Action code: AT FIRST OPPORTUNITY

Starting air system

Main engine and requirements to auxillary system

SL2021-715/PRP
August 2021

Concerns
Owners and operators of MAN B&W two-stroke marine diesel engines.
Type: All two-stroke engines.

Summary
Prevent oil leakages from compressor side and ensure correct air quality for starting air system to prevent ruptures.

Reference
SL2018-668
Starting air diagram 0788376-7
SOLAS Chapter II-1 Reg. 34.4

Dear Sir or Madam

Recently, we have received reports of ruptured starting air manifolds. Most likely, this is caused by oil contamination of the starting air pipe with lubricating oil from the starting air compressor.

Accordingly, we find it necessary to emphasise the importance of ensuring a correct starting air quality. This will significantly minimise the potential risk of causing damage to the engine, and may even prevent potential personal injuries.

This Service Letter underlines the importance of preventing oil leakage from the starting air compressors to the engine.

Please direct any inquiries and questions regarding the content of this letter to our Operation Department at: Operation2s@man-es.com

Yours faithfully

Mikael C Jensen
Vice President, Engineering

Stig B Jakobsen
Senior Manager, Operation

Ruptured starting air manifold

Head office (& po. address)
MAN Energy Solutions
Teglholmsgade 41
2450 Copenhagen SV
Denmark
Phone: +45 33 85 11 00
Fax: +45 33 85 10 30
info-cph@man-es.com
www.man-es.com

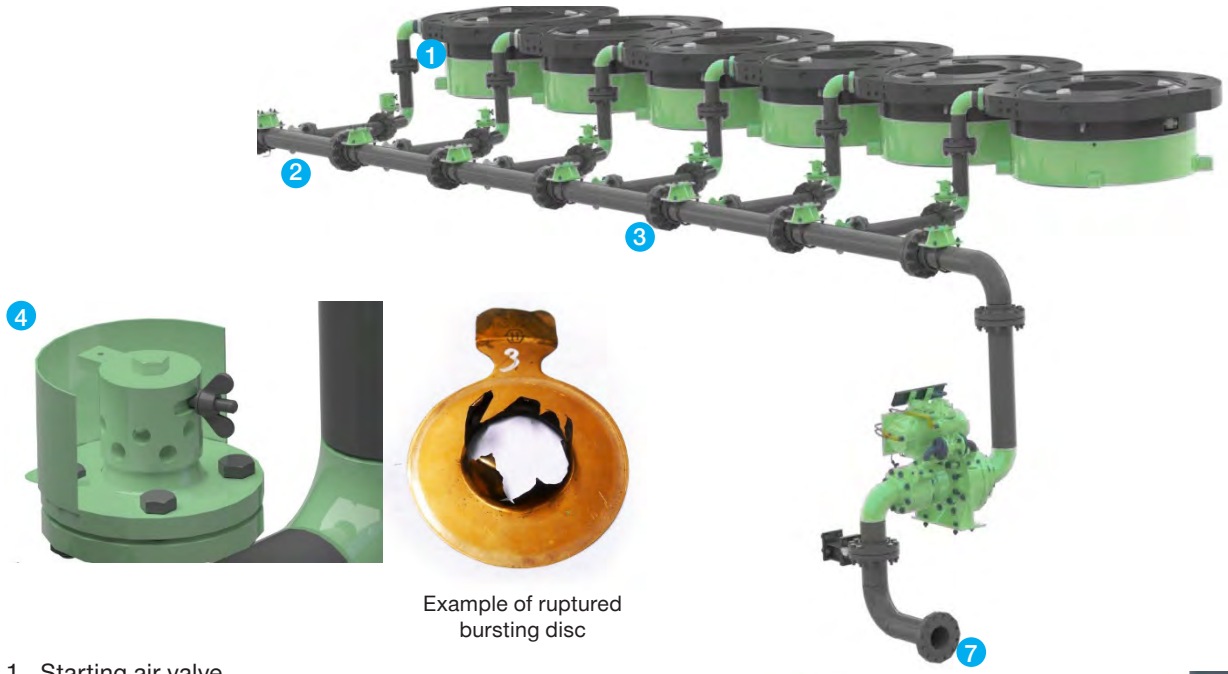
PrimeServ
Teglholmsgade 41
2450 Copenhagen SV
Denmark
Phone: +45 33 85 11 00
Fax: +45 33 85 10 49
PrimeServ-cph@man-es.com

Production
Teglholmsgade 35
2450 Copenhagen SV
Denmark
Phone: +45 33 85 11 00
Fax: +45 33 85 10 17
manufacturing-dk@man-es.com

Forwarding & Receiving
Teglholmsgade 35
2450 Copenhagen SV
Denmark
Phone: +45 33 85 11 00
Fax: +45 33 85 10 16
shipping-cph@man-es.com

MAN Energy Solutions
Branch of MAN Energy Solutions SE, Germany
CVR No.: 31611792
Head office: Teglholmsgade 41
2450 Copenhagen SV, Denmark
German Reg.No.: HRB 22056
Amtsgericht Augsburg

Engine starting air system



Example of ruptured bursting disc

1. Starting air valve
2. Drain/venting pipe
3. Starting air manifold
4. Bursting cap and bursting disc
5. Drain/venting pipe
6. Main starting valve
7. Starting air supply
8. Non-return valve

Fig. 1: Engine starting air system

Explosion in the starting air system

When a combustible media, such as lubricating oil, is supplied together with the starting air, an explosive combustion in the starting air manifold may take place and can lead to rupture of the starting air manifold. Such an incident poses a serious potential threat to property and persons, and may even result in bodily injuries and/or fatal casualties. Proper and timely maintenance can prevent such incidents.

The starting air manifold is designed in such a way that gravity will drain out any fluid via the open drains in both ends. This prevents any combustion from taking place inside the starting air system.

However, we have seen incidents of oil leakage from the compressor arrangement and must emphasise the following:

SOLAS Chapter II-1 Reg. 34.4: **Provision shall be made to reduce to a minimum the entry of oil into the air pressure systems and to drain these systems.**

In order to ensure that only a minimum amount of oil can reach the engine with the starting air, we recommend ensuring the following:

- Install a water and oil separator between the compressors and starting air receivers that will ensure an air quality according to ISO 8573-1:2010 [7:8:X(50)] – see further details in next column.

- As oil can only enter the starting air system from the compressors, it is important to observe if a compressor has a sudden increase in oil consumption and, if so, attend to the issue.

- Drain liquids from the starting air receivers, either manually as a daily routine or automatically. If an automatic drain function is installed, ensure that it works as intended.

- If the starting air pipe from the receiver to the engine is arranged in such a way that oil traps may occur, install a drain at the lowest point and drain either manually as a daily routine or automatically. If an automatic drain function is installed, ensure that it works as intended.

- At regular intervals, check that the two drains from the main starting air manifold on the engine (Fig. 1 pos. 2) – one is positioned after the main starting valve, the other is in the opposite end – are not blocked and that air is vented out of the two drains after an engine start.

We refer to the enclosed starting air diagram 0788376-7, which is the MAN Energy Solutions standard design for newbuildings.

In conclusion, we draw attention to the importance of noting and observing the following requirements to the starting air quality:

Starting air receiver inlet: ISO 8573-1:2010 [7:8:X(50)]

Classes for particles

7 Mass concentration (Cp):
$5 < Cp \leq 10$ mg/m³

Classes for humidity and liquid water

8 Concentration of liquid water (Cw):
$0.5 < Cw \leq 10$ g/m³

Classes for total oil

X Contamination outside class designation. Maximum concentration in mg/m³ informed inside the parentheses.

Normal engine operation

The bursting disc in the starting air pipe branch for each cylinder cover (pos. 1 in Fig. 1) is designed to withstand the 30 bar starting air pressure, but it will rupture when exposed to a significantly higher pressure. In this way, it protects the starting air manifold, the non-return valve, and the main starting valve.

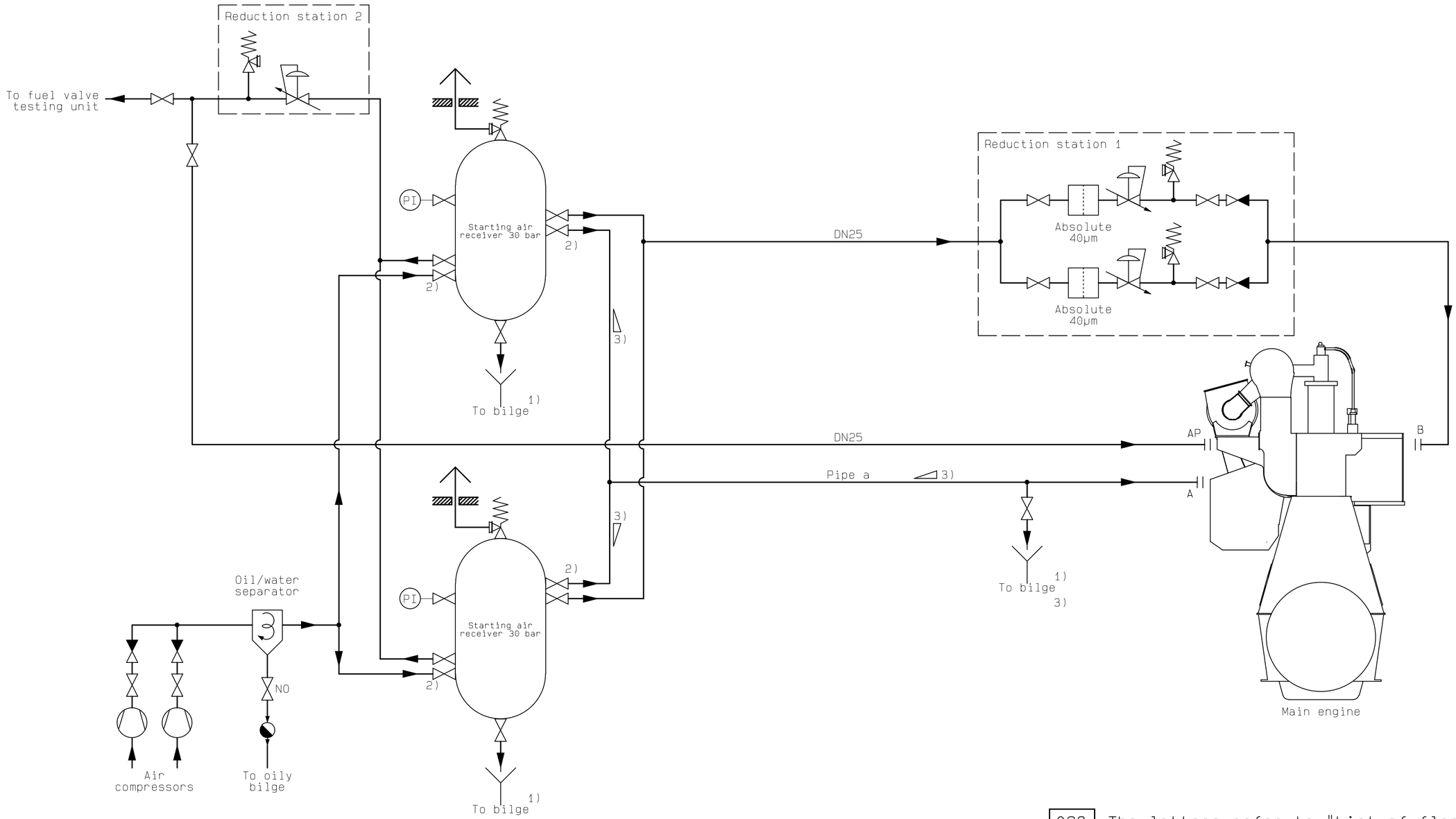
A hissing sound inside the bursting cap will indicate that it has ruptured.

Normally, only a single bursting disc will be found ruptured, and heat from the combustion gas will cause discoloration of the paint on the branch pipe and the starting air valve.

Normal daily operation of the main engine and scheduled proper maintenance will limit the number of incidents of ruptured bursting discs.

If the bursting disk has ruptured, replace it, and overhaul the starting air valve at the earliest opportunity.

For further information on the importance of proper engine maintenance, we refer to SL2018-668.



028 The letters refer to "List of flanges".

Reduction station information, see page two.

For "Pipe a" size see page two.

Notes and descriptions refer to page three and four

Date	Des.	Chk.	A.C.	Revision change	Chg. Not.	Rev.
20210701	NCHA	KID	Z3	Air quality req's and notes		13
20060313	IBB	KID				00

Suppl. Drawimg No.:

Basic Standards:	Product Type:	Size:	Page No.:
0790770-5	ME/ME-C/ME-B	A2	1 (4)
Info. No.: 374600	Item Name: STARTING AIR SYSTEM		Item Id.: 0788376-7
Final User Info. No.:	Final User Description:		Final User Ident. No.:

Requirements for pressure reduction and volume flow

Engine type	Nominal diameter of pipe marked "a"	Reduction station 1		Reduction station 2	
		Control air		Fuel valve test	
		barg	Nl/min	barg	Nl/min
G95ME-C	200	30 -> 7±10%	2100	30 -> 7±10%	2600
G90ME-C	175	30 -> 7±10%	2100	30 -> 7±10%	2600
G80ME-C	150	30 -> 7±10%	2100	30 -> 7±10%	2600
G70ME-C	150	30 -> 7±10%	2100	30 -> 7±10%	2600
S70ME-C	150	30 -> 7±10%	2100	30 -> 7±10%	2600
S65ME-C	125	30 -> 7±10%	2100	30 -> 7±10%	2600
G60ME-C	125	30 -> 7±10%	2100	30 -> 7±10%	2600
S60ME-C	125	30 -> 7±10%	2100	30 -> 7±10%	2600
G50ME-C	100	30 -> 7±10%	2100	30 -> 7±10%	2600
S50ME-C	100	30 -> 7±10%	2100	30 -> 7±10%	2600
S46ME-C	100	30 -> 7±10%	2100	30 -> 7±10%	2600
G45ME-C	100	30 -> 7±10%	2100	30 -> 7±10%	2600
S40ME-C	100	30 -> 7±10%	1400	30 -> 7±10%	2600
S35ME-C	65	30 -> 7±10%	1400	30 -> 7±10%	2600
S30ME-C	65	30 -> 7±10%	1400	30 -> 7±10%	2600

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20210701	NCHA	KID	Z3	Air quality req's and notes		13

Basic Standards: 0790770-5	Product Type: ME/ME-C/ME-B	Size: A2	Page No.: 2 (4)
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Final User Info. No.:	Final User Description:		Final User Ident. No.:

Starting air system

Info:..... Number of auxiliary engines, pumps, coolers etc. subject to alteration according to the actual specification. For common Main Engine and MAN Energy Solutions auxiliary engines arrangement, see special drawing.

Components

Starting air compressors:..... Flow capacity requirements are available in "List of Capacities". Oil content of compressed air might vary depending on compressor technology; similarly integrated oil/water separator is standard on some compressors. For air quality requirements please refer to below section.

Oil/water separator:..... Must help ensure compressed air quality conditions according to below "Air quality requirement" section.

Starting air receiver:..... Volume according to "List of Capacities".

Pressure reduction stations:..... Minimum requirements illustrated on page 1 and 2.

Air quality requirements

International standard:..... ISO 8573-1:2010

Standard reference conditions:..... Purity classes are evaluated at the following reference conditions:
Air temperature: 20°C
Absolute pressure: 100 kPa = 1 bar(a)
Relative water vapour pressure: 0

Classes for particles:..... 7: Mass concentration (C_p): $5 < C_p \leq 10$ mg/m³
(According to ISO 8573-1:2010 annex A: Class 7 corresponds to 40 µm filtration)

Classes for humidity and liquid water:.... 8: Concentration of liquid water (C_w): $0,5 < C_w \leq 10$ g/m³

Classes for total oil:..... X: Contamination outside class designation. Maximum concentration informed inside the parentheses.

Starting air receiver inlet:..... ISO 8573-1:2010 [7:8:X(50 mg/m³)]

Fuel valve testing unit:..... According to suppliers requirements

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20210701	NCHA	KID	Z3	Air quality req's and notes		13

Basic Standards: 0790770-5	Product Type: ME/ME-C/ME-B	Size: A3	Page No.: 3 (4)
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Flow rates

Main Engine: ..... Flow rates and capacities for Main Engine, see "List of Capacities" for relevant engine type. The air consumption for control air and valve testing are covered by the capacities stated for air receiver and compressors in the "List of Capacities".

Material selection

Info:..... The starting air receiver and piping shall not be galvanized because the galvanized layer might get damaged, due to pressure pulsations and thus accumulate in valves, filters etc.
Carbon steel EN 1.0308, normalized (+N) or equivalent material can be used.

Note 1: Starting air receiver and piping drainage

Guidance:..... Manual or automatic drain system.

Note 2: Starting air receiver inlet and outlet

Design:..... Recommended vertical placement of the air outlet connections is above or in-line with the air inlet connection from the starting air compressors.

Note 3: Piping layout

Design:..... Piping should be arranged with inclination towards the engine in such a way that any oil will flow backwards to the receiver, moreover the piping must be without liquid traps. If this is not possible a drain must be established at relevant lowest position so any oil can be drained.

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20210701	NCHA	KID	Z3	Air quality req's and notes		13

Basic Standards:	Product Type:	Size:	Page No.:
0790770-5	ME/ME-C/ME-B	A3	4 (4)

Info. No.:	Item Name:	Item Id.:
374600	STARTING AIR SYSTEM	0788376-7

Final User Info. No.:	Final User Description:	Final User Ident. No.: