

# FLAMEBLOCKER N2XH 0.6/1(1.2)kV

VDE 0276-604; VDE 0276-627

– Halogen- free low smoke power cables



## Applications:

XLPE insulated and halogen-free thermoplastic compound sheathed power and auxiliary control cables for the supply of electrical energy. Special for installations where fire and emissions of smoke and toxic fumes create a potential threat. Special outdoor installation in the open air, in underground, suitable for installation directly in the ground, indoors, in cable ducts. Not suitable for use in water

Standard length cable packing: 1000m on drums. Other forms of packing and delivery are available on request

## Construction

### Conductors

Annealed copper solid class 1(RE), circular or circular compacted stranded conductor class 2 (RM) or stranded sector – shaped conductor class 2 (SM) acc. to EN 60228

### Insulation

Special XLPE compound type 2X11 acc. to DIN VDE 0276-604

### Inner covering

Filling compound

### Sheath

Thermoplastic halogen- free compound type HM4 according to DIN VDE 0276-604

### Colour of sheath:

black ( other colours, included in standard RAL pallet available at customer request as (N)2XH)

HD 308 S2 (other colours available at customer request)

### Core identification

1-core

#### N2XH-J

with protective conductor

Green-yellow

#### N2XH-O

without protective conductor

Black

2-core

-

Blue, brown

3-core

Green-yellow, blue, brown

Brown, black, grey

3-core\*

Blue, brown, black

4-core

Green-yellow, brown, black, grey

Blue, brown, black, grey

4-core\*

Green-yellow, blue, brown, black

5-core

Green-yellow, blue, brown, black, grey

Blue, brown, black, grey, black

6 core and more

Green-yellow, other cores black with numbering

Black with white numbering

\* For certain applications only.

note: other insulation colours possible as version (N)2XH

## Characteristic

Maximum conductor operating temperature

+90°C

Lowest ambient temperature for fixed installation

-40°C

Highest ambient temperature for fixed installation

+70°C

Lowest installation temperature

-5°C

Maximum short-circuit conductor temperature

+250°C

Minimum bending radius

15 x D single core cables,  
12 x D multicore cables, D – overall diameter

Max. permissible tensile stress with cable grip for Cu-conductor

50 N/mm<sup>2</sup>

UV resistant

EN ISO 4892-2

## Fire performance

<b>Flame retardant</b>	IEC 60332-1-2, IEC 60332-3-24
<b>Smoke density</b>	IEC 61034-2 light transmittance values: s1, s1b, without CPR class >60 % s1a >80 %
<b>Gases evolved during combustion</b>	BS EN 60754-2, EN 60754-2, pH ≥ 4,3; conductivity ≤ 2,5 μS/mm BS EN 60754-1 HCL ≤ 0,5 %
<b>CPR – class reaction to fire (acc EN 50575)</b>	B2ca (fulfilled as well class Cca), Dca

## Approvals

VDE, GOST

## Parameters

Number and cross-sectional area of conductor	Nominal insulation thickness	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at temperature 20°C	Caloric load	CPR – class reaction to fire
<b>n × mm<sup>2</sup></b>	<b>mm</b>	<b>mm</b>	<b>kg/km</b>	<b>Ω/km</b>	<b>kWh/m</b>	
1x1.5RM	0.7	5.4	47	12.1	0.24	-
1x1.5RE	0.7	5.2	45	12.1	0.22	-
1x2.5RE	0.7	5.5	56	7.41	0.24	-
1x2.5RM	0.7	5.8	60	7.41	0.27	-
1x4RM	0.7	6.3	77	4.61	0.32	-
1x4RE	0.7	6	73	4.61	0.28	-
1x6RM	0.7	6.7	97	3.08	0.34	-
1x6RE	0.7	6.5	94	3.08	0.31	-
1x10RM	0.7	7.6	141	1.83	0.41	B2ca
1x10RE	0.7	7.3	136	1.83	0.37	B2ca
1x16RM	0.7	8.6	202	1.15	0.49	B2ca
1x16RE	0.7	8.2	194	1.15	0.44	B2ca
1x25RM	0.9	10.5	303	0.727	0.69	B2ca
1x35RM	0.9	11.6	399	0.524	0.79	B2ca
1x50RM	1.0	13.1	527	0.387	0.95	B2ca
1x70RM	1.1	14.6	731	0.268	1.15	B2ca
1x95RM	1.1	16.8	992	0.193	1.4	B2ca
1x120RM	1.2	18.4	1234	0.153	1.65	B2ca
1x150RM	1.4	20.2	1513	0.124	2.01	B2ca
1x185RM	1.6	22.5	1885	0.0991	2.46	B2ca
1x240RM	1.7	25.2	2421	0.0754	2.89	B2ca
1x300RM	1.8	27.4	3013	0.0601	3.39	B2ca
1x400RM	2.0	30.5	3868	0.047	4.04	B2ca
1x500RM	2.2	34.3	4939	0.0366	4.96	B2ca
1x630RM*	2.4	38.7	6267	0.0283	6.05	-
1x800RM*	2.6	43.9	7907	0.0221	7.33	-
1x1000RM*	2.8	47.5	9808	0.0176	8.49	-
2x1.5RM	0.7	9.9	144	12.1	0.54	B2ca
2x1.5RE	0.7	9.5	135	12.1	0.5	B2ca
2x2.5RE	0.7	10.3	168	7.41	0.57	B2ca
2x2.5RM	0.7	10.8	181	7.41	0.63	B2ca
2x4RM	0.7	11.8	231	4.61	0.73	B2ca

## Parameters

Number and cross-sectional area of conductor	Nominal insulation thickness	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at temperature 20°C	Caloric load	CPR – class reaction to fire
<b>n × mm<sup>2</sup></b>	<b>mm</b>	<b>mm</b>	<b>kg/km</b>	<b>Ω/km</b>	<b>kWh/m</b>	
2x4RE	0.7	11.2	214	4.61	0.65	B2ca
2x6RM	0.7	12.5	281	3.08	0.79	B2ca
2x6RE	0.7	12.2	271	3.08	0.75	B2ca
2x10RE	0.7	13	350	1.83	0.82	B2ca
2x10RM	0.7	13.6	369	1.83	0.9	B2ca
2x16RM	0.7	15.8	535	1.15	1.16	B2ca
2x16RE	0.7	15	504	1.15	1.04	B2ca
2x25RM	0.9	20.4	861	0.727	1.86	B2ca
2x35RM	0.9	22.7	1122	0.524	2.24	B2ca
2x50RM	1.0	25.7	1473	0.387	2.74	B2ca
2x70RM*	1.1	29.0	1976	0.268	3.42	B2ca
2x95RM*	1.1	33.3	2623	0.193	4.26	B2ca
2x120RM*	1.2	36.7	3364	0.153	5.13	-
2x150RM*	1.4	40.6	4129	0.124	6.27	-
2x240RM*	1.7	50.8	6591	0.0754	9.39	-
2x35RM+16RE	0.9 / 0.7	21.8	1209	0.524 / 1.15	2.14	-
2x50RM+25RM	1.0 / 0.9	25.6	1660	0.387 / 0.727	2.82	-
3x1.5RM	0.7	10.4	162	12.1	0.61	B2ca
3x1.5RE	0.7	10.2	159	12.1	0.56	B2ca
3x2.5RM	0.7	11.3	207	7.41	0.71	B2ca
3x2.5RE	0.7	10.8	194	7.41	0.64	B2ca
3x4RM	0.7	12.4	270	4.61	0.83	B2ca
3x4RE	0.7	11.8	253	4.61	0.73	B2ca
3x6RM	0.7	13.2	337	3.08	0.89	B2ca
3x6RE	0.7	12.8	325	3.08	0.83	B2ca
3x10RE	0.7	13.7	436	1.83	0.92	B2ca
3x10RM	0.7	14.4	456	1.83	1.01	B2ca
3x16RM	0.7	16.8	670	1.15	1.3	B2ca
3x16RE	0.7	15.9	637	1.15	1.16	B2ca
3x25RM	0.9	21.6	1076	0.727	2.09	B2ca
3x35SM	0.9	21.3	1236	0.524	2.01	B2ca
3x35RM	0.9	24.1	1418	0.524	2.51	B2ca
3x50SM	1.0	23.8	1632	0.387	2.47	B2ca
3x70SM	1.1	27.7	2301	0.268	3.16	B2ca
3x70RM	1.1	31.2	2614	0.268	3.92	B2ca
3x95SM	1.1	30.8	3089	0.193	3.74	B2ca
3x95RM	1.1	35.6	3519	0.193	4.82	B2ca
3x120SM	1.2	33.9	3849	0.153	4.47	B2ca
3x120RM	1.2	39.3	4377	0.153	5.79	B2ca
3x150SM	1.4	37.8	4742	0.124	5.55	B2ca
3x150RM	1.4	43.5	5379	0.124	7.05	B2ca
3x185SM	1.6	41.8	5883	0.0991	6.75	B2ca
3x185RM	1.6	48.2	6668	0.0991	8.55	B2ca
3x240RM	1.7	54.6	8636	0.0754	10.54	-
3x240SM	1.7	46.9	7657	0.0754	8.25	-
3x300RM	1.8	59.1	10623	0.0601	12.23	-
3x300SM	1.8	51.3	9462	0.0601	9.51	-
3x4RE+2.5RE	0.7 / 0.7	12.4	285	4.61 / 7.41	0.82	-
3x6RE+4RE	0.7 / 0.7	13.6	373	3.08 / 4.61	0.94	-
3x10RE+6RE	0.7 / 0.7	14.5	499	1.83 / 3.08	1.03	-

## Parameters

Number and cross-sectional area of conductor	Nominal insulation thickness	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at temperature 20°C	Caloric load	OPR – class reaction to fire
<b>n × mm<sup>2</sup></b>	<b>mm</b>	<b>mm</b>	<b>kg/km</b>	<b>Ω/km</b>	<b>kWh/m</b>	
3x16RE+10RE	0.7 / 0.7	16.8	737	1.15 / 1.83	1.3	-
3x25RM+16RE	0.9 / 0.7	22.6	1238	0.727 / 1.15	2.32	B2ca
3x25RM+16RM	0.9 / 0.7	22.8	1245	0.727 / 1.15	2.35	B2ca
3x35SM+16RE	0.9 / 0.7	23.9	1419	0.524 / 1.15	2.35	B2ca
3x35SM+16RM	0.9 / 0.7	23.9	1424	0.524 / 1.15	2.37	B2ca
3x35RM+16RE	0.9 / 0.7	24.5	1573	0.524 / 1.15	2.76	B2ca
3x35RM+16RM	0.9 / 0.7	24.7	1580	0.524 / 1.15	2.8	B2ca
3x35RM+25RM	0.9 / 0.9	25.8	1681	0.524 / 0.727	2.96	B2ca
3x50RM+25RM	1.0 / 0.9	28.7	2143	0.387 / 0.727	3.59	-
3x50SM+25RM	1.0 / 0.9	26.9	1918	0.387 / 0.727	3	B2ca
3x70SM+35RM	1.1 / 0.9	31.2	2683	0.268 / 0.524	3.78	-
3x70SM+35SM	1.1 / 0.9	30	2674	0.268 / 0.524	3.66	B2ca
3x95RM+50RM	1.1 / 1.0	37.2	3994	0.193 / 0.387	5.52	-
3x95SM+50SM	1.1 / 1.0	33.6	3583	0.193 / 0.387	4.42	B2ca
3x95SM+50RM	1.1 / 1.0	34.8	3600	0.193 / 0.387	4.5	B2ca
3x120RM+70RM	1.2 / 1.1	41.2	5051	0.153 / 0.268	6.69	-
3x120SM+70SM	1.2 / 1.1	36.8	4537	0.153 / 0.268	5.29	B2ca
3x150RM+70RM	1.4 / 1.1	44.9	6068	0.124 / 0.268	8.09	-
3x150SM+70SM	1.4 / 1.1	41.4	5460	0.124 / 0.268	6.53	B2ca
3x185RM+95RM	1.6 / 1.1	50.1	7612	0.0991 / 0.193	9.83	-
3x185SM+95SM	1.6 / 1.1	45.4	6842	0.0991 / 0.193	7.84	B2ca
3x240SM+120SM	1.7 / 1.2	51.2	8869	0.0754 / 0.153	9.6	B2ca
3x300SM+150SM	1.8 / 1.4	56.6	10982	0.0601 / 0.124	11.38	B2ca
3x300SM+70SM	1.8 / 1.1	56.4	10226	0.0601 / 0.268	10.76	B2ca
4x1.5RE	0.7	10.7	177	12.1	0.64	B2ca
4x1.5RM	0.7	11.1	187	12.1	0.7	B2ca
4x2.5RE	0.7	11.6	228	7.41	0.73	B2ca
4x2.5RM	0.7	12.2	243	7.41	0.82	B2ca
4x4RE	0.7	12.7	301	4.61	0.84	B2ca
4x4RM	0.7	13.4	321	4.61	0.96	B2ca
4x6RE	0.7	13.9	394	3.08	0.97	B2ca
4x6RM	0.7	14.3	407	3.08	1.03	B2ca
4x10RE	0.7	15.2	546	1.83	1.11	B2ca
4x10RM	0.7	15.9	569	1.83	1.23	B2ca
4x16RE	0.7	17.4	794	1.15	1.34	B2ca
4x16RM	0.7	18.4	832	1.15	1.52	B2ca
4x25RM	0.9	23.9	1346	0.727	2.51	B2ca
4x35SM	0.9	23.9	1601	0.524	2.52	B2ca
4x35RM	0.9	26.4	1776	0.524	3.03	B2ca
4x50SM	1.0	26.9	2124	0.387	3.14	B2ca
4x50RM	1.0	30.2	2366	0.387	3.79	B2ca
4x70RM	1.1	34.6	3314	0.268	4.84	-
4x70SM	1.1	31.4	3009	0.268	4.08	B2ca
4x95RM	1.1	39.5	4472	0.193	5.95	-
4x95SM	1.1	35	4051	0.193	4.84	B2ca
4x120SM	1.2	38.9	5060	0.153	5.77	B2ca
4x120RM	1.2	43.5	5580	0.153	7.28	-
4x150SM	1.4	43	6215	0.124	7.14	B2ca
4x150RM	1.4	48.2	6845	0.124	8.74	B2ca
4x185RM	1.6	53.5	8494	0.0991	10.62	-

## Parameters

Number and cross-sectional area of conductor	Nominal insulation thickness	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at temperature 20°C	Caloric load	CPR – class reaction to fire
<b>n × mm<sup>2</sup></b>	<b>mm</b>	<b>mm</b>	<b>kg/km</b>	<b>Ω/km</b>	<b>kWh/m</b>	
4x185SM	1.6	47.4	7710	0.0991	8.64	B2ca
4x240RM	1.7	60.6	11002	0.0754	13.07	-
4x240SM	1.7	53.3	10045	0.0754	10.59	B2ca
4x300RM	1.8	65.6	13565	0.0601	15.17	-
4x300SM	1.8	58.1	12428	0.0601	12.25	B2ca
4x25RM+16RE	0.9 / 0.7	25	1539	0.727 / 1.15	2.98	B2ca
4x25RM+16RM	0.9 / 0.7	25.2	1540	0.727 / 1.15	3.02	B2ca
4x35RM+16RE	0.9 / 0.7	27.3	1959	0.524 / 1.15	3.46	B2ca
4x35RM+16RM	0.9 / 0.7	27.5	1966	0.524 / 1.15	3.5	B2ca
4x50RM+25RM	1.0 / 0.9	32.2	2694	0.387 / 0.727	4.57	B2ca
4x70RM+35RM	1.1 / 0.9	36.4	3712	0.268 / 0.524	5.7	B2ca
4x95RM+50RM	1.1 / 1.0	41.6	5007	0.193 / 0.387	7.07	B2ca
4x120RM+70RM	1.2 / 1.1	46.3	6345	0.153 / 0.268	8.63	-
4x150RM+70RM	1.4 / 1.1	50.5	7712	0.124 / 0.268	10.38	-
4x150RM+95RM	1.4 / 1.1	51.5	7888	0.124 / 0.193	10.61	-
4x185RM+95RM	1.6 / 1.1	56.7	9726	0.0997 / 0.193	12.81	-
4x240RM+120RM	1.7 / 1.2	63.6	12391	0.0754 / 0.153	15.59	-
4x300RM+150RM <sup>1</sup>	1.8 / 1.4 (4.8)	73.8	15858	0.0601 / 0.124	19.3	-
5x1.5RE	0.7	11.5	206	12.1	0.76	B2ca
5x1.5RM	0.7	12	219	12.1	0.84	B2ca
5x2.5RE	0.7	12.5	268	7.41	0.88	B2ca
5x2.5RM	0.7	13.2	286	7.41	0.99	B2ca
5x4RE	0.7	12.9	327	4.61	0.93	B2ca
5x4RM	0.7	13.8	350	4.61	1.08	B2ca
5x6RE	0.7	14.6	457	3.08	1.08	B2ca
5x6RM	0.7	14.7	452	3.08	1.17	B2ca
5x10RE	0.7	17.0	680	1.83	1.38	B2ca
5x10RM	0.7	17.4	690	1.83	1.53	B2ca
5x16RE	0.7	19.4	993	1.15	1.68	B2ca
5x16RM	0.7	20.1	1053	1.15	1.9	B2ca
5x25RM	0.9	26.1	1646	0.727	3.18	B2ca
5x35RM	0.9	29.2	2187	0.524	3.82	B2ca
5x50RM	1.0	33.8	2958	0.387	4.88	B2ca
5x70RM	1.1	38	4066	0.268	6.01	B2ca
5x95RM	1.1	43.7	5521	0.193	7.5	B2ca
5x120RM	1.2	48.2	8434	0.153	9.04	B2ca
5x150RM	1.4	53.4	8421	0.124	11.14	-
5x150SM*	1.4	47.1	7669	0.124	8.66	-
5x185RM	1.6	59.7	9594	0.0991	13.74	-
5x185SM*	1.6	52.2	9576	0.0991	10.59	-
5x240RM	1.7	67.4	13621	0.0754	16.88	-
5x240SM*	1.7	58.1	12433	0.0754	-	-
6x1.5RE*	0.7	12.6	243	12.1	0.93	-
6x2.5RE*	0.7	13.4	309	7.41	1.03	-
7x1.5RE	0.7	12.3	248	12.1	0.87	Dca
7x1.5RM	0.7	12.9	262	12.1	0.97	Dca
7x2.5RE	0.7	13.4	328	7.41	1	Dca
7x2.5RM	0.7	14.2	349	7.41	1.14	Dca
7x4RM	0.7	14.9	439	4.61	1.25	-
7x4RE	0.7	14	413	4.61	1.07	Dca

## Parameters

Number and cross-sectional area of conductor	Nominal insulation thickness	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at temperature 20°C	Caloric load	OPR – class reaction to fire
<b>n × mm<sup>2</sup></b>	<b>mm</b>	<b>mm</b>	<b>kg/km</b>	<b>Ω/km</b>	<b>kWh/m</b>	
8x1.5RE*	0.7	12.9	276	12.1	1	Dca
8x2.5RE*	0.7	14.7	382	7.41	1.16	Dca
8x6RM*	0.7	17.2	663	3.08	1.64	-
9x1.5RE*	0.7	13.8	319	12.1	1.17	Dca
10x1.5RE	0.7	15	342	12.1	1.18	Dca
10x1.5RM	0.7	15.8	363	12.1	1.32	Dca
10x2.5RE	0.7	17.1	478	7.41	1.47	Dca
10x2.5RM	0.7	17.8	497	7.41	1.61	Dca
10x4RE	0.7	18.2	613	1.07	1.2	Dca
12x1.5RE	0.7	15.8	387	12.1	1.35	Dca
12x1.5RM	0.7	16.6	410	12.1	1.51	Dca
12x2.5RE	0.7	17.5	530	7.41	1.60	Dca
12x2.5RM	0.7	18.6	563	7.41	1.83	Dca
14x1.5RE	0.7	16.4	428	12.1	1.48	Dca
14x2.5RE	0.7	18.4	596	7.41	1.74	Dca
14x4RE	0.7	19.7	781	4.61	1.95	Dca
16x1.5RE	0.7	17.5	485	12.1	1.71	Dca
16x2.5RE	0.7	19.3	666	7.41	1.32	Dca
19x1.5RE	0.7	18	534	12.1	1.82	Dca
19x2.5RE	0.7	20.2	748	7.41	2.18	Dca
20x2.5RE	0.7	21.4	801	7.41	2.35	Dca
24x1.5RE	0.7	21.3	687	12.1	2.37	Dca
24x2.5RE	0.7	23.5	978	7.41	2.74	Dca
27x1.5RE*	0.7	21.4	728	12.1	2.47	-
28x2.5RE	0.7	24.8	1075	7.41	3.01	-
30x1.5RE	0.7	22.4	802	12.1	2.73	Dca
30x2.5RE	0.7	24.5	1100	7.41	3.1	Dca
30x4RE*	0.7	27.3	1538	4.61	3.65	-
37x1.5RE*	0.7	23.7	930	12.1	3.12	Dca
37x2.5RE*	0.7	26.9	1338	7.41	3.79	Dca
40x1.5RE	0.7	24.5	994	12.1	3.36	Dca
40x2.5RE	0.7	27.6	1433	7.41	4.08	Dca

\*based on norm (N)2XH

<sup>1</sup> reduced core insulated to the diameter of the phase cores

## Current ratings\*

Operating temperature at conductor 90°C; ambient air temperature 30°C

Installation	 1)		
Number of loaded cores	<b>1</b>	<b>3</b>	<b>3</b>
		<b>Laying in air</b>	
Cross-section, mm <sup>2</sup>	Current ratings in Ampere (A)		
1,5	33	24	26
2,5	43	32	34
4	57	42	44
6	72	53	56
10	99	74	77
16	131	98	102
25	177	133	138
35	217	162	170
50	265	197	207
70	336	250	263
95	415	308	325
120	485	359	380
150	557	412	437
185	646	475	507
240	774	564	604
300	901	-	697
400	1060	-	811
500	1252	-	940
630	1486	-	1083
800	1751	-	1228
1000	2039	-	1368

<sup>1)</sup> Rated current for direct current systems with a far-distanced return conductor

Operating temperature at conductor 90°C; ambient air temperature 30°C

Installation	 1)		
Number of loaded cores	1	3	3
		Laying in air	
<b>Cross-section, mm<sup>2</sup></b>		<b>Current ratings in Ampere (A)</b>	
1.5	48	31	33
2.5	63	40	42
4	82	52	54
6	102	64	67
10	136	86	89
16	176	112	115
25	229	145	148
35	275	174	177
50	326	206	209
70	400	254	256
95	480	305	307
120	548	348	349
150	616	392	393
185	698	444	445
240	815	517	517
300	927	-	583
400	1064	-	663
500	1227	-	749
630	1421	-	843
800	1638	-	935
1000	1869	-	1023

<sup>1)</sup> Rated current for direct current systems with a far-distanced return conductor

## Current ratings for control cables – HD 627 S1

Number of loaded cores	3
	Laying in air
<b>Cross-section, mm<sup>2</sup></b>	<b>Current ratings in Ampere (A)</b>
1.5	25
2.5	33
4	43

The values are referred to the following basic conditions

Laying in ground	Laying in air		
Ground temperature at installation depth	20°C	Ambient temperature	30°C
Load factor	0.7	Load factor	1.0
Soil-thermal resistivity of moist area	1.0 K · m/W	Arrangement: free in air, protection against direct solar radiation, no external heat sources, unrestricted dissipation of heat	
Soil-thermal resistivity of dry area	2.5 K · m/W		
Laying depth	0.7 m		

### Correction factors for various ambient air temperatures

Ambient temperature, °C	10	15	20	25	30	35	35	40	45	50
Rating factor	1.15	1.12	1.08	1.04	1.00	0.96	0.96	0.91	0.87	0.82

### Conversion factors for multicore cable ( $\geq 5$ cores)

The conversion factors are to be used for laying the cables in ground or in air, to the values given in above tables

Number of loaded cores	Laying in air
5	0.75
7	0.65
10	0.55
14	0.50
19	0.45
24	0.40
40	0.35
61	0.30

Note: valid for cross-section 1.5 to 10 mm<sup>2</sup>

\* As defined in DIN VDE 0276-604, DIN VDE 0276-627, HD 604 S1, HD 627 S1 && DIN VDE 0276-603, DIN VDE 0276-627, HD 603 S1, HD 627 S1.

### Conversion factors for deviating ambient temperature defined in DIN VDE 0298 part 4.