

Dear Sirs

We refer to our Product Safety Warning Letter SL2016-614/PRP of May 2016, where we informed you about incidents reported with TSP accumulators which have suffered from breakage. Such incidents pose a serious potential threat to property and persons and may even result in bodily injuries and/or fatal casualties.

We wish to clarify that only accumulators of the TSP 10L design are affected. Furthermore, the affected accumulators are restricted to the accumulators fitted to the hydraulic system on ME engines of our design with 300-bar working pressure. Accordingly, accumulators fitted to the Alpha Lubricator system and to the MC-type engines are not affected.

In addition, we inform you that additional investigations by TSP have shown that the protective guard solution designed by TSP for the accumulator of the 10L design is not a feasible measure to solve the potential serious threat to property and persons. Therefore, we attach a safety warning letter from TSP showing their action plan on how to handle the situation through immediate exchange of all affected 10L accumulators of TSP design with a new improved version.

Yours faithfully



Mikael C Jensen
Vice President, Engineering



Per Pallisgård
Head of Product Safety,
Engineering

Attachments

1. Service Letter with Safety Warning from TSP
2. Form to be filled in and forwarded to TSP for exchange of affected TSP accumulators of 10L design.

Action code: IMMEDIATELY

Product Safety Warning - Updated Information

Total Solutions & Power (TSP) accumulators

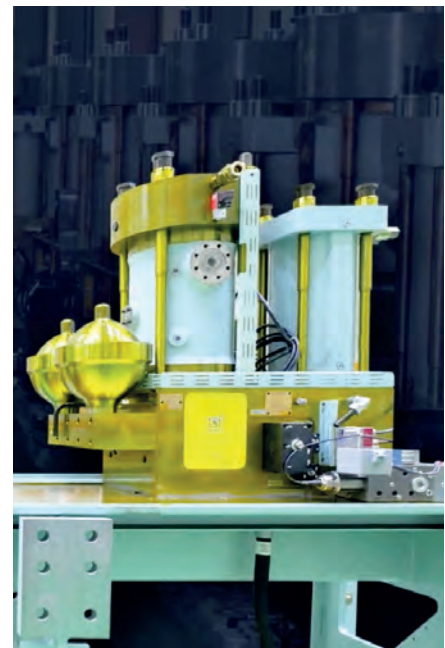
SL2016-616/PRP
May 2016

Concerns

Owners and operators of MAN B&W two-stroke diesel ME-type engines.

Summary

Product safety warning letter concerning accumulators produced by TSP.



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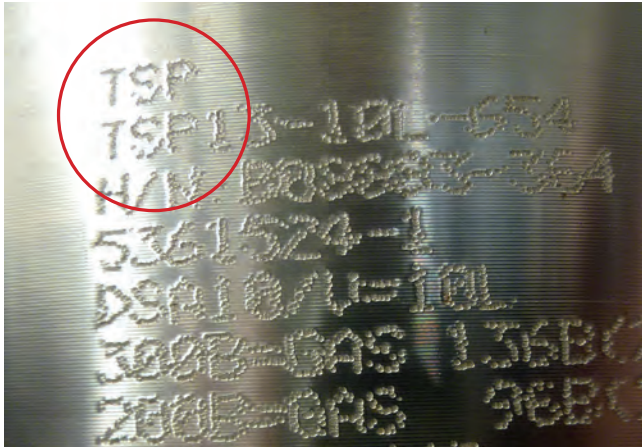


Fig. 1: TSP accumulator

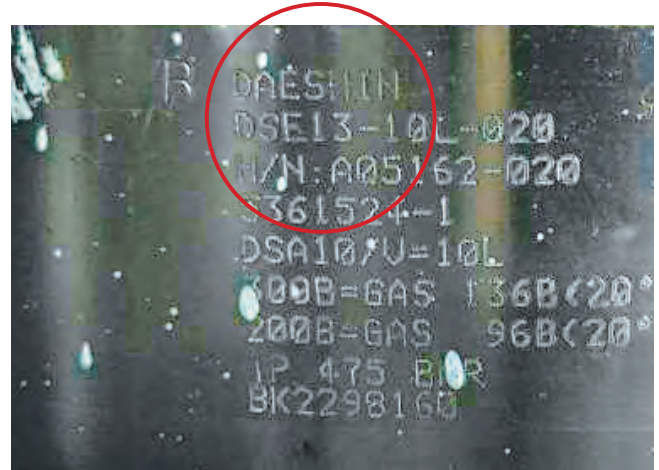


Fig. 2: 10L accumulators produced in 2013

The TSP accumulator can be identified as shown in Fig. 1.

TSP produced 10L accumulators in 2013 which are marked Daeshin, see Fig. 2. These must also be exchanged.

As mentioned in Product Safety Warning Letter SL2016-614/PRP, we strongly recommend to inspect the accumulators installed on your engines at the very first opportunity possible in order to verify whether, and to what extent, your engines have 10L accumulators installed that are made by TSP.

Please ensure that such an inspection is only done when the engine is in the Finished with Engine-mode, and the hydraulic system is without pressure. Until any affected 10L accumulator of the TSP design installed on your engines

has been exchanged, we encourage you to ensure adherence to the following precautions:

1. Always ensure that the safety instructions of the Instruction Manual are strictly followed.
2. At the first opportunity, check the nitrogen pressure in the accumulators.
3. The operating personnel should minimise their presence/stay in the vicinity of the running engine and should never be in the vicinity of the affected hazardous area in front of or above the accumulators while the hydraulic system is pressurised, which means during engine running and standby condition.

If you have already installed the protective guard solution designed by TSP for the accumulator of 10L design, we encourage you to ensure adherence to the precautions above until any affected 10L accumulator of TSP design has been exchanged.

For any questions regarding this service letter, please write to: lep@mandieselturbo.com

Service Letter with Safety Warning

Dear Sirs

Reference is made to MAN Diesel & Turbo Service Letter SL1016/PRP of May 2016 warning about accumulators from our company TSP Co., Ltd.

The accumulator of TSP was approved from MDT in October 2012 in accordance with First Time Approval procedure (FTA).

TSP has experienced 10 pcs of 10 liter accumulator which have been suffered from breakage among their delivery records with total quantity of 4,857 for 10 liter where parts of the accumulator body were ejected into the engine room causing damage. Accordingly, such breakage poses a serious potential threat to property and persons and may potentially even result in bodily injuries and/or fatal casualties.

TSP root cause analysis has shown:

- The failure is related to the execution of the thread. This gave negative effect on fatigue strength for 10 L accumulators mounted on MAN B&W engines.
- The 4 L accumulator has not been reported with any failure since the first production on MAN B&W engines in 2013. Furthermore MDT and TSP have confirmed the design to be safe.
- The nine (9) accumulators for 10 liter have failed after 6,000 service hours with one (1) case after 3,200 hours. This is reflected in the prioritization of replacement of accumulators in service.
- The failed accumulators are based on the thread with root corner radius 0.05mm.
- TSP has changed production execution and improved 10L accumulator in way of
 - 1) thread root radius 0.37mm.
 - 2) longer thread
 - 3) increased shell thickness
- These make sure the fatigue strength can be guaranteed. MDT will review this design according to FTA procedure and the approval will be expected within one (1) week.

As a responsible maker of accumulators TSP has decided that all 10L accumulators should be replaced with new design. However as we are not in a position to produce and deliver so many accumulators within such a short time frame for all our customers, we have decided to prioritize as follows;

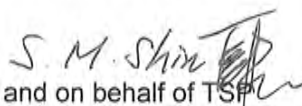
Priority	Description	Time frame for Delivery
1	Accumulator 6,000 - 9000 hours in service	Within 6 weeks
2	Accumulator 9,000 - 12000 hours in service	Within 9 weeks
3	Accumulator 2,000 - 6,000 hours in service	Within 12 weeks
4	Accumulator more than 12,000 hours in service	Within 15 weeks
5	Accumulator less than 2,000 hours in service.	Within 18 weeks

The engines not yet in service shall be handled separately based on the shop test and sea trial dates.

As mentioned in MDT Service Letter SL2016-614/PRP of May 2016, TSP strongly recommend the crew to inspect the accumulators installed on your engines at the very first opportunity possible in order to verify whether and to what extent your engines have accumulators installed that are made by TSP. In case you have TSP accumulators, please fill in the enclosed form in order to expedite your enquiry as efficiently as possible. The filled in form, questions and coordination of delivery of accumulators and instruction for the installation should be directed to:

TSP Co., Ltd
E-mail sales@tspco.kr
Fax +82 51 728 6275

Until the accumulators have been replaced or relevant action from TSP, we encourage you to ensure adherence to the precautions prescribed in MDT Service Letter SL2016-614/PRP of May2016 as amended in the MDT Service Letter


For and on behalf of TSP
Sung Ming Shin, President

Enclosure.

[illegible]