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Evaluation of Asbestos Graphite Fibrous Packing rings Used in Valve System

ARUL JOSEPH AMALRAJ. M
Department of Chemistry, Veltech MultitechDrRangarajan Dr Sakunthala Engineering College, AVADI, Chennai – 600062, Tamilnadu, India.

ABSTRACT
The objective of the present study was to determine the product goes to the assembly of valves the quality of thevarious source inIndia and abroad are being to assess its quality. The asbestos packing rings are manufactured from the material.Random samples in each size of packing ring shall be selected for evaluation of line – Density, Binder, Lubricant, Loss on ignition tem, pH, Zinc inhibitor, Reinforcement wire, Ash.Based on results this is an experimental and analytical approach to evaluate the quality of packing rings, wear resistance and durability at high working temperature and pressure. The result obtained in the present study focuses on the valves assemblies in order to arrest the steam leakage from the valve system.
KEYWORDS: Material fiber,grease oil, lubricant, valves, packing rings.

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I. INTRODUCTION :

Valves are being manufactured for different field utilities such as oil pipe line, steam pipeline .In the valves assemblies in order to arrest the steam leakage from the valve system. The asbestos gland packing ring are being used in the stuffing box of soot blowers valves to seal the leakage of steam. This process involves under different temperature and pressure ranges around a linear and rotatory movement of stem under fluctuating service condition.The asbestos packing rings are manufactured from the material fiber . Fiber is the yarn used in the manufacture of packing shall be the long stable white Christine asbestos fiber containing not more than 12.5% of long stable organic fiber . The binder material used in the manufactured of gland packing rings are grease oil. The purpose of the study is to investigate the lubricant shall be either petroleum , jelly a mixture of petroleum oil and petroleum jelly. Packing rings shall contain scarified metal as corrosion inhibiting metals.

II. LITERATURE SURVEY :

Many studies have been conducted on the arrest of steam leakage from the valve system.Chengand McDermott (1991) looked at the difference between wet and dry removal of asbestos gaskets in a real work situation. The analysis method Cheng used was limited to PCM. They found that the average fiber concentration of four samples using dry removal was 0.11-0.33 fibers ml~'. The sampling duration ranged between 19 and 55 min. For wet removal, fiber concentrations for two samples were below 0.06 fibers ml"1. The sampling duration for the first and second sample was 15 and 30 min, respectively.(1). The large variation in the performance of supposedly similar packing products has resulted in the Manufacturers Standards Society of Valves and Fittings (MSS) recognizing the need for valve packing standards. The MSS has issued performance testing guidelines for valve packing modeled after the AECL/OH guidelines, (MSSSP-121, "Qualification Testing Methods For Stem Packing For Rising Stem Steel Valves", 1997 February). The MSS specification is based on valve rating whereas the CANDU specification is based on PHT design conditions. (AECL specification "Standard and Live Loaded Packing Assemblies for Valves,." 98-3O83O-TS003.) CANDU Qualification Criteria.(2). Select the quality characteristic to be controlled: length, thickness, war page, injection pressure time, packing pressure, etc.(3). Many studies have been conducted on the leakage of valves, using packing rings. *Manikandan et al*leakages[1]Fugitive emissions are inherently difficult to identify as they often involve leaks to atmosphere, and due to the nature of organic solvent any visual liquid leak will rapidly evaporate. (5).Fugitive emissions may be due to wear, corrosion, incorrect specification incorrect installation, incorrect maintenance, incorrect process operation, poor working practices.

The results show that the compression packing controls the loss of media by blocking fluid migration from a higher pressure system to a lower pressure external environment. The sealing mechanism of compression packing is based on a tight fit between the packing and sealing surfaces. Packing commonly seals pumps, valves and other equipment through axial compression that causes radial expansion of the packing against a dynamic sealing surface like a valvestem(6). The packing pressure is used to fully compress the plastic as it cools and shrinks in the mold. Changes to the packing pressure will control the compression of the melt along the flow path. Insufficient packing pressure can result in voids, short shots, excessive shrinkage on ejection, warping and other filling defects.(4,7).

III. SCOPE OF WORK:

Random samples in each size of packing ring shallbe selected forevaluation of in characteristics line .

3.1. Density

The test specimen was dried at 110 C in an air oven and weighed after cooling to room temperature in a desiccator . The test specimen was then suspended in water and allowed to be in water itself for 5 minutes . It shall be ensured that the test specimen was not in contact with the sides and the bottom of the container . Now the test specimen was weighed white suspending in water .

Calculation

The volume of the test specimen is calculated by subtracting the mass of the test specimen weighed in suspension in water from the mass of the specimen weighed in air . Density = Mass of the test specimen in gm / volume of the test specimen in CM^3

3.2. Determination of the Grease oil or Binder content using sox let extraction apparatus

The packing ring to be analyzed was cut into a representative section of not less than 5gm and unplanted tacking care to collected all pieces which are dislodged . A Sox let thimble was placed in a weighing bottle the lid offset . It was placed in an oven at 105˚ C - 110˚ C for a period of one hour. The lid of the weighting bottle was then replaced and cooled in a desiccator to room temperature and weighed as (w_1) gm.

The sample prepared was transferred to the Soxhlet thimble and replaced in the oven for one hour as before . It was then cooled to room temperature in a desiccators and weighed as (w_2) gm . The thimble with the dried sample was placed in a vapour jacketed Soxhlet extraction apparatus and extracted for one hour with carbon tetrachloride . The volume of solvent to be used should be at least three times the volume of Soxhlet liner .

An evaporating basin was dried in an oven at 105 ˚ C and cooled to room temperature and weighed as $w_3$gms. The solution from extraction flash transferred to the basin and evaporated of the solvent . The basin and its contents were placed in an oven for half an hour at 105˚ C and cooled to room temperature and weighed as $w_4$gm percentage of grease oil or binder = $w_4 - w_3 / w_2 - w_1 * 100$

3.3.Determination of lubricant content

The lubricant used in the packing rings was free graphite evenly distributed throughout the packing. The sox let thimble with test piece taken for determination of binder grease ,oil content was dried in an oven . The extracted yarn was carefully removed from the Soxhlet Thimble on to a sheet of clean smooth paper. The graphite flashes was dislodged by gently untwisting the yarn . The graphite powder dislodged foam the yarn was transferred to the thimble and the thimble was then replaced in the weighing bottle used originally and dried in air oven for one hour . It was cooled to room temperature and then weighed .

Percentage of Graphite = Mass of the graphite / Mass of the sample *100

3.4. Determination of ignitionloss on dried sample

About 2.0 gm of sample was weighed and its contents such as grease, oil and other binder content were removed by sox let extraction using carbon tetrachloride . Again the sample was dried in an oven at 105˚ C - 110˚ C for an hour . The wire reinforcement used in the packing ring also removed . Sufficient quantity of dried sample was taken in an already weighed silica or platinum crucible weight w gm . The crucible with its contents was weighed w_1 gm .

The sample was ignited in a muffle furnace for 30 minutes at 1000˚ C . The sample was then cooled in a desiccator to room temperature and weighed

(w_2) in gm . Percentage of Ignition loss by weight = $w_1 - w_2 / w_1 - w * 100$

3.5. Determination of pH using pH meter

The measurement of pH is essentially the determination of a difference of pH between a standard and an unknown solution , both of which are at the same temperature . The most suitable electrodes should be chosen and corrections applied .

3.6. Determination of Zinc content in Asbestos packing Ring By AAS Technique

Preparation of sample solution

The sample in smaller piece weaving about 4.00 gm's was cut and accurately weighed . The test piece was unplanted carefully without loss of any loose of any loose binding particles so that it facilitates the case of penetration of mineral acid used for dissolution of Zinc metal powder . About 20 ml or 30 ml of mixture of con Hydrochloric acid and acetic acid was added to it to dissolve Zinc present in Asbestos packing ring . The test piece was heated in acid mixture slowly for a period of at least 2 hours.

After dissolution the solution was filtered of and the filtrate was received into 500 ml Standard flask . This solution was aspirated into Atomic Absorption spectrophotometer .If the Zinc content in solution was found to be less than 3.0 mg / ml the solution in 500 ml as such was aspirated . If the zinc content in the solution was found to be more than 3.0 mg / ml . suitable dilution of solution was made and diluted solution was aspirated .

Parameters of AAS for determination of Zinc content

1 amp current = 5.0 Ma

Flame used and type = Air - Acetylene (oxidizing)

Wavelength in nm = 213.9

Slit width = 0.5 nm

Sensitivity = 0.008 mg / ml

Preparation of Standard Zinc solution

Standard Zinc solution having concentration of 1.0 mg /ml . 2.0 mg /ml . 3.0mg/ ml
wasprepared and aspirated in AAS.

Analytical Procedures

Calibration

Calibration was performed by using the blank solution to zero the instrument . The standards were analyzed with the lowest concentrations first and the blank run between standards to ensure the baseline (Zero point) has not changed . Three standard solutions were analyzed and its corresponding absorbance was found out .

By usingthis absorbance in mg / ml . a graph was drawn . Now the sample was analyzed and its absorbance was found . From the graph the concentration of Zinc content was derived .

Calculation

Percentage of Zinc = Concentration in mg / ml *100*500 (dilution) / 1000 * Mass of the sample

3.7. Reinforcement wire

Inconel wire is identified in emission spectrograph . The elements such as carbon , manganese , Si , Cr , Ni , Cu etc .. can be analyzed qualitatively and quantitatively .

3.8. Determination of Ash content

About 2.0 gm of sample was weighed accurately in a silica dish and this was heated to a temperature of 1000°C till the residue in the silica dish was constant is weight . After this the silica dish along with a residue was cooled in a desiccator and weighed .

Calculation

Mass of the Silica dish = w_1 in gm

Mass of the Silicadish + sample = w_2 gm

Mass of the sample = $w_2 - w_1$ gm

Mass of the silica dish+ Residue = $w_3$gm

Mass of the residue = $w_3 - w_1$gm

Percentage of Ash = 100 * Mass of the residue / Mass of the sample

IV. RESULTS AND DISCUSSION

The results presented in this paper are obtained from the determination of grease oil or binder content using sox let extraction apparatus , percentage of grease oil or binder content calculated. Percentage of graphite calculated from lubricant content. Percentage of ignition loss , pH value and zinc content by AAS Technique. Ash content also determined.

Conclusion

Thefindings from this studymakes several contributions to the current literature. The present study demonstrated the integrative approach of packing rings used in valve system. The asbestos gland packing rings are being used in stuffing valves to seal the leakage of steam. This study also demonstrated the significance of Cotton packing with a mineral hydro carbon lubricant suitable for high speeds in centrifugal pumps. Temperature limit 65°C . Typical duties , sludge pumps , water pumps . Lubricated plaited hemp or flax packing. Hemp packing with a high proportion of tallow which , is more suitable than cotton packing for high pressure . ex . In

reciprocating pumps temperature limit 65̊ C Typical duties , Hydraulic work . This current study also demonstrated that Foliated or braided asbestos packing . Metallic wire reinforced . Asbestos packing , impregnated with Mica or graphite if required for dry heat applications. Types of asbestos packing rings specifies the description material, lubricant, size , weight packing and marketing of gland picking's.

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