10. A retaining washer 22, if used with bolt  
8 20, is preferably slightly smaller in diameter than the annular  
9 bushing 12, thereby preventing metal to metal contact and  
10 transmission of vibrational energy. A fastener, here a bolt 20,  
11 tightens and ensures sealing both between the gasket 10 and the  
12 pipe flange 14 and between the gasket 10 and the wall flange 4.  
13 To join the invention together, each bolt 20 passes through an  
14 aperture 16 in flange 14. As discussed above, bolt 20 is  
15 insulated from flange vibrations by washer 22 and bushing 12.  
16 Bolt 20 then passes through a gasket aperture 17 corresponding to  
17 flange aperture 16. The end of bolt 20 is inserted in a wall  
18 flange aperture 18 where it can be secured by washer 23 and nut  
19 24. As an alternative, wall flange aperture 18 can be internally  
20 threaded for mating with a threaded bolt 20. The complete  
21 assembly thereby provides structural isolation between the pipe 2  
22 and the wall 6 while maintaining a seal against fluid leakage  
23 from inside the testing structure 8.

24 In light of the above, it is therefore understood that  
25 the invention may be  
26 practiced otherwise than as specifically described.

1 Navy Case No. 77947

2 VIBRATION ISOLATING FLANGE ASSEMBLY

3  
4 ABSTRACT OF THE DISCLOSURE

5 A vibration isolating flange mount assembly for a pipe has a  
6 vibration absorbing gasket and fastener recesses having a  
7 vibration dampening material disposed therein to provide a fluid  
8 seal between the pipe and a flooded structure and to isolate pipe  
9 vibrations.

