LSM PUMPER
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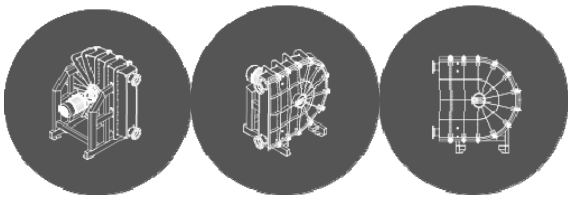

USERS GUIDE FOR LSM – PUMPS TYPE

10
15
19
25
32
40
50
65
80
100
125
150
200

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Declaration of conformity

LSM PUMPER
Sigenvej 7
DK 9760 Vrå

DECLARATION OF CONFORMITY

We **LSM** declare under our sole responsibility than the products

LSM 10, LSM 15

LSM 19, LSM 25, LSM 32, LSM 40, LSM 50, LSM 65, LSM 80, LSM 100

LSM 150, LSM 200

To which this statement relates, are in conformity with the Council Directives on the approximation of the laws of the EC Member States relating to:

- Machinery (98/37/EC)
  EN 292-1 Basic terminology, methodology
  EN 292-2 Technical principles and specifications

- ATEX 94/9/EC (applies only to products with the ATEX mark on the nameplate)
  EN 1127-1 Explosive atmospheres – Explosion prevention and protection – Part 1: Basic concepts and methodology.
  EN 13463-1 Non-electrical equipment for potentially explosive atmospheres – Part 1 : Basic method and requirements.
  EN 13463-5 Non-electrical equipment for potentially explosive atmospheres – Part 5 : Protection by constructional safety 'c'

- Electromagnetic compatibility (89/336/EEC)

The machine is built according to the ATEX Equipment Group II. Category 2 G for use in zone 1 (EN 1127-1) (applies only to products with the ATEX mark on the nameplate)

The technical file no. 0006001, is retained by the notified body.

Vrå 2006-02-06

Leo Sørensen
Manufacturer

Conditions of usage

This pump is only to be used for pumping the products described in the LSM ATEX questionnaire.

The pump has had a risk assessment made, based on experience with known medias. The usage of the pump with medias other than the ones we have been made aware of removes the foundation of our risk assessment.

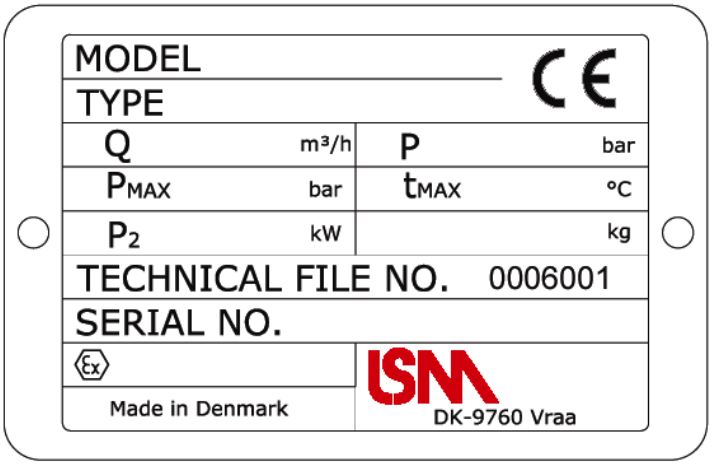
It is the users responsibility to inform us of this.

Prior to start-up of the pump, it is important to read the Installation Guide thoroughly.

Zones according to EN 60079-10

If there is a demand to place the pump within a certain zone, the Customer is required to handover a drawing showing the zones and boundaries.

Delivery / nameplate



The nameplate is marked with Model, type, CE and ATEX marking.

Note that if the Ex space is not filled, the pump is not ATEX approved.

When contacting us, please state the model, type and serial number.

The nameplate is usually placed on the backside of the pump.

If the pump is ATEX approved, it bears this marking:

II 2G c T5

Explanation to the symbolics:

'II' : Equipment Group II.

'2G' Category 2 equipment for use in areas, where flammable gasses, vapor or mists exists.

'c' : Protektion by constructional safety.

'T5': temperatureclass, see below.

Temperature Class for Equipment Group II G	
Temperature Class	Max. Surface temperature (°C)
T1	450
T2	300
T3	200
T4	135
T5	100
T6	85

Important ! :

In order for the pump to fulfil the demands for temperature Class T5, it is mandatory to install a dry run safety device in the pipeline immediately before the pump on the suction side. This safety device has to cut the motorpower when running dry of pumping media for more than 2 minutes.

In the pump housing there shall be an ATEX approved PT-100 sensor that measures the temperature inside the pump housing. The electrical control must be made so that the motor current is cut off if the temperature exceeds 70°C[1].

[1] Previously this read : *´By the Atex-pump there is built in a dry run safety switch, which disconnects the motor Power whenever it runs dry of Glycol.'*

Plan of conservation

No measure has been taken to store the pump for a longer period of time. At delivery, the pump is as standard painted or Hot galvanized. The internal parts in the pump housing are generally protected from corrosion by the Glycol.

Upon reception of the pump or spare parts, the items should be unpacked and stored in a suitable dry facility until it is installed at the end customer.

General design / Usage

The LSM hose pump features:

- Low energy consumption
- It's uncomplicated to perform maintenance on.
- It can make a precise dosing.
- It's able to pump medias with a high dynamic viscosity.
- The pump is very versatile in its areas of usage. It's area of usage covers practically all "wet" medias, ranging from Industrial fish plants, wastewater treatment plants over Chemical industry to combined power and heating stations.

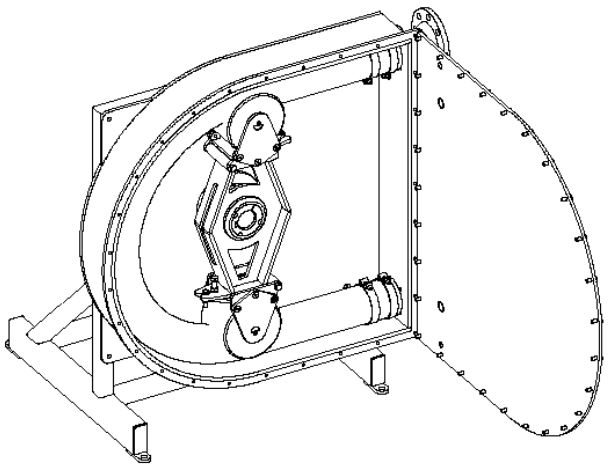
Construction and function principle

Construction

The pump consists of a rigid metal frame, which enables the pump to be firmly installed on it's underlying foundation.

The pump housing is made of metal on all models, except LINE 2000, which is made out of Poly-ureathane.

On the endplate of the pump housing, the connection points are placed. As standard they come with Treaded pipe, but can also be delivered as a Standard (ISO) flange or a hose nipple.



The pump housing can be opened by unscrewing the screws in the front of the housing. On the bigger models the front of the housing does not come off completely, but has hinges in the side.

When dismanteling the front plate of the pump, it is important to ensure that the pump is securely fastend to it's foundation. If the pump is not properly fastend, there is a risk of the pump tilting over (if the front plate is hinged).

The same causion is to be taken when dismantling a gear or motor from the pump housing.

In the housing of the pump the hose is fitted by means of hose clamps..

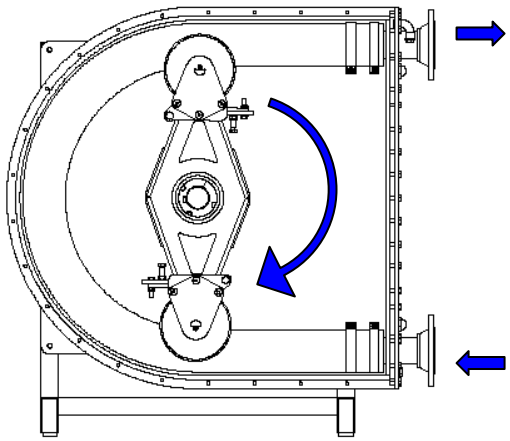
Centrally in the housing, the rotor is fitted.

Normally the rotor is connected directly to the gear shaft. Some models are also available with a separate shaft and bearing housing, where the gear shaft is connected to the shaft to the rotor by a coupling.

On the outer part of the rotor the rollers are placed.

Functioning principle

The rollers on the rotor are adjusted outwards, so that they compress the hose fully. (See maintenance guide for adjusting the rollers correctly)



When the rotor turns, the roller will run on the hose, pressing the hose flat underneath the roller. The movement of the roller will push any fluid in front of the roller, forward.

Also there will be created a vacuum behind the roller, which makes the pump self-priming. For the pump to be self-priming there has to be sufficient fluid present at the intake.

In some cases there can be a pulsating effect because of the mentioned vacuum. Fitting a LSM pulsation damper in the pipeline can reduce this.

Technical Data

	LINE 2000		LINE 2000C								BIG FLOW	
R P M	45		35				30					20
TYPE	**10**	**15**	**19**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**150**	**200**
Flow capacity [l/min]	2.25	5	11	22	44	83	130	290	470	920	2300	3900
Working pressure [bar]	6	6	6	6	6	6	6	6	5	5	5	5
Weight [kg]	23	23	45	55	112	180	210	250	400	700	1800	3000
Power limits [kW]	0.09 .. 0.55	0.09 .. 0.55	0.25 .. 0.55	0.25 .. 0.75	0.25 .. 0.75	0.37 .. 1.50	0.55 .. 2.20	2.2 .. 4.0	2.2 .. 5.5	4.0 .. 7.5	7.5 .. 22	18 .. 55
Glycol Quantity [l]	0.75	0.75	2	3	4	5	8	15	20	25	100	200

The pump is self-priming and can run dry for shorter periods, up to 5 min.

Motor:

The pump has a 3-phased asyncronous fan cooled motor, which has a rating that fits the pump size and performance. The size of the motor and the power consumption is calculated by LSM.

The motor must always have a protective switch fitted.

Gear:

The gear is carefully chosen and is specific to each customer. This enables LSM to choose a gear that fits the exact rpm needed for the pump. If the pumps gear comes with at variator, the oil level has to be checked at specific intervals, see the maintenance guide.

Hose:

The hose is per standard fitted with a hose made of natural Rubber.

The hose can be exchanged to another type e.g. food compliant, Chemical resistant a.o.

When handeling hoses for the LSM pump, there are certain safety rules to work by. These rules are placed in the back of this guide and should be read before attemting to handle a hose for the pump.

Capacity

Table 1 : flow [l / min]

Type	10	15	19	25	32	40	50	65	80	100	150
Q_1	0,05	0,11	0,314	0,54	1,26	2,37	4,31	9,66	15,66	30,83	78,2
RPM	**l/min.**	**l/min.**	**l/min.**	**l/min.**	**l/min.**	**l/min.**	**l/min.**	**l/min.**	**l/min.**	**l/min.**	**l/min.**
10	0,5	1,1	3,1	5,4	12,6	23,7	43	97	157	308	782
11	0,6	1,2	3,5	5,9	13,9	26,1	47	106	172	339	860
12	0,6	1,3	3,8	6,5	15,1	28,4	52	116	188	370	938
13	0,7	1,4	4,1	7,0	16,4	30,8	56	126	204	401	1.017
14	0,7	1,5	4,4	7,6	17,6	33,2	60	135	219	432	1.095
15	0,8	1,7	4,7	8,1	18,9	35,6	65	145	235	462	1.173
16	0,8	1,8	5,0	8,6	20,2	37,9	69	155	251	493	1.251
17	0,9	1,9	5,3	9,2	21,4	40,3	73	164	266	524	1.329
18	0,9	2,0	5,7	9,7	22,7	42,7	78	174	282	555	1.408
19	1,0	2,1	6,0	10,3	23,9	45,0	82	184	298	586	1.486
20	1,0	2,2	6,3	10,8	25,2	47,4	86	193	313	617	1.564
21	1,1	2,3	6,6	11,3	26,5	49,8	91	203	329	647	1.642
22	1,1	2,4	6,9	11,9	27,7	52,1	95	213	345	678	1.720
23	1,2	2,5	7,2	12,4	29,0	54,5	99	222	360	709	1.799
24	1,2	2,6	7,5	13,0	30,2	56,9	103	232	376	740	1.877
25	1,3	2,8	7,9	13,5	31,5	59,3	108	242	392	771	1.955
26	1,3	2,9	8,2	14,0	32,8	61,6	112	251	407	802	2.033
27	1,4	3,0	8,5	14,6	34,0	64,0	116	261	423	832	2.111
28	1,4	3,1	8,8	15,1	35,3	66,4	121	270	438	863	2.190
29	1,5	3,2	9,1	15,7	36,5	68,7	125	280	454	894	2.268
30	1,5	3,3	9,4	16,2	37,8	71,1	129	290	470	925	2.346
31	1,6	3,4	9,7	16,7	39,1	73,5	134	299	485	956	
32	1,6	3,5	10,0	17,3	40,3	75,8	138	309	501	987	
33	1,7	3,6	10,4	17,8	41,6	78,2	142	319	517	1.017	
34	1,7	3,7	10,7	18,4	42,8	80,6	147	328	532	1.048	
35	1,8	3,9	11,0	18,9	44,1	83,0	151	338	548	1.079	
36	1,8	4,0	11,3	19,4	45,4	85,3					
37	1,9	4,1	11,6	20,0	46,6	87,7					
38	1,9	4,2	11,9	20,5	47,9	90,1					
39	2,0	4,3	12,2	21,1	49,1	92,4					
40	2,0	4,4	12,6	21,6	50,4	94,80					
41	2,1	4,5	12,9								
42	2,1	4,6	13,2								
43	2,2	4,7	13,5								
44	2,2	4,8	13,8								
45	2,3	5,0	14,1								
46	2,3	5,1	14,4								
47	2,4	5,2	14,8								
48	2,4	5,3	15,1								
49	2,5	5,4	15,4								
50	2,5	5,5	15,7								
51	2,6	5,6	16,0								
52	2,6	5,7	16,3								
53	2,7	5,8	16,6								
54	2,7	5,9	17,0								
55	2,8	6,1	17,3								
56	2,8	6,2	17,6								
57	2,9	6,3	17,9								

Q_1 is the pumps displacement in l

Table 2 : m² per hour

Type	10	15	19	25	32	40	50	65	80	100	150
RPM	m³/h	m³/h	m³/h	m³/h	m³/h	m³/h	m³/h	m³/h	m³/h	m³/h	m³/h
10	0,030	0,066	0,188	0,32	0,76	1,42	2,6	5,8	9,4	18,5	47,4
11	0,033	0,073	0,207	0,36	0,83	1,56	2,8	6,4	10,3	20,3	52,1
12	0,036	0,079	0,226	0,39	0,91	1,71	3,1	7,0	11,3	22,2	56,9
13	0,039	0,086	0,245	0,42	0,98	1,85	3,4	7,5	12,2	24,0	61,6
14	0,042	0,092	0,264	0,45	1,06	1,99	3,6	8,1	13,2	25,9	66,4
15	0,045	0,099	0,283	0,49	1,13	2,13	3,9	8,7	14,1	27,7	71,1
16	0,048	0,106	0,301	0,52	1,21	2,28	4,1	9,3	15,0	29,6	75,8
17	0,051	0,112	0,320	0,55	1,29	2,42	4,4	9,9	16,0	31,4	80,6
18	0,054	0,119	0,339	0,58	1,36	2,56	4,7	10,4	16,9	33,3	85,3
19	0,057	0,125	0,358	0,62	1,44	2,70	4,9	11,0	17,9	35,1	90,1
20	0,060	0,132	0,377	0,65	1,51	2,84	5,2	11,6	18,8	37,0	94,8
21	0,063	0,139	0,396	0,68	1,59	2,99	5,4	12,2	19,7	38,8	99,5
22	0,066	0,145	0,414	0,71	1,66	3,13	5,7	12,8	20,7	40,7	104,3
23	0,069	0,152	0,433	0,75	1,74	3,27	5,9	13,3	21,6	42,5	109,0
24	0,072	0,158	0,452	0,78	1,81	3,41	6,2	13,9	22,6	44,4	113,8
25	0,075	0,165	0,471	0,81	1,89	3,56	6,5	14,5	23,5	46,2	118,5
26	0,078	0,172	0,490	0,84	1,97	3,70	6,7	15,1	24,4	48,1	123,2
27	0,081	0,178	0,509	0,87	2,04	3,84	7,0	15,6	25,4	49,9	128,0
28	0,084	0,185	0,528	0,91	2,12	3,98	7,2	16,2	26,3	51,8	132,7
29	0,087	0,191	0,546	0,94	2,19	4,12	7,5	16,8	27,2	53,6	137,5
30	0,090	0,198	0,565	0,97	2,27	4,27	7,8	17,4	28,2	55,5	142,2
31	0,093	0,205	0,584	1,00	2,34	4,41	8,0	18,0	29,1	57,3	
32	0,096	0,211	0,603	1,04	2,42	4,55	8,3	18,5	30,1	59,2	
33	0,099	0,218	0,622	1,07	2,49	4,69	8,5	19,1	31,0	61,0	
34	0,102	0,224	0,641	1,10	2,57	4,83	8,8	19,7	31,9	62,9	
35	0,105	0,231	0,659	1,13	2,65	4,98	9,1	20,3	32,9	64,7	
36	0,108	0,238	0,678	1,17	2,72	5,12					
37	0,111	0,244	0,697	1,20	2,80	5,26					
38	0,114	0,251	0,716	1,23	2,87	5,40					
39	0,117	0,257	0,735	1,26	2,95	5,55					
40	0,120	0,264	0,754	1,30	3,02	5,69					
41	0,123	0,271	0,772								
42	0,126	0,277	0,791								
43	0,129	0,284	0,810								
44	0,132	0,290	0,829								
45	0,135	0,297	0,848								
46	0,138	0,304	0,867								
47	0,141	0,310	0,885								
48	0,144	0,317	0,904								
49	0,147	0,323	0,923								
50	0,150	0,330	0,942								
51	0,153	0,337	0,961								
52	0,156	0,343	0,980								
53	0,159	0,350	0,999								
54	0,162	0,356	1,017								
55	0,165	0,363	1,036								
56	0,168	0,370	1,055								
57	0,171	0,376	1,074								

The above values apply to water. By other medias the capacity can vary mainly from the difference in Dynamic viscosity.

Noise

The pump has a very low noise level and does generally not require additional noise reducing measures.

Cleaning

Motor:

The cabling is to be checked every 6 month. Dust on the motor should be removed because it can cause the cooling of the motor to be reduced. The cooling fan should be checked for failure or beginning rupture.

For other matters please view the motor suppliers maintenance guide. This is supplied together with the pump.

Warning: When dismantling the motor, make sure that the motor does not fall down.

Other equipment

Below is mentioned the accessories that is available to nearly all of the pumps in the programme.

- Hose rupture indicator
- Pulsation damper
- Vacuum pump.
- Dry run safety device for Glycol
- Temperature indicator
- Frequency inverter
- Gear Variator

Security rules concerning Rubber hoses for LSM Pumps

(Should be read before using the pump)

STANDARD PRODUCTS (natural rubber, EPDM & SBR)

PRODUCTION SAFETY DATALIST

PRODUCT: Extruded and/or form casted rubber.

CHEMICAL COMBINES: Vulcanised rubber-mixtures based on natural and synthetic polymers.

ADDITIVES AND MIXING SUBSTANCES: Besides the polymers, the rubber contains varius standard rubber chemicals such as filler, vulcanising accelerators, vulcanising substances, protection remedies etc.
Some of these chemicals have been decomposed in connection with the manufacturing and the vulcanising process. The final vulcanised product can be considered one mass when evaluating the risks.

COMMERCIAL UPTAKE LIMITS:

Dust from burnishing rubber 10 mg/m3
Steam from hot rubber 0,75 mg/m3

INDUSTRIAL HYGIENE:

CONTACT WITH SKIN: Some people may be liable to get a skin infection when in contact with rubber products for a longer period of time. Ordinary industrial hygiene or blocking lotion should be able to prevent this.

CONTACT WITH EYES: Rubber particles should be treated the same way as any foreign body.

CONSUMPTION: Must not occur.

INHALATION: When the rubber is hot, fumes may appear which must not be inhaled. This may also appear when sawing and polishing.

SAFETY EQUIPMENT: Is not necessary. Safety glasses are recommended when sawing. Local ventilation is recommended where dust or smoke is produced during further manufacturing, sawing, melting etc.

STORAGE: Under ordinary storage conditions. Avoid extreme temperatures, sunlight and flames.

RENOVATION: Use an approved renovation firm. Destruction should take place in a special melting furnace at high temperatures.

IN CASE OF FIRE: Burning rubber causes thick, black smoke and toxic fumes. Wear gas masks.
Extinct the fire with CO2 powder, foam or water spray.

FLOURO POLYMERS (VITON)

PRODUCTION SAFETY DATALIST

PRODUCT: Extruded and/or form casted rubber.

CHEMICAL COMBINES: Vulcanised rubber-mixtures based on synthetic polymers containing flourine.

ADDITIVES AND MIXING SUBSTANCES: Besides the polymers, the rubber contains varius standard rubber chemicals such as filler, vulcanising accelerators, vulcanising substances, protection remedies etc.
Some of these chemicals have been decomposed in connection with the manufacturing and the vulcanising process. The final vulcanised product can be considered one mass when evaluating the risks.

COMMERCIAL UPTAKE LIMITS:

Dust from burnishing rubber 10 mg/m3
Steam from hot rubber 0,75 mg/m3

INDUSTRIAL HYGIENE: Do not mix tobacco products with dust or other articles. Do not smoke. Wash hands before breaks and by the end of the working day. Do not inhale fumes developed by hot articles.

CONTACT WITH SKIN: Some people may be liable to get a skin infection when in contact with rubber products for a longer period of time. Ordinary industrial hygiene or blocking lotion should be able to prevent this.

CONTACT WITH EYES: Rubber particles should be treated the same way as any foreign body.

CONSUMPTION: Must not occur.

INHALATION: When the rubber is heated, fumes may appear which must not be inhaled. This may also occur when sawing and polishing.

SAFETY EQUIPMENT: Is not necessary. Safety glasses are recommended when sawing takes place with grinding methods. Local ventilation is recommended where dust or smoke is produced during further manufacturing, sawing, melting etc.

STORAGE: Under ordinary storage conditions. Avoid extreme temperatures, sunlight and flames.

RENOVATION: Must be carried out in accordance with local regulations. Can be destructed by using a purifier to remove hafnium if this is in accordance with local regulations.

IN CASE OF FIRE: Fire may cause hafnium to generate. In such case one should carry a closed breathing device and safety clothing. Use neopren gloves when handling fire waste where viton has been involved.

FIRE APPLIANCES: Water, carbon dioxide (CO_2), foam or dry powder. Burning rubber causes thick, black smoke and toxic fumes. Wear gas masks.
Extinct the fire with CO_2 powder, foam or water spray.

POLYCLOROPRENE, HYPALON, NITRILLE, POLYORETHANE, AND HALOBOTYL.

PRODUCTION SAFETY DATALIST

PRODUCT: Extruded and/or form casted rubber.

CHEMICAL COMBINES: Vulcanised rubber-mixtures based on natural and synthetic polymers which may contain halogen and/or nitrogen components.

ADDITIVES AND MIXING SUBSTANCES: Besides the polymers, the rubber contains varius standard rubber chemicals such as filler, vulcanising accelerators, vulcanising substances, protection remedies etc.
Some of these chemicals have been decomposed in connection with the manufacturing and the vulcanising process. The final vulcanised product can be considered one mass when evaluating the risks.

COMMERCIAL UPTAKE LIMITS:

Dust from burnishing rubber 10 mg/m3
Steam from hot rubber 0,75 mg/m3

INDUSTRIAL HYGIENE:

CONTACT WITH SKIN: Some people may be liable to get a skin infection when in contact with rubber products for a longer period of time. Ordinary industrial hygiene or blocking lotion should be able to prevent this.

CONTACT WITH EYES: Rubber particles should be treated the same way as any foreign body.

CONSUMPTION: Must not occur.

INHALATION: When the rubber is heated, it may cause fumes to appear which must not be inhaled. This may also occur when sawing and burnishing.

SAFETY EQUIPMENT: Is not necessary. Safety glasses are recommended when sawing takes place with grinding methods. Local ventilation is recommended where dust or smoke is produced during further manufacturing, sawing, melting etc.

STORAGE: Under ordinary storage conditions. Avoid extreme temperatures, sunlight and flames.

RENOVATION: Use an approved renovation firm. Destruction must take place in a special melting furnace at high temperatures and with a built-in acid disengager.

IN CASE OF FIRE: Burning rubber causes thick, black smoke and toxic fumes. One should wear gas masks.Extinguish the fire with CO2 powder, foam or water spray.
The presence of halogen will cause toxic glasses when burned.