BEARING TEMPERATURE PERFORMANCE

Standard
S-6001

Adopted: 2008; Revised: 2023

1.0 SCOPE

Any method used to justify a bearing removal for WM51 and WM52 must meet all requirements of paragraph 2.0.

2.0 GENERAL REQUIREMENTS

2.1 Wayside bearing temperature detectors must be physically inspected and validated at least annually to measure the actual temperature variance from ambient for a roller bearing within +/–5 °F at one temperature between 100 °F and 250 °F.

2.2 Systems using data from wayside bearing temperature detectors must incorporate logic to exclude the thermal effects on bearing temperatures due to braking or break-in. These thermal effects may be excluded as follows:

2.2.1 Determine that the wheel temperature for the bearing in question is not an outlier within the train or the equipment.

2.2.2 Determine that the bearing in question is an outlier within the equipment.

2.3 Systems using data from wayside bearing temperature detectors must use a method to exclude spurious temperature readings. These spurious readings may be excluded as follows:

2.3.1 Examination of raw multiple temperature readings from the measuring sensor to confirm a non-spurious signal. [Utilize a filter across multiple readings of the same bearing from one hot bearing detector (HBD).]

2.3.2 Observation of the bearing across multiple hot bearing detector readings to confirm repeated outlier K-value measurements.

2.3.3 Observation of the bearing performance in conjunction with other suitable data, such as that from an acoustic bearing detector.

2.4 Systems using data from wayside bearing temperature detectors must provide a printable record of the measurements.

3.0 DEFINITIONS:

Tb	=	temperature of bearing

K values: Statistical indicators that define the relative variation of one measurement to the population.

Q values (x = t for train side data) or (x = e for equipment data)

Q2_x	=	median of the dataset values
Q3_x (3rd quartile)	=	median of all values above Q2
Q1_x (1st quartile)	=	median of all values below Q2

Qx_t indicates Q values calculated from all train side bearing temperatures

Qx_e indicates Q values calculated from all bearing K values (Kt) on equipment

Qx_e may also be calculated using all raw bearing temperatures (Tb) on equipment

Kt: Train side K-value for a bearing:

Kt	=	(Tb-Q3_t) / (Q3_t - Q1_t) using all bearing on that side as a basis. Note: (Q3_t - Q1_t) must be greater than 12.5 F or else be set to a minimum of 12.5 F

Ke: Equipment K-value for a bearing:

Ke	=	(Kt - Q3_e) / (Q3_e - Q1_e) using all bearings on that equipment as a basis
Ke	=	(Tb - Q3_e) / (Q3_e - Q1_e) if raw temperatures are used as a basis. Note: If (Q3_e-Q1_e) is zero (0) due to low temperature variation, the Kt value may be used in its place.

4.0 QUALIFYING INDICATIONS

4.1 WM51

4.1.1 The bearing has a calculated value of Kt > 3.5 within the train *and* the bearing has a value of Ke > 2 with respect to the equipment *and* the bearing is detected 50 °F hotter than any other bearing on the equipment.

4.1.2 The bearing has a calculated value of Kt > 3.5 within the train *and* the second hottest bearing on the equipment has a value of Kt < 45% of the bearing in question.

4.1.3 A minimum of three (3) HBD passings, where:

- One (1) HBD reading of Kt ≥ 4.0 and bearing temperature is ≥ 95 degrees Fahrenheit above ambient, and Ke is ≥ 2, and,
- Two separate HBD reads with Kt ≥ 1.5, and Ke is ≥ 2.

Any of these three (3) events can occur in any order within a rolling window of sixteen (16) consecutive reads within a period not to exceed 240 hours.

4.2 WM52

4.2.1 The bearing has a value of Kt > 1.7 within the train *and* the bearing is an outlier with respect to the equipment (Ke > 2 *or* the second hottest bearing on the equipment has a value of Kt < 45% of the bearing in question) *and* the bearing has an indicated TADS® defect with a rank of 2 or greater.

4.2.2 The bearing has a value of Kt > 1.7 within the train *and* the bearing is an outlier with respect to the equipment (Ke > 2 *or* the second hottest bearing on the equipment has a value of Kt < 45% of the bearing in question) *and* the bearing has an indicated RailBAM® defect with a rolling surface defect of RS2 or RS1.

4.2.3 The bearing has a Kt > 2.5 within the train *and* the bearing is an outlier with respect to the equipment (Ke > 2 *or* the second hottest bearing on the equipment has a value of Kt < 45% of the bearing in question) *and* the bearing has an indicated wheel impact load detector (WILD) impact with a ratio >3 or a dynamic >30 kips or a peak impact >65 kips.

4.2.4 The bearing has a Kt > 2.5 within the train *and* the bearing is an outlier (Ke > 2) with respect to the equipment *and* the bearing is detected 25 °F hotter than any other bearing on that equipment and is in a train carrying a commodity with a Standard Transportation Commodity Code (STCC) of 48 (Waste Hazardous Materials or Waste Hazardous Substances) or 49 (Hazardous Materials).

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