ME Filter

Ident No.: 0744631-6

Quality Specification of Standard and Extended ME-filter concept

This document is valid for existing engine types on order as of the date of this document:

Engine types:

All ME engine types

Quality Specification

0744631-6.6

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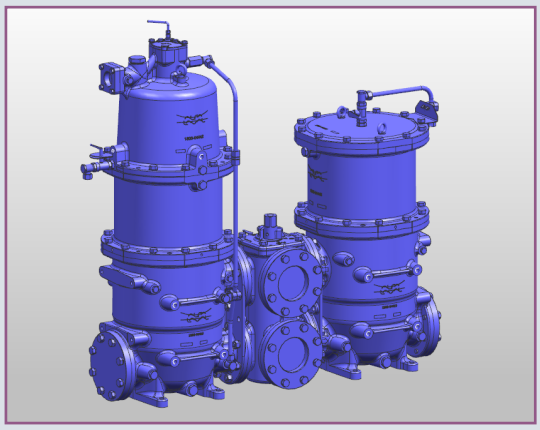
Replaces:

Scope and Field of Application

This specification describes required acceptance criteria for the ME filter.



Example of one filter design.

Document history

Date	Designer	Checked	AC	Revision change	Revision
2017-03-09	SVO	PXC			0
2022-03-30	AISI	JUH	Z3	Section 2, 4 and 6 are updated	4
2022-06-24	AISI	JUH	Z3	Section 2.1 is updated	5
2025-04-03	AISI	JUH	Z3	Section 2 is updated. Section 3 and 5 are deleted	6

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Contents

Changes in this revision:

Section 2 is updated.

Old section 3 and 5 are deleted

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2025-04-03	AISI	JUH	Z3	Section 2 is updated. Section 3 and 5 are deleted	6

1. References

MAN B&W Quality Specification
No. 0743604-8 Lubricating oil cleanliness.
No.5832509-5 Main Lub.Oil System.

MAN B&W Production Recommendation:
No. 0743119-6 How to take fluid sample.

ISO 4406; Hydraulic fluid power - Fluids - Method for coding the level of contamination by solid particles.
ISO 16889; Hydraulic fluid power - Filters - Multi-pass method for evaluating filtration performance of a filter element Filtration requirements.

2. Standard and extended ME-filter concept

2.1. Concept requirements

1. The ME filter must consist of one automatic self-cleaning main filter and an independent bypass filter for redundancy, which is not integrated into the main filter housing.
2. The automatic self-cleanable main filter and the redundancy filter must be connected with a changeover valve where inlet and outlet are operated in parallel.
3. No single failure must interrupt engine operation and the ME-filter must be designed in a way that maintenance or repair can be accommodated during operation. In case of a single failure, continuous operation of the main engine must be possible for >90 days and the filter maker shall make a procedure of how to obtain that. The procedure can include descriptions of cleaning or exchanging filter elements or other parts, but all necessary parts must be available in a mandatory spare part kit onboard the vessel.
   - In summary:
     Procedure for emergency operation for >90 days.
     Content of mandatory spare part kit.
4. The automatic self-cleanable main filter must be equipped with a backwashing or sludge filter which can collect the dirt during the cleaning sequence. Otherwise a tank-in-tank solution must be installed according to specification 0793308-7
5. Max allowed flow for main filter cleaning must never exceed 8% of nominal filter flow when the return outlet is connected to main tank.
6. The extended ME-filter concept is distinguished from the standard concept by a higher filtration efficiency on the main filter and a more efficient dirt collection in the backwashing filter. A backwashing pump or similar positive displacement device is here required to ensure best possible cleaning efficiency no matter LPS pressure. Return oil after the backwashing can be directed to either tank or inlet by the backwashing pump. However, if directed to inlet there must be a valve which can direct this oil to tank if the backwashing filter is removed due to lack of new backwashing filter element onboard the ship.

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7. The redundancy filter part of the ME-filter arrangement will often be used from first engine start and during shop test and sea trial until ship delivery. This is to accommodate that some ship owners like to have an unused and clean automatic main filter at delivery.
8. In case of item 7 the redundancy filter element must be replaced with a new one or if possible cleaned at ship delivery. This is to ensure that the ship has a clean and fully operational redundancy filter.
9. The redundancy filter is expected to be ready for redundancy at any time and may not be used in combination with backwashing or offline filter during normal operation.
10. To ensure adequate time for repairs etc. of the ME-filter during emergency operation and also the running time before delivery, the redundancy filter must be dimensioned to a Qs value <1 Liter/Hour/cm^2.
11. It is expected that the main filter shall be able to handle oil that is dirtier than normally expected without this causing a stop in operation and that the redundancy is only used in extremely rare cases of breakdown of the main filter.
    This also means that the filter shall be able to restore itself if the engine load and thus the oil flow is reduced for a shorter period.

2.2. General design requirements

1. LPS inlet pressure is measured in the system at pressure sensor with tag number PT8108, and it is set according the required inlet pressure to the Turbo Charger, i.e. the pressure depends on the height of the engine.
   Normal range ranges from 1.7 to 2.8 bar, i.e. the smallest engine has a range of 1.7-2.3 bar and the largest a range of 2.2-2.8 bar.
   Low Alarm for PT8108 is 0.2bar below range and slowdown 0.4bar below range.
2. Filtration area for main and redundancy filter must be defined for nominal flow, at ΔP = 0.15 bar +/- 20% and oil viscosity 112 cSt @ 40C corresponding to SAE 30 engine oil.
3. Filter arrangement inlet and outlet flange dimensions to be defined accord to DN50, DN65, DN80, DN100, DN125, DN200, DN250.
4. The specific load of the filter elements, also known as the Qs value, is expected to be at the same level for all filter sizes.
5. Flow velocity to inlet and from outlet of the filter arrangement must never exceed 1.25m/s at nominal filter flow.
6. All filter elements must be protected to resist backflow and defined for the same flow and pressure resistance for both flow/pressure directions.
7. The filter arrangement must be equipped with two sample points (Minimess) at inlet and outlet in order to take oil samples.

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2.3. Filtration ability

Filter name	Filtration ability		Filter element type
	Standard	Extended	
Main filter	β6 = min.2	β6 = min.8	Automatic & Cleanable
Redundancy filter	β6 = min.8	β6 = min.8	Disposable or Cleanable
Backwashing filter Or Sludge filter	β – ratio not specified, but return oil to be ISO code 4406 xx/17/14 otherwise a tank-in-tank solution is required	β6 = min.50 Backwashing pump is required	Disposable or Cleanable

A filtration ability of β6 = min.8, will enable engine start when the oil system is flushed and cleaned to a cleanliness level of ISO code 4406 xx/19/15. Otherwise the engine need to be flushed to a cleanliness level of ISO code 4406 xx/16/13 prior engine start.

The stated filtration abilities are minimum requirements and the filter supplier is free to develop a filter that is significantly better than these. However, it is not permitted to promote filters with a better filtration ability than a IFTS report can document.

2.4. Alarms and surveillance

- Main filter need to be equipped with two alarm switches:
  - dP Alarm no.1 = 0,6 bar.
  - dP Alarm no.2 = 0,8 to 1 bar (to protect the filter element from burst).
- Backwashing filter need to be equipped with one alarm switch:
  - dP Alarm no.3 = 3 to 5 bar (depending on the filter element and pump).
- Redundancy filter need to be equipped with two alarm switches:
  - dP Alarm no.4 = 0,6 bar.
  - dP Alarm no.5 = 0,8 to 1 bar (to protect the filter element from burst).

dP Alarm no. 1,2 and 4,5 can be the same if mounted in the inlet/outlet of the change over valve.

Following items are subject for approval at MAN-ES:

1. Design outline of filter arrangements (existing footprint and flange position shall be kept at re-designs).
2. Filtration ability at main filter and redundancy filter elements to be documented by IFTS reports.
3. The filter maker shall confirm and document in a written report how all items in this specification are fulfilled or at least are acknowledged as requirements. This also includes the filter maker describing a procedure for how to operate the filter in the event of failure scenarios and which spare parts are found necessary to accommodate it (reference to item 3).

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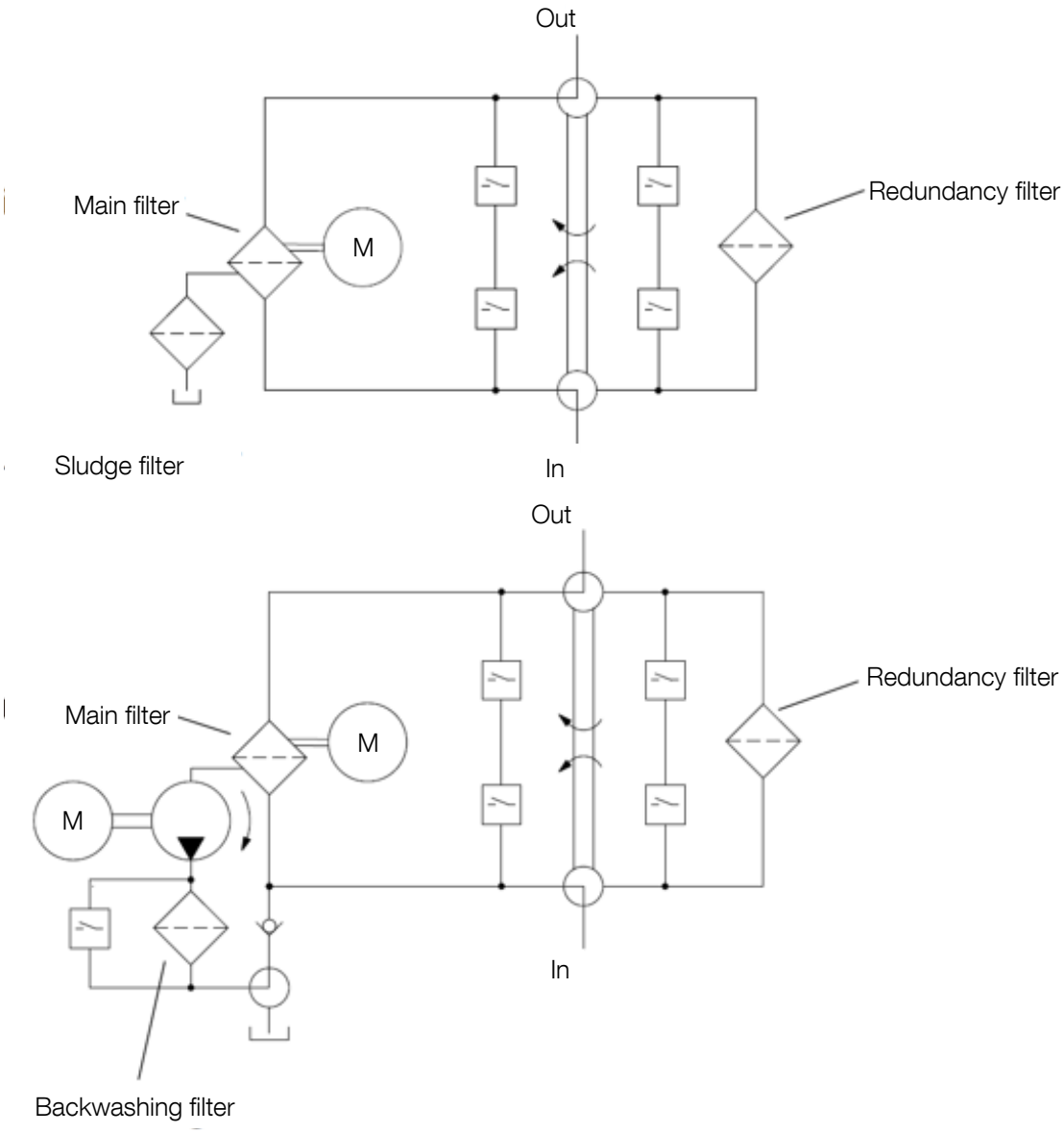
2.5. Simplified examples and principal hydraulic diagrams of the concepts



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2.6. Black box dimensions

In order to be uniform and follow a modularization line, the filter sizes must as far as possible stay within certain specified limits.

Therefore, dimensions have been defined for a 'black box' that describes the height, width and length that the filter must stay within. In addition, the minimum space for overhaul is also stated.

	Minimum space requirements			Maintenance space requirements		
	Height (mm)	Floor space (mm)		Height (mm)	Floor space (mm)	
	H	L	W	H	L	W
DN50	1000	1044	746	1579	1092	746
DN65	1165	1770	677	1750	1770	697
DN80	1165	1770	677	1750	1770	697
DN100	1300	2295	760	1950	2295	760
DN125	1861	1810	752	2160	1903	857
DN150	1861	2505	797	2235	2605	932
DN200	1861	3287	972	2585	3387	1170
DN250	1620	3050	1120	2200	3050	1120

- All filters are categorized into DN-flange sizes and shall have all dimensions within a 'black box' for installation and maintenance for each DN-flange category.
- The 'black box' dimensions are then used as a guideline when finding the optimal location at the ME-engine.
- Inlet and outlet flanges are to be located in the same direction and in the middle of the ME-filter arrangement.
- The inlet flange is located in the bottom and the outlet flange is located in the top.
- The layout of the ME-filter arrangement shall follow an longitudinal formation and the width (W) shall be kept as narrow as possible.

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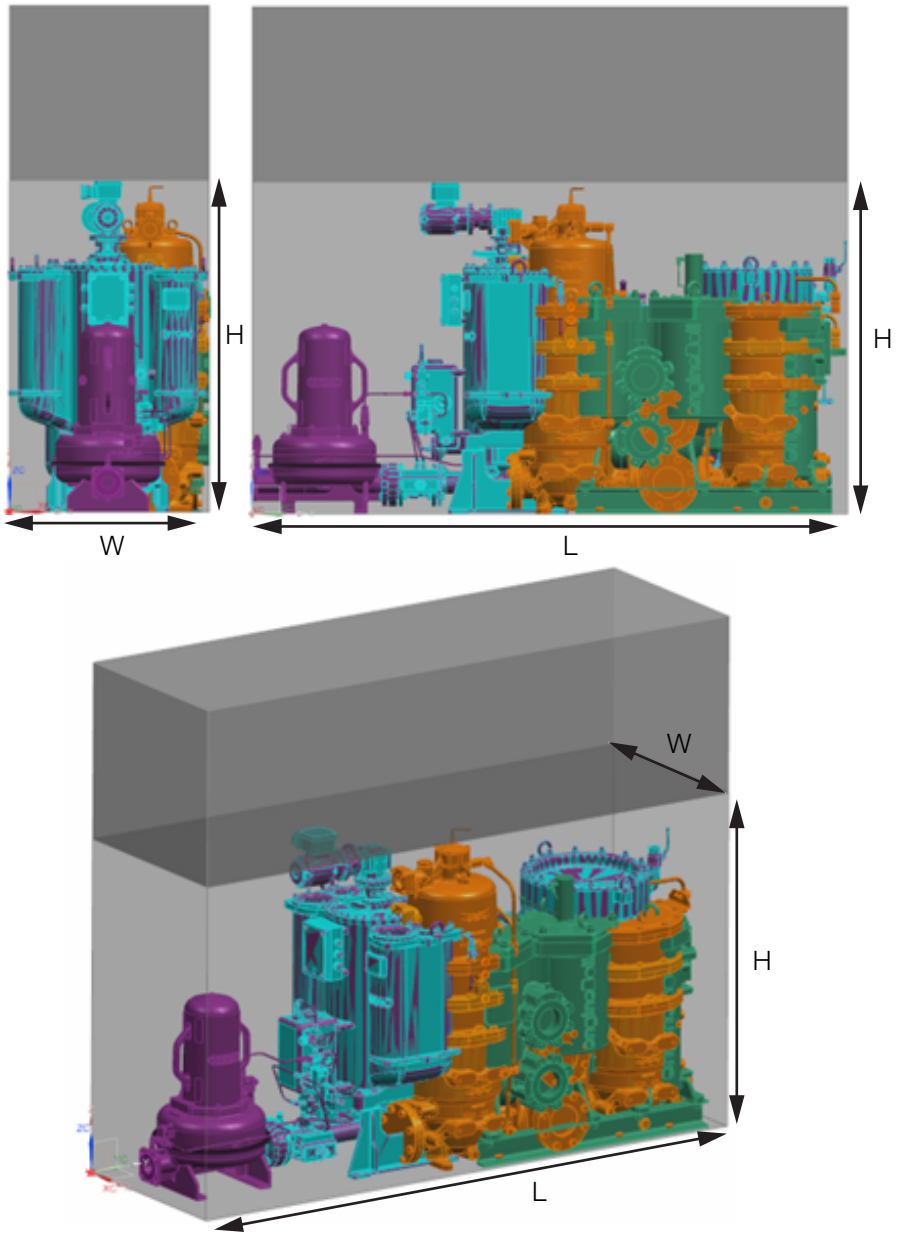

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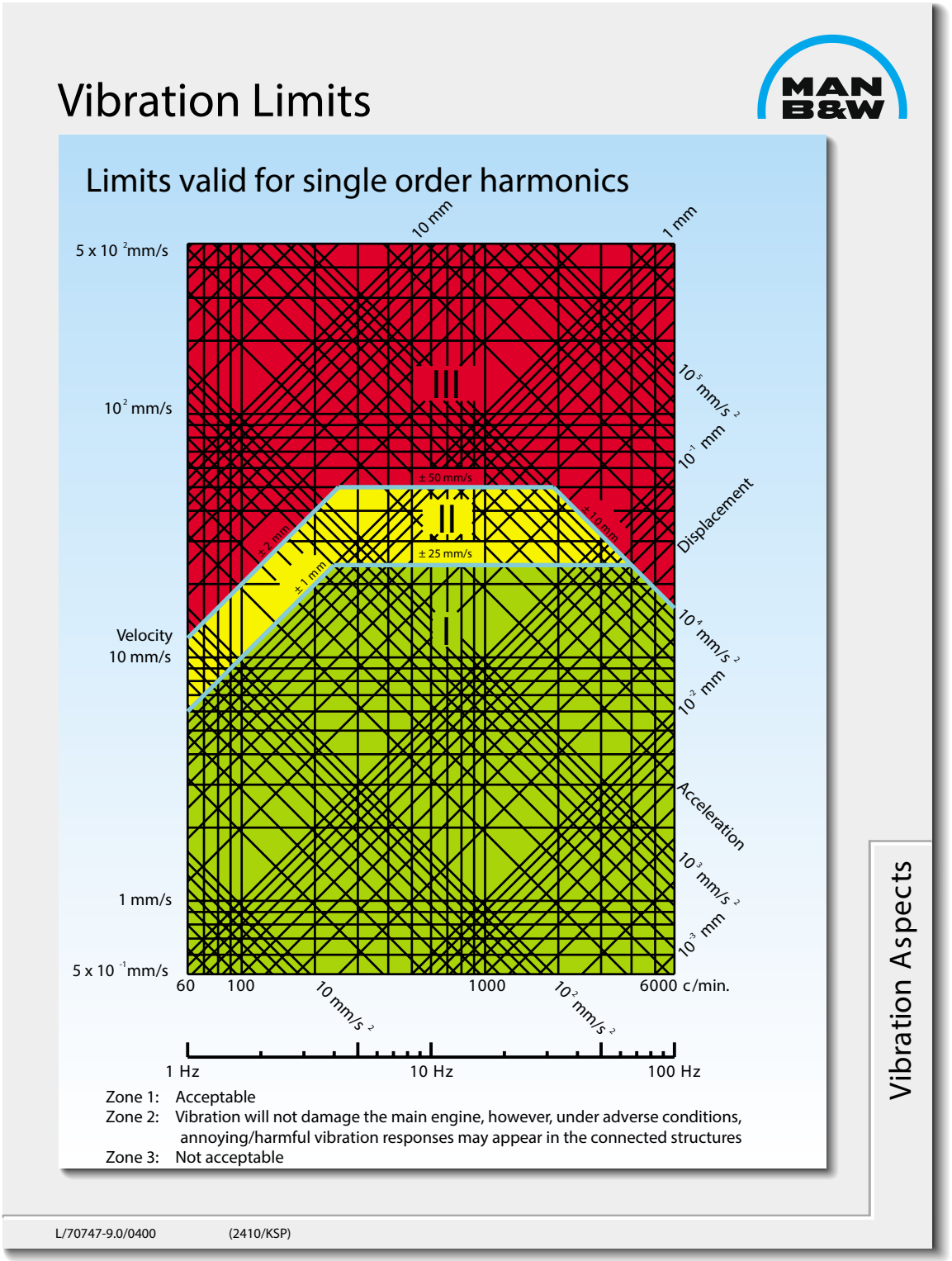
3. Vibration Limits

Filter arrangement must be designed to be installed in area with below mentioned vibration levels.



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4. Lubricating oil specification

MAN Energy Solutions recommends the following oil types as lubricating oils.

Table 1: Examples of international system oil brands that have a No Objection Letter (NOL) from MAN Energy Solutions.

Company	System oil
SAE 30, BN 5-10	CDX 30
Castrol	Castrol CDX 30
Chevron Lubricants	Veritas 800 Marine 30
ENEOS Corporation	Marine S30
ExxonMobil	Mobilgard 300 C
Gulf Oil Marine	GulfSea Superbear 3006
Shell	Shell Melina S 30
Sinopec Lubricant co.	System Oil 3005
SK Lubricants	SK Supermar AS
TotalEnergies Lubmarine	Atlanta Marine D3005

5. Documentation to be delivered together with each ME filter

- Filter instruction.
- Control settings.
- Installation manuals.
- Maintenance manual.
- Service manual.
- Spare parts info.
- Hydraulic function diagram.
- EI-Diagram (wiring).
- Technical specification.
- Trouble shooting manual.
- Inspection Certificate 3.1 according to EN 10204 (required by some Classifications Societies).

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