Experimental Study on Drop Point of Grease Samples for Various Lubricating Applications

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***Abstract* -Grease is a very important substance that provides lubrication to a variety of machines. One important property that denotes the suitability of grease is the drop point. In this regard in the present study, different types of greases were obtained from local outlets and were tested for their suitability for different applications by arriving the drop point using method described by ASTM D 2265.**

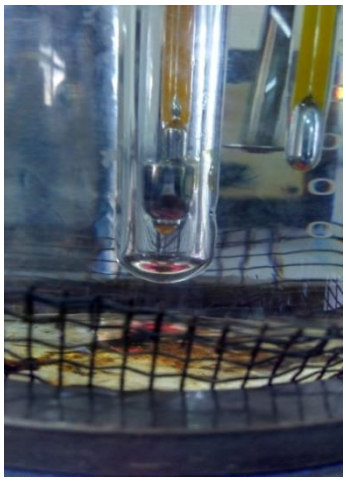
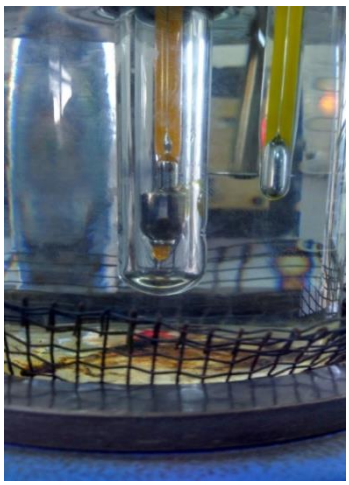
Keywords – Grease, drop point, ASTM, lubricant.

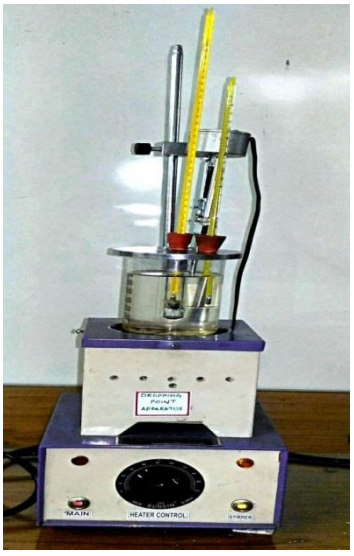
I. INTRODUCTION

Grease is a semi solid material that functions as a lubricant when applied on movable machine components. The composition of grease includes Soap emulsified with Petroleum Oil or Vegetable Oil. Grease is one of the alternatives for lubricating oil that serves the purpose of reducing wear and tear, friction and heat dissipation generated between moving mechanical machine devices. Grease has wide industrial and household applications like (i) As a sealant to prevent the seepage of water and is also used as a sealant in the stuffing box of various electrical devices (ii) As a lubricant in mechanical devices that are operated continuously where grease take the form of a lubricating film (iii) As a lubricant in areas that are isolated and in accessible (iv) As a lubricant in machinery operating at higher temperature and pressure. Grease is also convenient to use when compared to lubricating oil in view of its high rigidity. Grease does not require the operation of a circulating system and holding devices as is required for a lubricating oil system. Grease is composed of base oil, a thickener and additives. The base oil is derived from petroleum oil source or a vegetable oil source. The petroleum oil source of the base oil is also known as lubricant base fluid which is categorized into five groups indicated by American Petroleum Institute (API) [1, 2].

II. MATERIALS AND METHODS

Drop point is defined as the "temperature at which it passes from the semi-solid to the liquid state". At this condition, a drop of grease sample falls from the orifice of the test apparatus. This methodology confirms to the ASTM D 2265. This temperature determines the upper temperature limit of the applicability of the grease. The dropping point is not the melting point of lubricating grease. Dropping point is used in many grease specifications. However, this test has very limited relevance to service performance [2,3]. The dropping point test procedures are given in ASTM standards D-566 and D-2265. The following precautions are to be taken while conducting the experiment: (i) not to inhale ethylene glycol vapors because it causes respiratory track irritation, (ii) the fluid for oil bath must have flash point greater than the maximum temperature at which the bath is used and (iii) an open flame must not be used for heating bath liquid. Figure 1 shows the experimental setup for obtaining drop point of the given grease sample.



The apparatus essentially comprises of a chromium-plated brass grease cup, heat resistant borosilicate glass, an ethylene glycol bath and a porcelain base nichrome heater coil. Figure 2 demonstrates the grease drop protruding from grease cup.

III. RESULTS AND DISCUSSION

For the present study four types of grease samples were obtained from different outlets. Table 1 presents the details of these samples and their drop points.

Table 1
DROP POINTS OF DIFFERENT GREASES

S.No	Type of Grease	Drop Point
1	Reliance grease NLGI-3	174ºC
2	HPCL grease NLGI -3	173ºC
3	Multipurpose grease	99ºC
4	Pensol wheel bearing grease	117ºC

Reliance and HPCL greases that belong to NLGI-3 category (National Lubricating Grease Institute) have high drop point of around 170-180°C and hence can be used in commercial vehicles such as cars, trucks, propeller shafts, large electric motors, vertical shaft applications etc, since this type of grease does not lose its lubrication properties at high temperatures.

Multipurpose grease has relatively low drop point of 99°C. Therefore this can be used for valves, conveyors, axles, springs, weight and fitness equipment, linkages, cycles, motor cycles etc. Wheel bearing grease has a drop point of around 117°C, which means that it can withstand effectively excessive churning and provides trouble-free long service. It can sustain high temperatures. It is useful for bearings of tractors and three wheelers.

IV. CONCLUSIONS

Drop point data have been obtained for four different greases available in the market from different outlets. It was found that the greases categorized as NLGI-3 can be used for high temperature applications.Whereas multipurpose grease has low drop point and can be recommended for less intense applications. Wheel bearing grease has medium drop point and can be used for bearings of tractors etc.

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