TECHINICAL INFORMATION

IEC 61238-1 Compression and Mechanical Connectors for Power Cables for rated voltages up to 30 kV (Um = 36 kV).

DONG-A Terminal Lug "PPIO & PPIT" type, PPEO & PPET Type(see page E4~E15) are complied with IEC61238-1 requirements and they have been carried out the tests according to "Class A" of IEC61238-1.

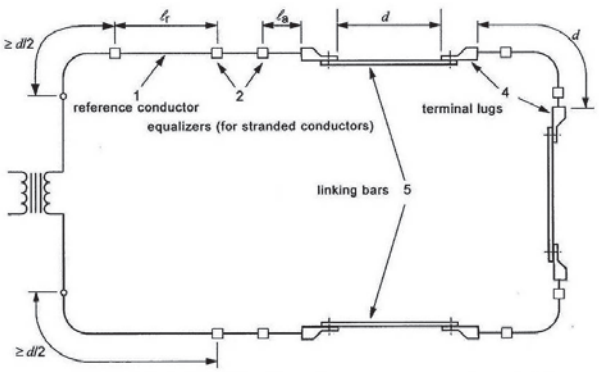
1. Scope and object of IEC61238-1
   Compression and mechanical connectors for power cables for rated voltages up to 30kV(Um=36kV), e.g. burried cables or cables installed in buildings, having
   a) conductors complying with IEC60228 and IEC60228A with cross-sectional areas 10mm^2 and greater for copper and 16mm^2 and greater for aluminum,
   b) a maximum continuous conductor temperature not exceeding 90℃

   Class A
   These are connectors intended for electricity distribution or industrial networks in which they can be subjected to short-circuits of relatively high intensity and duration. As a consequence, Class A connectors are suitable for the majority of applications.

   Class B
   These are connectors for networks in which overloads or short-circuits are rapidly cleared by the installed protective devices, e.g. fast-acting fuses.

   Depending on the application, the connectors are subjected to the following tests :
   Class A : heat cycle, short-circuit tests and mechanical tests.
   Class B : heat cycle tests only.

2. IEC 61238-1 Class A Test Process.
   Installation : All conductors of the same cross-sectional area in the test loop shall be taken from the same continuous core and installed in a location where the air calm and the ambient temperature between 15℃ and 30℃



Typical test circuit for through connectors and terminal lugs

where

$d \geq 80\sqrt{A}$ or 500 mm, whichever is the greater

A is the corresponding conductor cross-sectional area, in mm^2

$\ell_r \geq \ell_a + \ell_b + \ell_j$ (for ℓ_j, see Figure 3)

For stranded conductors:

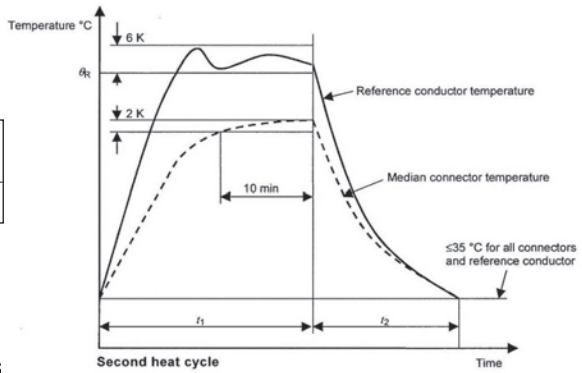
$\ell_a, \ell_b \approx 15\sqrt{A}$ or 150 mm, whichever is the greater

- Heat Cycle Test - Total 1000 cycles required.
  - First heat cycle :
    Current is circulated in the test loop, bringing the reference conductor to 120℃ at equilibrium.
    Equilibrium is defined as the moment when the reference conductor and the connectors do not vary in temperature by more than ±2 K for 15 min.if the temperature of the median connector is equal to or greater than 100℃ the reference conductor temperature for subsequent heat cycles shall be deemed to be 120℃
    if not, then the current shall be increased until the median connector temperature reaches 100℃ at equilibrium, subject to the reference conductor temperature not exceeding 140℃ If the temperature of the median connector does not reach 100℃ even with a reference conductor temperature of 140℃ the test shall be continued at that temperature.

TECHINICAL INFORMATION

- Second heat cycle :
  The second heat cycle is to determine the heat cycle duration and temperature profile which will be used on the test loop for all subsequent heat cycles. Current is circulated in the loop until the main reference conductor temperature reaches the value θ_R determined in first heat cycle, with a tolerance of +6/0 K and the median connector temperature is stable within a band of 2K over a 10 min period.
  An elevated current may be used to reduce the heating period.

Nominal conductor cross-sectional area, A	mm²	Al Cu	16≤A≤50 10≤A≤35	50≤A≤150 35≤A≤95	150≤A≤630 95≤A≤400	A>630 A>400
Time	min		5	10	15	20

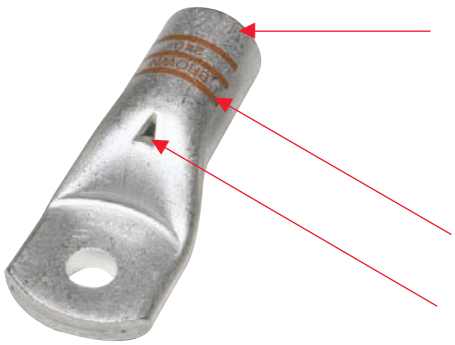


- Subsequent heat cycles :
  Measurements shall be made at the following cycles (Class
  0 (before the first heat cycle)
  200 cycles, before short-circuit
  200 cycles, after short-circuit
  250
  Then every 75 cycles
  (in total 14 measurements)

• Short-circuit tests (for Class A connectors only).
  Six short-circuits are applied after the 200th heat cycle.
  The short-circuit current level shall be such that it raises the bare reference conductors from a temperature of ≤ 35℃ to a temperature between 250℃ and 270℃
  The maximum temperature, time and approximate current, or the actual current and time, used for the short-circuit test, shall be recorded and stated in the test report. After each short-circuit, the test loop shall be cooled to a temperature ≤ 35℃

• Mechanical Tests.
  The conductor lengths, between connector and tensile test machine jaws, shall be ≥500mm.
  The rate of application of the load shall not exceed 10N per square millimetre of cross-sectional area and per second up to the value in copper 60 x Aa(mm²) : maximum 20000N, which is then maintained for 1 min.

• Quality Products.



Barrel Diameter : Type of conductors -
- compacted.
- non-compacted.
- flexible(class 5 and 6, according to IEC60228)
- number and arrangement of strands.

Color coding on the barrel for easy selection of crimping dies.

Eye-hole(inspection hole)

• Quality Approved by DnV(Det Norske Veritas).
  Certificate No : E-10595
  Application : Cable shoes for installation inside switchboards/ enclosures onboard ships and mobile offshore units.

TERMINAL LUG - Comply with IEC61238-1

COPPER CABLES ONLY

- Available wire range : IEC standard cables of Metric Cables.
- Color coded on the barrel to eliminate errors during installation and select to easy crimping dies.
- Material : High Conductivity copper per 99.9% up with Electro-Tin Plated.
- Voltage Rating : 35kV

GOST

ONE-HOLE(ROUND TYPE)

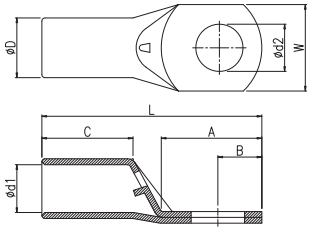


Fig. 1

UL listed

Certificate No : E-11820

ONE-HOLE(SQUARE TYPE)

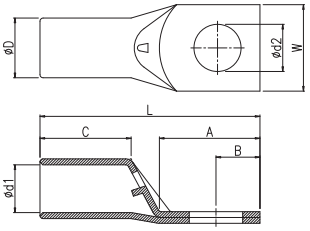


Fig. 2

Wire Range Metric ㎟ CODE	Wire Range Metric ㎟ FLEX	Part No.	Stud Size	Dimension W	ø D	ø d1	ø d2	A	B	C 1-S	C 2-L	L 1-S	L 2-L	Dies Part No.(※) ㎟	Drawing
0.75	0.75	PPEO0000.75 - xx03 -	3	6.5	2.8	1.3	3.3	8.2	4	6		17		DATH-40 TOOL	Fig 1 Fig 2
		- xx04 -	4				4.3								
		- xx05 -	5	9			5.4	10.5	5			19			
1.5	1.5	PPEO0001.5 - xx03 -	3	6.5	3.3	1.8	3.3	8.5	4	6		17			
		- xx04 -	4				4.3								
		- xx05 -	5	9			5.4	10.5	5			19			
		- xx06 -	6				6.4	12.5	6			21			
2.5	2.5	PPEO0002.5 - xx03 -	3	6.5	4.2	2.3	3.3	8.5	4	6		17			
		- xx04 -	4				4.3								
		- xx05 -	5	9			5.4	10.5	5			19			
		- xx06 -	6				6.4	12.5	6			21			
		- xx08 -	8	13			8.4	17	8			25.5			
4	4	PPEO0004 - xx03 -	3	6.5	5	3	3.3	8.5	4	8		19.5			
		- xx04 -	4				4.3								
		- xx05 -	5	9.5			5.4	10.5	5			21.5			
		- xx06 -	6				6.4	12.5	6			23.5			
		- xx08 -	8	13			8.4	17	8			28			
6	6	PPEO0006 - xx04 -	4	7.5	5.5	3.5	4.4	10	4	10		21.5		DATH-60 TOOL	
		- xx05 -	5	9.5			5.4	13	6			26			
		- xx06 -	6				6.4								
		- xx08 -	8	15.5			8.4	17	8			30			
		- xx10 -	10				10.5								
10	10	PPEO0101 - xx05 -	5	9.5	6.6	4.6	5.4	14	6.2	15	21	33	39	DCI3 - 0010C	
		- xx06 -	6				6.4								
		- xx08 -	8	15.5			8.4	20	8.2			39	45		
		- xx10 -	10				10.5								
		- xx12 -	12	18			13	23	10.7			43	49		
16	16	PPEO0102 - xx05 -	5	10.5	7.5	5.5	5.4	14	6.2	15	21	33	39	DCI3 - 0016C	
		- xx06 -	6				6.4								
		- xx08 -	8	15.5			8.4	20	8.2			39	45		
		- xx10 -	10				10.5								
		- xx12 -	12	18			13	23	10.7			43	49		
25	25	PPEO0103 - xx05 -	5	13.5	9.5	7.2	5.4	17	7	17	23	40	46	DCI3 - 0025C	
		- xx06 -	6				6.4								
		- xx08 -	8				8.4								
		- xx10 -	10	15.5			10.5	23	10.7			44	50		
		- xx12 -	12	18			13								
35		PPEO0104 - xx05 -	5	16	11	8.5	5.4	20	9.3	20	26	46	52	DCI3 - 0035C	
		- xx06 -	6				6.4								
		- xx08 -	8				8.4								
		- xx10 -	10				10.5								
		- xx12 -	12	18			13	23	10.7			50	56		
	35	- xx05-F	5	17	12	8.8	5.4	22	10	20	26	48	54	DCI3 - 0035F	Fig 1 Fig 2 Fig 3 Fig 4 Fig 5
		- xx06-F	6				6.4								
		- xx08-F	8				8.4								
		- xx10-F	10				10.5								
		- xx12-F	12				13								
50		PPEO0105 - xx05 -	5	17.5	12	9.5	5.4	22	10.7	20	35	50	65	DCI3 - 0050C	
		- xx06 -	6				6.4								
		- xx08 -	8				8.4								
		- xx10 -	10				10.5								
		- xx12 -	12				12.2								
		- xx14 -	14	24.5			15	28	13			55	70		
		- xx16 -	16				17								
	50	PPEO0106 - xx05 -	5	19	13.2	10.2	5.4	25	11	20	35	52	67	DCI3 - 0050F	
		- xx06 -	6				6.4								
		- xx08 -	8				8.4								
		- xx10 -	10				10.5								
		- xx12 -	12				13								
		- xx14 -	14	24			15	28	13			55	70		
		- xx16 -	16				17								
70		PPEO0107 - xx08 -	8	21	14.5	11.2	8.4	25	11	22	35	54	67	DCI3 - 0070C	
		- xx10 -	10				10.5								
		- xx12 -	12				13								
		- xx14 -	14	25			15	28	13			57	70		
		- xx16 -	16				17								
	70	PPEO0108 - xx08 -	8	23	16	12.5	8.4	31	14.5	24	40	64	80	DCI3 - 0070F	
		- xx10 -	10				10.5								
		- xx12 -	12				13								
		- xx14 -	14				15								
		- xx16 -	16				17								

(※) Dies No : See detail page E44~E45

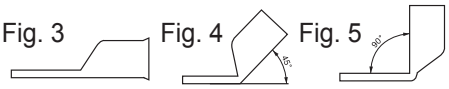
TERMINAL LUG - Comply with IEC61238-1

HOW TO ORDER

PPEO 0101 - X X 0 5 - F

- Barrel I.D/see drawing
- Stud Size
- Wire Part
- Tongue Form — R ; Round Type / S ; Square Type
- Barrel Form — S ; One(1) Clamping Type / L ; Two(2) Clamping Type
- Product Part — PPEO ; One(1)-Hole Type / PPET ; Double(2)-Hole Type

Fig. 3 Fig. 4 Fig. 5



For Flex, Conductor(Belled End)

Wire Range Metric ㎟ CODE	Wire Range Metric ㎟ FLEX	Part No.	Stud Size	Dimension W	ø D	ø d1	ø d2	A	B	C 1-S	C 2-L	L 1-S	L 2-L	Dies Part No.(※) ㎟	Drawing
95		PPEO0109 - xx08 -	8	24.5	17	13.3	8.4	31	14.5	29	40	69	80	DCI3 - 0095C	Fig 1 Fig 2 Fig 3 Fig 4 Fig 5
		- xx10 -	10				10.5								
		- xx12 -	12				13								
		- xx14 -	14				15								
		- xx16 -	16				17								
	95	- xx08-F	8	26	18	14	8.4	30	14	29	37	69	82	DCI3 - 0095F	
		- xx10-F	10				10.5								
		- xx12-F	12				13								
		- xx14-F	14				15								
		- xx16-F	16				17								
120		PPEO0110 - xx08 -	8	27.5	19	15.2	8.4	31	14.5	29	50	70	90	DCI3 - 0120C	
		- xx10 -	12				10.5								
		- xx12 -	12				13								
		- xx14 -	14				15								
		- xx16 -	16				17								
150	120	PPEO0111 - xx08 -	8	31	21	16.8	8.4	31	14.5	32	50	77	94	DCI3 - 0150C -0120F	
		- xx10 -	10				10.5								
		- xx12 -	12				13								
		- xx14 -	14				15								
		- xx16 -	16				17								
		- xx08-F	8	31	22	17.5	8.4	35	16	30	45	80	95		
		- xx10-F	10				10.5								
		- xx12-F	12				13								
		- xx14-F	14				15								
		- xx16-F	16				17								
185	150	PPEO0112 - xx10 -	10	34	23.5	18.5	10.5	33	14.5	35	50	83	98	DCI3 - 0185C -0150F	
		- xx12 -	12				13								
		- xx14 -	14				15								
		- xx16 -	16				17								
		- xx20 -	20				21	37	16.5			87	102		
200	185	PPEO0113 - xx10 -	10	37.5	25	20	10.5	33	14.5	40	50	88	98	DCI3 - 0200C -0185F	
		- xx12 -	12				13								
		- xx14 -	14				15								
		- xx16 -	16				17								
		- xx20 -	20				21	37	16.5			92	102		
	200	- xx10-F	10	37.5	26	20.5	10.5	38	18	40	51	94	105		
		- xx12-F	12				13								
		- xx14-F	14				15								
		- xx16-F	16				17								
		- xx20-F	20				21								
240		PPEO0114 - xx10 -	10	40.5	28	22	10.5	34	14.5		50		102	DCI3 - 0240C DSI3 - 0240C	
		- xx12 -	12				13								
		- xx14 -	14				15								
		- xx16 -	16				17								
		- xx18 -	18				19								
		- xx20 -	20				21	46	22				114		
		- xx24 -	24				25								
300	240	PPEO0115 - xx10 -	10	43.5	30.5	24	10.5	36	15		54		110	DCI3 - 0300C -0240F DSI3 - 0300C	
		- xx12 -	12				13								
		- xx14 -	14				15								
		- xx16 -	16				17								
		- xx20 -	20				21	48	22				122		
		- xx24 -	24				25								
	300	- xx10-F	10	46	32	25	10.5	48	22		57		125	DSI3 - 0300F	
		- xx12-F	12				13								
		- xx14-F	14				15								
		- xx16-F	16				17								
		- xx20-F	20				21								
		- xx24-F	24				25								
400		PPEO0116 - xx12 -	12	49	34	26.5	13	36	15		57		127	DSI3 - 0400C	
		- xx14 -	14				15								
		- xx16 -	16				17								
		- xx20 -	20				21	48	24				131		
		- xx24 -	24				25								
500		PPEO0117 - xx12 -	12	56.5	40	30	13	36	15		60		122	DSI3 - 500C	
		- xx14 -	14				15								
		- xx16 -	16				17								
		- xx20 -	20				21	48	24				135		
		- xx24 -	24				25								
630		PPEO0118 - xx12 -	12	64.5	45	35.5	13	48	23		70		150	DSI3 - 0630C	
		- xx14 -	14				15								
		- xx16 -	16				17								
		- xx20 -	20				21								
		- xx24 -	24				25								

(※) Dies No : See detail page E44~E45

TERMINAL LUG - Comply with IEC61238-1

COPPER CABLES ONLY

- Available wire range : IEC standard cables of Metric Cables.
- Color coded on the barrel to eliminate errors during installation and select to easy crimping dies. (IEC61238:2003)
- Material : High Conductivity copper per 99.9% up with Electro-Tin Plated.
- Voltage Rating : 35kV

GOST

TWO-HOLE(ROUND TYPE)

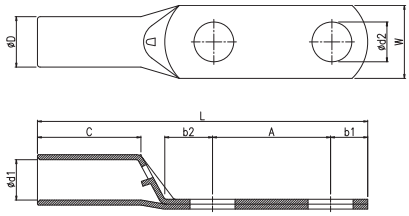


Fig. 1

UL listed

DNV·GL

Certificate No : E-11820

TWO-HOLE(SQUARE TYPE)

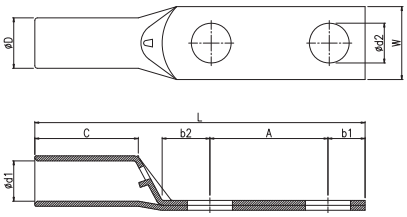


Fig. 2

Wire Range Metric ㎟ CODE	Wire Range Metric ㎟ FLEX	Part No.	Stud Size	Dimension W	Dimension ø D	Dimension ø d1	Dimension ø d2	Dimension A	Dimension b1=b2 ±2	Dimension C 1-S	Dimension C 2-L	Dimension L 1-S	Dimension L 2-L	Dies Part No.(※) ㎟	Drawing
10	10	PPET0201 - xx05 -	5	9	6.6	4.6	5.4	16	8	15	30	52	67	DCI3 - 0010C	Fig 1 Fig 2 Fig 3 Fig 4 Fig 5
		- xx06 -	6				6.4								
		- xx08 -	8	15			8.4	19	14			67	82		
		- xx10 -	10				10.5								
		- xx12 -	12	19.5			13	22				70	85		
16	16	PPET0202 - xx05 -	5	15	7.5	5.5	5.4	16	8	15	30	52	67	DCI3 - 0016C	
		- xx06 -	6				6.4								
		- xx08 -	8				8.4	19	14			67	82		
		- xx10 -	10				10.5								
		- xx12 -	12	19.5			13	22				70	85		
25	25	PPET0203 - xx05 -	5	13	9.5	7.2	5.4	16	8	17	33	54	70	DCI3 - 0025C	
		- xx06 -	6				6.4								
		- xx08 -	8				8.4	19	14			70	86		
		- xx10 -	10	15			10.5								
		- xx12 -	12	19.5			13	22				73	89		
35		PPET0204 - xx05 -	5	16	11	8.5	5.4	19	9	20	33	62	75	DCI3 - 0035C	
		- xx06 -	6				6.4								
		- xx08 -	8				8.4		14			72	85		
		- xx10 -	10				10.5								
		- xx12 -	12	19.5			13	22				75	88		
	35	- xx05-F	5	17	12	8.8	5.4	44.5	14	20	40	97	117	DCI3 - 0035F	
		- xx06-F	6				6.4								
		- xx08-F	8				8.4								
		- xx10-F	10				10.5								
		- xx12-F	12				13								
50		PPET0205 - xx05 -	5	17.5	12	9.5	5.4	44.5	14	20	35	97	112	DCI3 - 0050C	
		- xx06 -	6				6.4								
		- xx08 -	8				8.4								
		- xx10 -	10				10.5								
		- xx12 -	12				13								
		- xx14 -	14	24.5			15		17			103	115		
		- xx16 -	16				17								
	50	PPET0206 - xx05 -	5	19	13.2	10.2	5.4	44.5	14	20	35	100	115	DCI3 - 0050F	
		- xx06 -	6				6.4								
		- xx08 -	8				8.4								
		- xx10 -	10				10.5								
		- xx12 -	12				13								
		- xx14 -	14	24			15		17			106	121		
		- xx16 -	16				17								
70		PPET0207 - xx08 -	8	21	14.5	11.2	8.4	44.5	14	24	45	108	128	DCI3 - 0070C	
		- xx10 -	10				10.5								
		- xx12 -	12				13								
		- xx14 -	14	25			15		17			111	130		
		- xx16 -	16				17								
	70	PPET0208 - xx08 -	8	23	16	12.5	8.4	44.5	14	24	45	106	130	DCI3 - 0070F	
		- xx10 -	10				10.5								
		- xx12 -	12				13								
		- xx14 -	14				15		17			112	128		
		- xx16 -	16				17								
95		PPET0209 - xx08 -	8	25.5	17	13.3	8.4	44.5	14	24	40	106	122	DCI3 - 0095C	
		- xx10 -	10				10.5								
		- xx12 -	12				13								
		- xx14 -	14				15		17			112	128		
		- xx16 -	16				17								
	95	- xx08-F	8	26	18	14	8.4	44.5	14	24	47	112	135	DCI3 - 0095F	
		- xx10-F	10				10.5								
		- xx12-F	12				13								
		- xx14-F	14				15		17			115	138		
		- xx16-F	16				17								

(※) Dies No : See detail page E44~E45

TERMINAL LUG - Comply with IEC61238-1

HOW TO ORDER

PPET 0101 - X X 0 5 - F

- Barrel I.D/see drawing
- Stud Size
- Tongue Form — R ; Round Type / S ; Square Type
- Barrel Form — S ; One(1) Clamping Type / L ; Two(2) Clamping Type
- Serial Number
- Product Part — PPEO ; One(1)-Hole Type / PPET ; Double(2)-Hole Type

Fig. 3

For Flex, Conductor (Belled End)

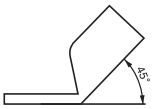


Fig. 4

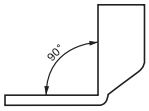


Fig. 5

Wire Range Metric ㎟ CODE	Wire Range Metric ㎟ FLEX	Part No.	Stud Size	Dimension W	ø D	ø d1	ø d2	A	b1=b2 ±2	C 1-S	C 2-L	L 1-S	L 2-L	Dies Part No.(※) ㎟	Drawing
120		PPET0210 - xx08 -	8	27.5	19	15.2	8.4	44.5	14	24	50	112	137	DCI3 - 0120C	Fig 1 Fig 2 Fig 3 Fig 4 Fig 5
		- xx10 -	10				10.5								
		- xx12 -	12				13								
		- xx14 -	14				15		17			115	140		
		- xx16 -	16				17								
150	120	PPET0211 - xx08 -	8	31	21	16.8	8.4	44.5	17	30	50	122	142	DCI3 - 0150C - 0120F	
		- xx10 -	10				10.5								
		- xx12 -	12				13								
		- xx14 -	14				15								
		- xx16 -	16				17								
		- xx08-F	8	31	22	17.5	8.4	44.5	17	30	50	124	147		
		- xx10-F	10				10.5								
		- xx12-F	12				13								
		- xx14-F	14				15								
		- xx16-F	16				17								
185	150	PPET0212 - xx10 -	10	34	23.5	18.5	10.5	44.5	17	35	50	129	144	DCI3 - 0185C - 0150F	
		- xx12 -	12				13								
		- xx14 -	14				15								
		- xx16 -	16				17								
		- xx20 -	20				21								
200	185	PPET0213 - xx10 -	10	37.5	25	20	10.5	44.5	17	35	50	129	144	DCI3 - 0200C - 0185F	
		- xx12 -	12				13								
		- xx14 -	14				15								
		- xx16 -	16				17								
		- xx20 -	20				21								
	200	- xx10-F	10	37.5	26	20.5	10.5	44.5	17	40	57	138	155		
		- xx12-F	12				13								
		- xx14-F	14				15								
		- xx16-F	16				17								
		- xx20-F	20				21								
240		PPET0214 - xx10 -	10	40.5	28	22	10.5	44.5	17	40	57	142	159	DCI3 - 00240C DSI3 - 00240C	
		- xx12 -	12				13								
		- xx14 -	14				15								
		- xx16 -	15				17								
		- xx20 -	20				21		20			147	162		
		- xx24 -	24				25								
300	240	PPET0215 - xx10 -	10	43.5	30.5	24	10.5	44.5	20		60		162	DCI3 - 0300C - 0240F DSI3 - 0300C	
		- xx12 -	12				13								
		- xx14 -	14				15								
		- xx16 -	16				17								
		- xx20 -	20				21								
		- xx24 -	24				25								
	300	- xx10-F	10	46	32	25	10.5	44.5	20		66		168	DSI3 - 0300F	
		- xx12-F	12				13								
		- xx14-F	14				15								
		- xx16-F	16				17								
		- xx20-F	20				21								
		- xx24-F	24				25								
400		PPET0216 - xx12 -	12	49	34	26.5	13	44.5	21		66		168	DSI3 - 0400C	
		- xx14 -	14				15								
		- xx16 -	16				17								
		- xx20 -	20				21								
		- xx24 -	24				25								
500		PPET0217 - xx12 -	12	56.5	40	30	13	44.5	21	60	73	173	189	DSI3 - 0500C	
		- xx14 -	14				15								
		- xx16 -	16				17								
		- xx20 -	20				21								
		- xx24 -	24				25								
630		PPET0218 - xx12 -	12	64.5	45	35.5	13	44.5	23		70		195	DSI3 - 0630C	
		- xx14 -	14				15								
		- xx16 -	16				17								
		- xx20 -	20				21								
		- xx24 -	24				25								

(※) Dies No : See detail page E44~E45