

STATEMENT OF CONFORMITY

DNV GL Certificate No.:
12919-2018-PC-IND Rev 1.0

Initial date:
07, August, 2018

Valid:
06, August, 2021

This certificate consists of 3 pages

This is to certify that the Functional Safety Capability of

**Air Filter;
Air Pressure Regulator;
Air Filter Regulator;
Volume Booster;
Air Lubricator
as per table shown in Page 2 & 3 of this Certificate**

Manufactured by:

Shavo Norgren (India) Pvt. Ltd.

Regd. Off: 74, Mittal Chambers, Nariman Point, Mumbai 400 021, INDIA

Factory: R-545, M.I.D.C., T.T.C. Industrial Area, Rabale, Navi Mumbai - 400 701, Maharashtra, INDIA

have been assessed by **DNV GL**, and found to confirm to the Functional safety standards and sub-clauses:

IEC 61508:2010 Parts 1 to 7

The above Products and its associated data contained herein can be considered for use in the design of safety functions up to and including

SIL 3

When used in accordance with the scope and conditions of this certificate.

The Safety Integrity Level (SIL) relates to the complete safety System, not the individual elements, therefore this certificate only demonstrates the capability of the product to be implemented into a safety system of a required integrity level as defined above.

Place and date:
Chennai 04-May-2020

**DNV GL Business Assurance India
Private Limited**

**Manojkumar Panchal
Head of Section, Project Manager**

Certificate history

Revision	Description	Issue Date
0.0	Original certificate	2018-08-07
1.0	Administrative change – Corrected table number on page number 3 and 4	2020-05-04

Products covered by this Certificate

1. Air Filter Regulators

Model	Pipe Size	Volume (cc)	Drawing & Revision No.
SB07	1/8", 1/4"	25	SN-6195-01 R0
SB10	1/8", 1/4"	25	SN-6199-01 R0
SB15	1/4", 3/8"	100	SN-6267-01 R0
SB20	1/4", 3/8", 1/2"	210	SN-6207-01 R0
SB60	1/4", 3/8", 1/2", 3/4", 1"	330	SN-6213-01 R0
SB02	1/4", 3/8", 1/2", 3/4"	330	SN-6191-01 R0
SB70	3/4", 1", 1 1/4", 1 1/2"	1400	SN-6217-01 R0
11-4SN(AL)	1/4", 3/8", 1/2"	75	SN-6229-01 R0
SB77	1/8", 1/4"	25	SN-6045-01/ SN-6385-01 R0
SB27	1/4", 3/8"	210	SN-6239-01 R0
SB67	1/2", 3/4"	220	SN-6261-01 R0
SB67	1", 1 1/2", 2"	740	SN-6260-01 R0
SB37	1/4" to 3/4"	150	SN-6249-01/ SN-6252-01/ SN-6367-01 R0
SB37	1", 1 1/2"	400	SN-6251-01 R0
11-4SN(SS)	1/4"	75	SN-6228-01 R0

2. Volume Boosters

Model	Pipe Size	Volume (cc)	Drawing & Revision No.
VB60 (AL)	1/4", 3/8"	75	SN-6275-02 R0
VB60 (AL) STANDARD FLOW	1/2", 3/4"	150	SN-6276-01 R0
VB60 (AL) HIGH FLOW	1/2", 3/4"	225	SN-6273-02 R0
VB60 (SS)	1/4", 3/8"	75	SN-6275-01 R0
VB60 (SS) STANDARD FLOW	1/2", 3/4"	150	SN-6276-02 R0
VB60 (SS) HIGH FLOW	1/2", 3/4"	225	SN-6273-01 R0

3. Air Filters

Model	Pipe Size	Volume (cc)	Drawing & Revision No.
SF10G	1/8", 1/4"	25	SN-6196-01 R0
SF10C	1/8", 1/4"	25	SN-6197-01 R0
SF15G	1/4", 3/8"	135	SN-6264-01 R0
SF15C	1/4", 3/8"	135	SN-6265-01 R0
SF20G	1/4", 3/8", 1/2"	200	SN-6202-01 R0
SF20C	1/4", 3/8", 1/2"	200	SN-6201-01 R0
SF20V	1/4", 3/8", 1/2"	200	SN-6203-01 R0
SF60G	1/4", 3/8", 1/2", 3/4", 1"	320	SN-6208-01 R0
SF60C	1/4", 3/8", 1/2", 3/4", 1"	320	SN-6209-01 R0
SF60H	1/4", 3/8", 1/2", 3/4", 1"	320	SN-6210-01 R0
SF60V	1/4", 3/8", 1/2", 3/4", 1"	320	SN-6211-01 R0
SF02	1/4", 3/8", 1/2", 3/4"	320	SN-6190-01 R0
SF70G	3/4", 1", 1 1/4", 1 1/2"	1200	SN-6215-01 R0
SF70C	3/4", 1", 1 1/4", 1 1/2"	1200	SN-6216-01 R0
SF17G	1", 1 1/4", 1 1/2"	1200	SN-6269-01 R0
SF18G	1 1/2", 2"	3500	SN-6220-01 R0
SF51C	1/4" to 1"	320	SN-6227-01 R0
SF50C	1/4" to 1"	400	SN-6226-01 R0
SF46	1/2", 3/4", 1", 1 1/4", 1 1/2"	1200	SN-6224-01 R0
SF47	1 1/2", 2"	3500	SN-6223-01 R0

Model	Pipe Size	Volume (cc)	Drawing & Revision No.
SF77G	1/8", 1/4"	25	SN-6233-01 R0
SF27G	1/4", 3/8"	200	SN-6236-01 R0
SF27C	1/4", 3/8"	200	SN-6237-01 R0
SF27V	1/4", 3/8"	200	SN-6238-01 R0
SF37G	1/4", 3/8", 1/2", 3/4"	150	SN-6250-01/ SN-6244-01 R0
SF37G	1", 1 1/2"	375	SN-6245-01 R0
SF67G	1/2", 3/4"	220	SN-6254-01 R0
SF67C	1/2", 3/4"	220	SN-6255-01 R0
SF67V	1/2", 3/4"	220	SN-6066-01 R0
SF67G	1", 1 1/2", 2"	735	SN-6253-01 R0
SF97	1/8", 1/4"	25	SN-6346-01 R0
SF88	1/2", 3/4", 1", 1 1/4"	1200	SN-6345-01 R0

4. Air Pressure Regulators

Model	Pipe Size	Volume (cc)	Drawing & Revision No.
SR07	1/8", 1/4"	20	SN-6194-01 R0
SR10	1/8", 1/4"	20	SN-6198-01 R0
SR15	1/4", 3/8"	60	SN-6266-01 R0
SR20	1/4", 3/8", 1/2"	130	SN-6204-01 R0
SR60	1/4", 3/8", 1/2", 3/4", 1"	200	SN-6212-01 R0
SR02	1/4", 3/8", 1/2", 3/4"	200	SN-6193-01 R0
SR17	1", 1 1/4", 1 1/2"	300	SN-6270-01 R0
SR70	3/4", 1", 1 1/4", 1 1/2"	320	SN-6218-01 R0
SR18	1 1/2", 2"	1500	SN-6221-01 R0
SR48	1/4" to 1"	500	SN-6225-01 R0
SR28	1/4"	200	SN-6242-01 R0
11-4SNR(AL)	1/4", 3/8", 1/2"	80	SN-6231-01/SN-6230-01 R0
SR97	1/8", 1/4"	15	SN-6263-01 R0
SR88	3/4", 1", 1 1/4"	500	SN-6262-01 R0
SR77	1/8", 1/4"	20	SN-6044-01 R0
SR27	1/4", 3/8"	120	SN-6240-01 R0
SR67	1/2", 3/4"	150	SN-6258-01 R0
SR67	1", 1 1/2", 2"	495	SN-6257-01 R0
SR37	1/4" to 3/4"	150	SN-6246-01/ SN-6247-01 R0
SR37	1", 1 1/2"	300	SN-6248-01 R0
11-4SNR(SS)	1/4"	80	SN-6232-01 R0
SR57	1 1/2", 2"	1500	SN-6338-01 R0

5. List of Lubricators considered for SIL certification

Model	Pipe Size	Volume (cc)	Drawing & Revision No.
SL10	1/8", 1/4"	25	SN-6200-01 R0
SL15 M/C	1/4", 3/8"	135	SN-6268-01/ SN-6329-01 R0
SL20 M/C	1/4", 3/8", 1/2"	200	SN-6206-01/ SN-6205-01 R0
SL60 M/C	1/4", 3/8", 1/2", 3/4", 1"	300	SN-6214-01 R0
SL012	1/4", 3/8", 1/2", 3/4"	300	SN-6192-01 R0
SL17 M/C	1", 1 1/4", 1 1/2"	1200	SN-6272-01/ SN-6271-01 R0
SL70 M/C	3/4", 1", 1 1/4", 1 1/2"	1200	SN-6219-01 R0
SL18	1 1/2", 2"	1500	SN-6222-01 R0
SL27	1/4", 3/8"	200	SN-6241-01 R0
SL67	1/2", 3/4"	220	SN-6259-01 R0

Applied Standards:

IEC 61508:2010 Parts 1 to 7

Product Details

Safety function under consideration : As per SIL Safety Case Report Z0567077-01
 Architectural Constraints : HFT: 0
 : SFF:
 AIR FILTER REGULATOR – 97.57% (Table 1)
 VOLUME BOOSTER – 97.42% (Table 2)
 AIR PRESSURE REGULATOR – 97.42% (Table 3)
 AIR FILTER – 97.54% (Table 4)
 AIR LUBRICATOR – 97.54% (Table 5)
 Values used to demonstrate achieved SFF^[4] : As per below Table 1, 2, 3, 4 & 5
 Random Hardware Failure Rates (FIT) : As per below Table 1, 2, 3, 4 & 5

Table 1: Failure rates for Air Filter Regulators

Sr. No.	FAILURE MODE	FAILURE RATE (FIT)	SAFE FAILURE FRACTION (SFF)
1	Safe undetected	38948	97.57%
2	Dangerous undetected	968	

Table 2: Failure rates for Volume booster

Sr. No.	FAILURE MODE	FAILURE RATE (FIT)	SAFE FAILURE FRACTION (SFF)
1	Safe undetected	36543	97.42%
2	Dangerous undetected	968	

Table 3: Failure rates for Air Pressure Regulator

Sr. No.	FAILURE MODE	FAILURE RATE (FIT)	SAFE FAILURE FRACTION (SFF)
1	Safe undetected	36543	97.42%
2	Dangerous undetected	968	

Table 4: Failure rates for Air Filters

Sr. No.	FAILURE MODE	FAILURE RATE (FIT)	SAFE FAILURE FRACTION (SFF)
1	Safe undetected	36098	97.54%
2	Dangerous undetected	962	

Table 5: Failure rates for Air Lubricator

Sr. No.	FAILURE MODE	FAILURE RATE (FIT)	SAFE FAILURE FRACTION (SFF)
1	Safe undetected	36098	97.54%
2	Dangerous undetected	962	

Probability of Failure on Demand : NA
 Hardware Safety Integrity Compliance : Route 1_H
 Systematic Safety Integrity Compliance : NA as per clause 7.4.2 of IEC 61508 Part 2
 Systematic Capability^[2] : SC 2
 Overall SIL Capability Achieved^[3] : SIL 3

^[1] According to IEC 61508:2010 Part 2 Clause 7.4.2 & 7.4.4

^[2] According to IEC 61508:2010 Part 4 Clause 3.5.9

^[3] Lowest SIL indicated

^[4] According to IEC 61508 Part 2 section 7.4.2 & 7.4.4

Information supporting the failure data

- | | |
|--|---|
| 1. Product ID | : As per Page 2 & 3 |
| 2. Functional specification | : As per SIL Safety Case Report Z0567077-01 |
| 3. Environmental Limits | : NA |
| 4. Lifetime / Replacement Limits | : 20 Years |
| 5. Maintenance Requirements | : As detailed in Operation & Maintenance manual |
| 6. Diagnostic Coverage | : NA |
| 7. Diagnostic Test interval | : NA |
| 8. Evidence of use in similar conditions | : NA |

Conditions of Safe Use

1. User shall comply with the detail contained in the manufacturer user manual as well as the information provided above.
2. Selection of this equipment for use in a safety application shall only be made by a competent person.
3. The collection of any data associated with this type for equipment during operations shall be collected and reported to the manufacturer
4. The product should be tested at regular intervals to identify any malfunctions in accordance with the product safety manual.

Conditions of Certificate

1. This certificate is based on the assessment carried out by DNV GL as recorded in assessment reports; SIL Safety Case Z0567077-01 and FMEDA report Z0567077-02.
2. Printed copies of the certificates are not a controlled version.
3. This certificate is based on the contract, (Project No. PRJC-567077-2017-PRC-IND), agreed between DNV GL and Shavo Norgren (India) Pvt. Ltd.
4. Shavo Norgren (India) Pvt. Ltd. shall ensure the Management of Functional Safety is maintained.
5. DNV GL shall be notified of any changes to the product that may impact on this certificate during the period of validity.
6. The use of this certificate is subject to the 'certificate agreement' for Functional Safety Certification.
7. This certificate remains the property of DNV GL and shall be returned upon request.

Other valid terms and conditions are found in the DNVGL Agreement.

END OF CERTIFICATE