

MOV GREASE PRESENTATION SUMMARIES

Ken J. Brown, P Eng, CLS, FSTLE

Eco Fluid Center Ltd.

Toll free 888 442-5008 416 466-3144

www.fluidcenter.com info@fluidcenter.com

2015 'Understanding Low Temperature MOV Greases', K. Brown, Eco Fluid Center Ltd., Toronto, ON, W. Mackwood and S. Wilson, Chemtura Co/Cie, West Hill, ON, and E. Austin, Canoil Canada Ltd, Mississauga, ON, Motor-Operated Valve Users' Group Annual Meeting, Jan 12-14, 2015, Hyatt Regency Riverfront Hotel Jacksonville, FL.

The standard Litorque SMB greases are rated to -20°F (-29°C) to 150°F (66°C). Higher temperatures have been evaluated and seem to be better understood than what happens at lower temperatures. The wrong grease can lead to higher torques, wear and other component damage. It was found that a number of tests had to be run to ensure that the greases used meet the requirements of the actuators. This is because there are various needs for the bearings, gears and spring packs. Just using grease with a softer consistency was not enough nor was just using a synthetic base fluid. For the stem nut wear talk given in 2014 more data was presented on non EP (non antiwear) Grade 2 greases being used that gave poor wear rates so stem nut wear could be more. An EP grease like MOV Long Life or MOV Extra should be used. In addition, a question came up about COF and ROL affects with MOV Long Life and references were provided on past successful testing by Flowserve, INEEL, EPRI and AECL (for COG).

2014 'MOV Stem Nut Grease Wear Testing – Update', K. Brown, Eco Fluid Center Ltd., Toronto, ON, W. Mackwood and S. Wilson, Chemtura Co/Cie, West Hill, ON, and E. Austin, Canoil Canada Ltd, Mississauga, ON, Motor-Operated Valve Users' Group Annual Meeting, Jan 13-15, 2014, Hyatt Regency Riverfront Hotel Jacksonville, FL.

Higher stem nut wear has been attributed to the use of antiseize pastes and/or non EP (extreme pressure) greases. Unfortunately most standard tests are only steel on steel so the ASTM 4-Ball Wear test was modified to use brass and stainless steel balls. The wear scars varied considerably and were higher with antiseize pastes (N-5000 and N-7000) and non EP clay thickened grease (Mobilgrease 28). Calcium sulphonate thickened greases including MOV Long Life did the best. It was also determined that Mobilux EP had been reformulated. This has implications if being used on safety related equipment if the qualification testing was based on the previous formulation.

2013 'MOV Actuator Oil Seepage Causes and Solutions', K. Brown, Eco Fluid Center Ltd., Toronto, ON, W. Mackwood, Chemtura Co/Cie, West Hill, ON, E. Austin, Forsythe Lubrication Associates, Hamilton, ON, Power Generation Industrial Council, STLE Annual Meeting, May 4-8, 2013, Detroit, MI.

A very few stations had reported oil seepage through gaskets on motor operated valve gearboxes. Samples of grease were tested for oil separation using various ASTM and API procedures as well as for longer times and different temperatures. The calcium sulphonate thickened greases did very well with respect to competitive greases. Further investigation determined that the oil seepage was the result of the installation procedures. Grease was being put on the gaskets when nothing is recommended by the suppliers. Insufficient axial compression was also believed to be a factor. Further, that seepage at plugs was attributed to the fact that a thread sealant was not being used.

2013 'MOV Long Life Grease A Decade Later - Approval and Lessons Learnt', K. Brown, Eco Fluid Center Ltd., Toronto, ON, and T. Austin, Forsythe Lubrication Associates, Hamilton, ON, Motor-Operated Valve Users' Group Annual Meeting, Jan 14-16, 2013, Marriott Rivercenter, San Antonio, TX.

It has been over 10 years since production of the calcium complex thickened Nebula EP, the previous industry standard grease, was cancelled. This paper reviews the work and the approvals necessary for the calcium sulphonate complex thickened MOV Long Life as a replacement. Testing showed it to be better in most regards. In fact the most recent formulation for the previous grease was reported by EPRI to be "marginal" in some categories. It also did not survive the 5 year aging period used by COG. In addition to use in the main gearbox MOV Long Life has been tested by a number of labs for use on valve stems and in SMB limitswitch gearboxes. The lessons learnt include how to prevent oil seepage as well as not to use too much grease in the limitswitch gearboxes.

2010 'Semi-fluid Grease for Oil Filled Actuators', K. Brown, Utility Service Associates, Troy Olmsted, Forsythe Lubrication Associates, Wayne Mackwood, Chemtura Co., January 11-13, 2010, Marriott Rivercenter, San Antonio, TX.

Oil filled actuators have some advantages when it comes to lubrication and dissipating heat, but one issue is oil leakage. This happens when the seals get worn, harden or take a cold set. Oil leakage can compromise the actuator functionality. In addition, the leaking oil can be a slipping and/or fire hazard. Data was presented MOV Long Life 9000 EP that is essentially a thickened oil. It has the advantages of oil but with the reduced leakage attributed to grease. The thickener used is a calcium sulphonate that is same as that in MOV Long Life Grade 0 and Grade 1 so that some approvals are applicable and compatibility is not an issue. It has not as yet been commercialized.

2009 'Reducing Oil Seepage in SMB Actuators', K. Brown, Utility Service Associates., W. Mackwood, Crompton Co/Cie, E. Austin, Forsythe Lubrication Associates Motor Operated Valve (MOV) Users Group Meeting, January 5-7, 2009, Contemporary Resort, Orlando, FL.

A very few stations had reported oil seepage through gaskets on motor operated valve gearboxes. Samples of grease were tested for oil separation using various ASTM and API procedures as well as for longer times and different temperatures. The calcium sulphonate thickened greases did very well with respect to competitive greases. Further investigation determined that the oil seepage was the result of the installation procedures. Grease was being put on the gaskets when nothing is recommended by the suppliers. Insufficient axial compression was also believed to be a factor. Further, that seepage at plugs was attributed to the fact that a thread sealant was not being used.

2008 'Shop Floor Assessment of Grease in Motor Operated Valves', K. Brown, Utility Service Associates, Troy Olmsted, Forsythe Lubrication Associates, Wayne Mackwood, Chemtura Co., Neil Hutcheson, Georgia Western, Kennesaw, GA, Power Generation Technical Session, STLE Annual Meeting, May 18-22, 2008, Cleveland, OH.

It is very important for those maintaining actuator gearboxes to be able to assess the condition of the grease. This is necessary to be able to determine if a grease change is required now or if not now, then when. This is required because many MOV actuators are only readily accessible every 2 years or so during a reactor outage. Unfortunately getting a large sample of grease necessary for the typical laboratory tests used for greases is not practical nor can they wait weeks for the results. This paper presented results for quick visual and tactical tests that can be performed on small grease samples. These include color, smell, appearance and consistency. Some qualitative tests can be done on the shop floor but others, such as rheometry for consistency or FTIR for oxidation might require a lab. However, other measures of consistency are available and some tests such as the Ruler are being run by condition based maintenance staff. A simple blotter test can also be used to determine if the grease has gotten too dry. A set of tests with actions were presented.

2008 'Commercial Grade Dedication and In-Service MOV Long Life Grease Testing', K. Brown, Utility Service Associates., W. Mackwood, Crompton Co/Cie, E. Austin, Forsythe Lubrication Associates, Motor Operated Valve (MOV) Users Group Meeting, January 14-16, 2008, Contemporary Resort, Orlando, FL.

See 2008 STLE presentation listed above. Also, for safety related equipment many stations test every order of grease. This is to ensure that what they ordered is what they received. The tests can include penetration, dropping point and color. These were reviewed as well as other tests such as FTIR. The tests are important but so also are the limits to be used. Each batch of MOV Long Life is tested before it is shipped and has a certificate of analysis (COA). Unfortunately, many tests are not exact and there are variations between labs. This precision should be taken into account when reviewing the data. Variances were more often with the dropping point when the initial bath/block temperature was set too low and with penetration when ½ or ¼ scale rather than full scale penetration tests were run.

2007 'MOV Stem Grease Wear Testing', K. Brown, Utility Service Associates., W. Mackwood, Crompton Co/Cie, E. Austin, Forsythe Lubrication Associates MOV Users' Group Meeting, January 2007 Sheraton Sand Key, Clearwater, FL.

At the 2006 MUG meeting a presentation was given that showed excessive stem nut wear. Further an EPRI survey of stem lubricants had shown that a variety of different products were being used and than some might offer poor wear protection. Over 38% were using non EP greases and/or antiseize pastes. The role of the lubricant was investigated through various wear tests including 4-Ball, Timken, Pin-on-Disc and Navy Gear Wear Testing. It was found that with MOV Long Life that a stiffer grease provided better wear protection and that even MOV Extra with a lower viscosity oil still provided good wear protection. some of the pastes and the clay thickened non extreme pressure grease had higher wear rates. The calcium sulphonate greases did very well.

2006 'MOV Long Life Grease Condition Monitoring Update', K. Brown, Utility Service Associates., W. Mackwood, Crompton Co/Cie, E. Austin, Forsythe Lubrication Associates MOV Users' Group Meeting, January 2006, Sheraton Sand Key, Clearwater, FL.

As an update on the 2005 presentation on condition monitoring samples of MOV Long Life Grade 1 were aged for 600 hours at 150°C (302°F). This is twice as long as the aging done to qualify the grease and not that after 300 hours Nebula EP was spent. Some testing had been done on these samples previously but this time we examined the use of equipment that could be used on the small sized samples more typical of what could be easily obtained in service. These included the following; dropping point, 4-Ball Wear, Total Base Number (TBN), Penetration by three methods, rheological testing and Ruler testing. The later is a test for the remaining antioxidants. It was found that even after such severe aging the dropping point remained very high (good), the 4-Ball Wear did not increase (good), the FTIR had not changed (no significant degradation, the TBN was still high (good) and the Ruler testing still showed a lot of remaining antioxidants. Rheological testing showed a decrease in the yield point and a decrease in the plastic viscosity. There had been not age hardening. These tests were shown to be good candidates for in-service testing and that the samples of MOV Long Life were still in relatively excellent condition.

2006 'MOV Long Life Grease Condition Monitoring Tests', K. Brown, Utility Service Associates., W. Mackwood, Crompton Co/Cie, E. Austin, Forsythe Lubrication Associates MOV Users' Group Meeting, January 9-12, 2005, Sheraton Sand Key, Clearwater, FL.

It is very helpful to be able to monitor the in-service performance of grease and to be able to determine when it might require changing. For the EPRI environmental qualification work in 2002 samples of MOV Long Life Grade 1 were aged for 300 hours at 150°C (302°F). This was to simulate 5 years of service. Testing showed that MOV Long Life showed very little degradation while the previous calcium complex grease had hardened from a pen 334 to a 204 (Grade 1 to Grade 4 in the EPRI testing). This paper reviewed the testing performed by EPRI and COG (Candu Owners Group). Also samples of MOV Long Life were aged twice as long as that done previously to obtain more data on the degradation characteristics. Although the aged samples had darkened the samples of MOV Long Life were still considered to be in good condition and fit for further service. Data was also presented on oil bleed testing. This was because of reports of oil seepage. All the tests indicated good if not above average resistance to oil bleeding. From the point of view of grease monitoring the blotter test was a good option.

2004 'MOV Long Life Limit Switch Applications', K. Brown, Utility Service Associates., W. Mackwood, Crompton Co/Cie, E. Austin, Forsythe Lubrication Associates MOV Users' Group Meeting, January 12-14, 2004, Hilton Myrtle Beach Resort, SC.

MOV Long Life had been extensively tested for use in Limatorque SMB actuator main gearboxes as well as on the stems. It had been the goal that a single grease could be used for all three applications so that EPRI and others conducted studies. This paper compares MOV Long Life Grade 1 with Mobilgrease 28. MOV Long Life gave better results in the Timken test, the 4-Ball EP and the 4-Ball Wear Test so it should provide better wear protection. It should also provide better corrosion protection. Mobilux EP, A lithium grease, has also been proposed and data showed that it had much more oil separation as well as worse mobility at lower temperatures. It was also found to soften considerably when exposed to heat and water in a modified Shell Role Stability Test. The latter could be a particular problem for safety related equipment. Data was also presented on MOV Extra for fossil fired station application and/or for lower temperature ambients.

2003 'All-In-One Grease, An Update On MOV Long Life', K. Brown, Utility Service Associates., W. Mackwood, Crompton Co/Cie, E. Austin, Forsythe Lubrication Associates, MOV Users' Group Meeting, January 13-15, 2003, Sheraton Sand Key, Clearwater, FL.

To replace the discontinued Nebula EP, MOV Long Life grease had been given as the "best choice" and recommended for both the main gearbox and the limitswitch gearbox. This was in a 2002 MUG Position Paper CFI 02G-J01. Plus, MOV Long Life was tested by EPRI for use in safety related equipment and had been the factory fill for Limatorque for actuators shipped after Aug 29, 2002. Data was presented on MOV Long Life and Nebula EP showing how MOV Long Life can also be used on the stems and in the limit switch gearbox. Plus, samples of greases were tested at 177°C (350°F) and both MOV Long Life and MOV Extra did better than the competitive greases. The data sheet characteristics of a number of greases were also compared. It was concluded that MOV Long Life should provide better performance and longer lives than the previously used calcium complex grease. It should also perform adequately for both the limitswitch gearbox and on the stems. In 2002 MOV Long Life was approved by both Limatorque and EPRI to replace Nebula EP grease.

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