



SAFETY ASSESSMENT
FEDERATION

Guidance

In-Service Examination Procedures

Otis GeN2 Coated Steel Belts (CSB's)

REFERENCE: MLCC 12
ISSUE: 2.0
DATE: 28/11/2022

DOCUMENT INFORMATION:

REFERENCE:	MLCC 12
ISSUE:	2.0
DATE:	28/11/22
PREPARED BY:	Machinery Lifts and Crane Committee (MLCC)
APPROVED BY:	TC2, RSC and Pfizer

DOCUMENT HISTORY RECORD:

ISSUE:	DATE:	CHANGE DETAIL:
01	17/02/2012	Initial Document
01.1	22/02/2021	Document Review
2.0	28/11/2022	Para 2 Updated Conclusion Guidance

© The Safety Assessment Federation Ltd

All rights reserved. Except for normal review purposes, no part of this publication may be reproduced, utilised, stored in a retrieval system or transmitted in any form by any means electronic or mechanical, including photocopying, recording or by any information, storage or retrieval system without the written permission of the publisher.

CONTENTS

SITUATION 1

GUIDANCE..... 1

 1. Considerations 2

 2. Conclusion 2

 3. Information Sources 3

SITUATION

Otis GeN2 Coated Steel Belts (CSB's) are designed to retain sufficient strength after being subjected to 12 million bends at the design rated load.

Typical lift starts in commercial premises working a 12-hour day, 5-day week for 52 weeks per annum:

180 starts per hour for 3 hours per day (arrival and departure periods)

45 starts per hour for 9 hours per day (general working day)

This equates to approximately 250,000 starts per annum (245,700).

(Source of reference CIBSE Guide D Chapter 13)

GUIDANCE

The worst-case estimates for bends encountered per start by any section of belt is 3, from a building main entrance start (source of reference Otis). Assuming 80% of lift starts are from the building main entrance, then the worst case estimate for bends encountered by any section of belt over a one year period is:

$$250,000 \times 3 \times 80\% = 600,000$$

Bending fatigue tests were undertaken by Otis where it was determined that the belt design life is 12 million bends. Using the typical utilisation figure provided above this gives an estimated belt life of 20 years for a typical lift in commercial premises.

Note: This is a conservative estimate, and most lifts will have less than 250,000 starts per annum and less than 80% of starts from the building main entrance. The actual lift utilisation can only be established from data logging equipment or data from the Otis REM™ system.

GeN2 flat belt technology has now been available since the year 2000 and the indications to date, (from the considerable data now gathered by the manufacturer), show the belts to be extremely durable with only a very small percentage having to be renewed due to deterioration of the internal steel cords.

Nevertheless, consideration should be given that belt replacement will be required in the future.

1. Considerations

Considerations should be given to: -

- Estimated utilisation of the lift taking account of;
- Number of starts per annum,
- Lift loading,
- Environment,
- General condition of the lift installation,
- Frequency/quality of periodic maintenance,
- Any other influencing factors

Note: From the 250,000 starts per annum figure provided above, this would equate to, on average, one start every two minutes, working on a 24-hour day, 52 weeks a year. If we also consider door opening / closing, dwell times and journey times, these figures are very conservative.

Whether applying the 250,000 starts per annum figure or if the unit is fitted with a Pulse™ belt monitoring device, the following should always be taken into consideration during a thorough examination:

- External condition of the belts,
- Signs of damage, degradation or unusual wear patterns to the polyurethane surface. The surface of the belt should be smooth and uniform without external damage.
- Evidence of belt elongation which may be evident when there is reduced clearance between the counterweight and buffer.

2. Conclusion

Where Coated Steel Belts (CSB) are fitted **without** a Pulse™ system monitor device (generally circa 2000 - 2005), there is no prescribed method for undertaking a supplementary test or as to the acceptable Ohms value that should be obtained and when to be discarded. Therefore, SAFed supplementary test 4.10 – Suspension System will not confirm if the CSB's are suitable for continued safe use.

A timed qualified defect shall be issued requesting CSB replacement if the CSB life has exceeded a 20-year period.

The date of the manufacture will be marked on the belts. If this has eroded then we can assume that the belts are original from the time of installation, and we can apply the date of original installation as a guideline.

The year of the lift manufacture may also be obtained from within the lift car, overspeed governor data plate or electrical wiring diagrams.

To obtain the number of starts the lift has completed, will require the assistance of a lift engineer using the Otis diagnostic (test) tool.

Note: Since 2005 CSB's have been fitted with Pulse™ monitoring systems. Where the CSB's have been replaced and no previous Pulse™ monitoring system provided, this should now be fitted at the time of replacing the CSB's. The only affected date range is between 2000 – 2005.

If the CSB's are fitted with a Pulse™ system monitor device, this can be utilised to determine the internal condition of the steel cords. The discard and replacement of CSB's should not be based on the number of starts or life span alone. A visual examination of the CSB's shall be undertaken, and the findings reported accordingly.

3. Information Sources

CIBSE Guide D Transportation systems in buildings

Otis Elevator Co Coated Belt Service Life