5100-5105 LOAD CELLS WITH STRAIN GAUGES

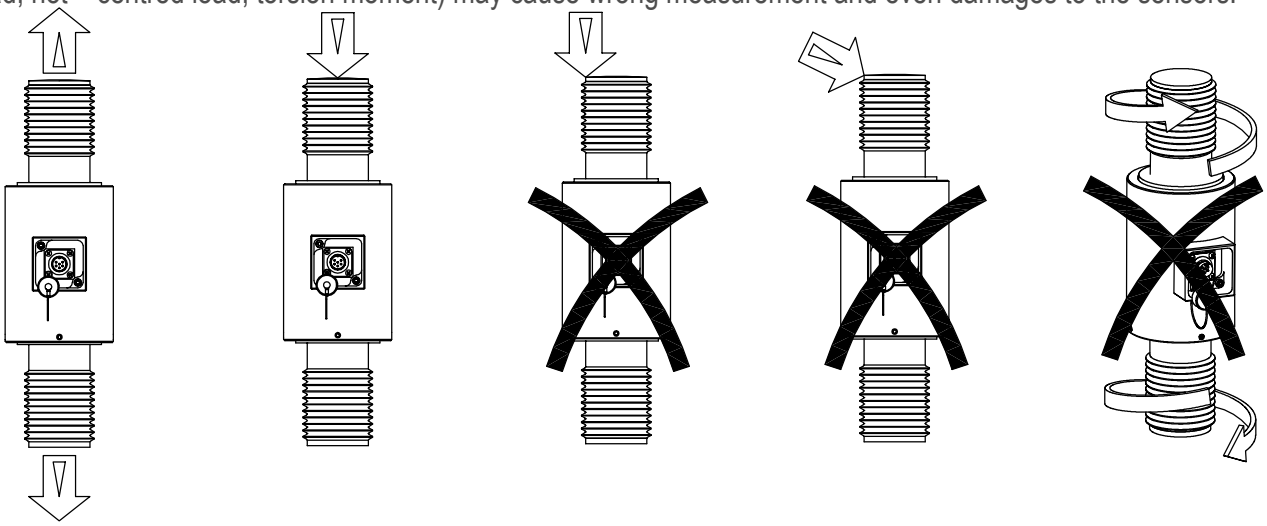
INSTRUCTIONS MANUAL

(This manual is applicable to load cells not provided with specific manual)

CE

1. CHOICE AND MOUNTING

The choice of a sensor must be done with the perfect knowledge of the application in which it has to be integrated. Focus need to put on capacity, mechanical conception, operating temperature, eventual vibrations and shocks, presence of chemical products, hazardous environment and overload.
Mounting is to be assured by skilled technician, in conformity with state-of-the-art mounting methods for each type of sensor. Among others: hardness, flatness and state of the bearing surfaces, adjustments, adapting parts, decoupling and control of the tightening.
The sensors are manufactured to assure a force measurement in the direction it has been engineered. They must be tightened in a way that their sensible axle corresponds to the direction of the force application. Either torsion and flexion moments or lateral interferences have to be prosecuted. Loading mistakes (non – axial load, not – centred load, torsion moment) may cause wrong measurement and even damages to the sensors.



All necessary precautions in terms of security have to be taken during load handling and use of tooling. The delivered cable cannot be lengthened, however it can be shortened. It is mandatory to connect the sensor to its electronic device according to the colour code specified on the sensor's data sheet, conform to the specifications of the electronic device in use.
The technician in charge of the installation will check the cable integrity after on-site mounting. Any damage on the cable sheath or on a wire implies its replacement by Sensy S.A.

2. MAINTENANCE

Sensors do not require particular maintenance. However, depending on requested performances, utilization and environmental conditions, it is necessary to perform following operation (check either particular instructions belonging to precise models):

- Clear the close area of the sensor
- Remove all objects that could cause effort transfer interferences (concrete, scrap iron, …)
- Protect against humidity and corrosive elements (ageing acceleration of the sensor)
- Keep from corrosion, especially electrolytic corrosion. Refurbish the oxidized elements (by sanding, painting, …)
- Control the cable integrity
- In order to guarantee the system performances and to control the measurement chain in its totality, perform at least once a year testing with duplicate standard forces. Re-calibrate if necessary
- Visual control of the mechanical parts and mounting (centring, wearing, dulling, …)

3. PARTICULAR PRECAUTIONS

Beyond the mechanical and electrical precautions and the necessary care for assembly, a particular attention has to be paid to following points:

3.1. Shock and overload protection

A sensor can be damaged when it has to sustain an overload between 1,5 and 3 times its nominal capacity. This overload can be static, but may also come from dynamic effects (shocks, vibrations, silo filling, …)

3.2. Electrical risk protection

Outdoor systems are particularly vulnerable to lightning hits. Sensor having sustained an over-voltage due to lightning can suffer from partially or totally damaged strain gauges, which will influence the performances. Indoor systems can also be subject to over-voltage (welding, grounding of electrical device, …) and have to be protected. Protecting the sensor has to be done by means of a by-pass through a grounding braid. In case of lightning risks, isolating electrically the sensor from the structure and its supports offers an additional protection.
An electronic protection has also to be considered, as far as it does not have any impact on the measurement precision (temperature drift, signal weakening, …)

3.3. Never weld on a structure equipped with sensors

If welding cannot be avoided, make sure that the current does not go through the sensor.

3.4. Protection against electrical perturbation;

Due to the low work voltage of the sensors, the measurement chain is to be kept from perturbations that can generate induced tensions and currents (make sure that it is placed away from magnetic fields, from power cables, use shielded cable).
It is important that all elements of the installation have the same grounding potential and that the grounding net does not generate perturbations and do not suffer from ground current circulation.

3.5. Protection against humidity and chemical products;

Sensor's electronic circuitry is highly sensible to corrosion. Use sensors with protection indexes (IP) corresponding to the environmental conditions and type of use, made of appropriated material that will not be influenced by these environmental conditions (some environments do represent an actual electrolyte with risk of galvanic couple between the sensor and other parts, made of different material, in the near area).

4. USE IN Ex ZONE

Use of sensors in Ex zone can only be done with Ex marked sensors, delivered with a certificate issued by an accredited organisation. Sensors must be used with appropriate safety material (Zener barrier) corresponding to the requested norms mentioned on the certificate.
The use of junction boxes and additional cable lengths must be considered in the choice of protection.
After having defined all elements, it is mandatory to control if the sensor's output tension is still compatible with the electronic device in use and the requested accuracy.

5. PERIODIC INSPECTIONS

1. Make sure by suitable means that the sensor and its mechanism are not subject to jamming. (At least an annual control)
2. Check the signal for a zero load. (Annually)
   Acceptable max. : ± 0.15 mV/V for resistive versions
   ± 6 mA for option C and J
   ± 0.8 V for option t
3. Make sure that the sensor was not victim of shocks (markings) or chemical attack (certain corrosive greases). If items 1 and 2 are not affected, preventive measures are sufficient. (Annually)
4. In case of doubt, fill in the diagnostic questionnaire provided in enclosure to the individual record sheet of the sensor and consult the manufacturer.
5. Check the integrity of the cable.
6. After any serious incident of operation, repeat operations 1 to 3.

6. USE FEATURES

			option C	option J	option t
Type		Resistive	4-20 mA 2 wires	4-20 mA 3 wires	1-5 V 3 wires
Compensated temperature range		From - 10° to + 45° C			
Operating temperature range		From - 30° to + 80° C			
Storage temperature range		From - 50° to + 85° C			
Power supply	**(VDC)**	5…10 …12	15 - 28	10- 30	10- 30
			not regulated	not regulated	not regulated
Bridge impedance	**(Ω)**	350 ±30	(5000)	(350)	(350)
Load impedance	**(Ω)**	NA	0,1 - 1k	0,1…0.3k	> 10k
Nominal signal range	**Min.**	0 - 0,5 mV/V	9 mA	4 - 9 mA	Nominal signal range
	Max.	0 - 1,7 mV/V	22 mA	4 - 22 mA	
Electrical saturation		> 2 mV/V	> 24 mA	> 24 mA	> 5.6 V
Normal drift (zero)	**%/°C**	< 0.01	< 0.03	< 0.03	< 0.03
Normal drift (span)	**%/°C**	< 0,01	< 0,025	< 0,025	< 0,02

7. GUARANTEE

The manufacturer's guarantee is applicable as far as mounting recommendations and general use principle, like above described, are respected.
For any particular use, not described in this document, it is mandatory to obtain a prior written agreement from SENSY S.A. for the validity of the guarantee

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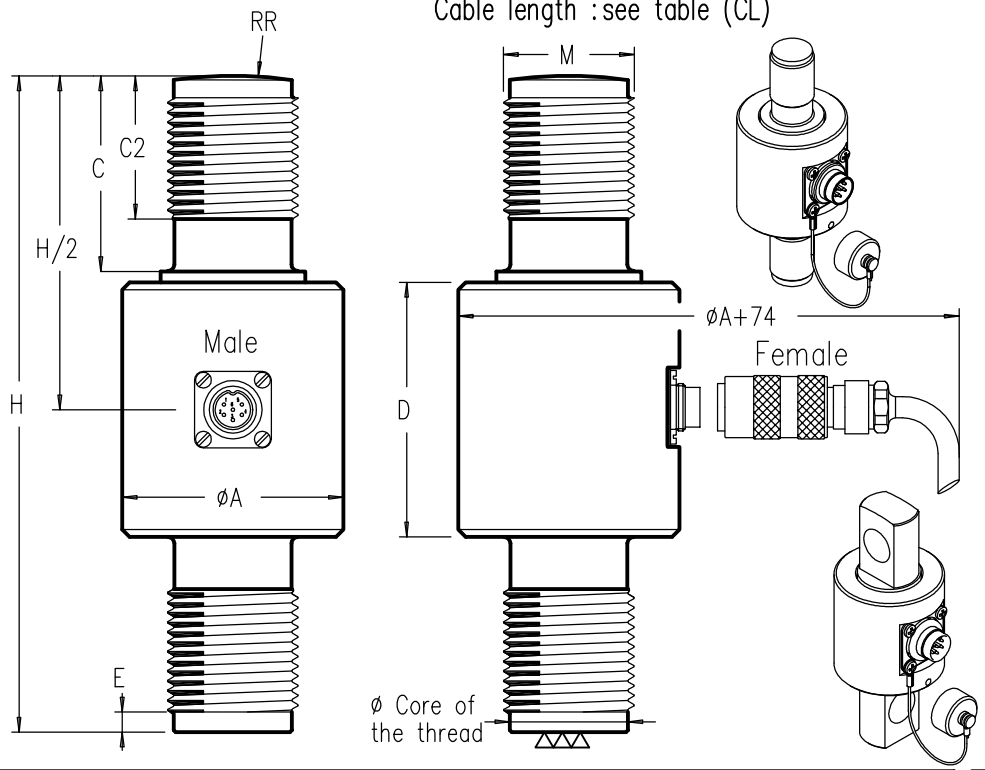
LOAD CELLS

model 5100 stainless steel
model 5105 alloy steel

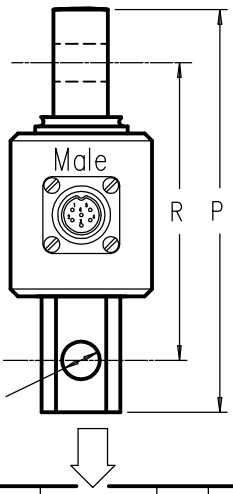
TENSION–COMPRESSION

Range 10kN–30MN (1–3000 t.) IP66
Cable length : see table (CL)

EN 10002

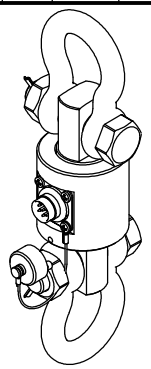


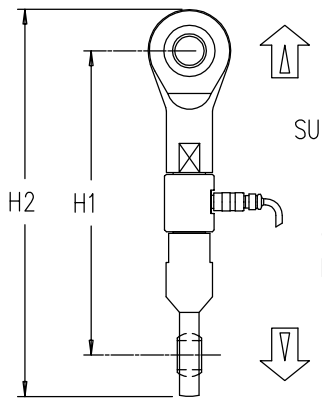
MODEL 5100L 5105L

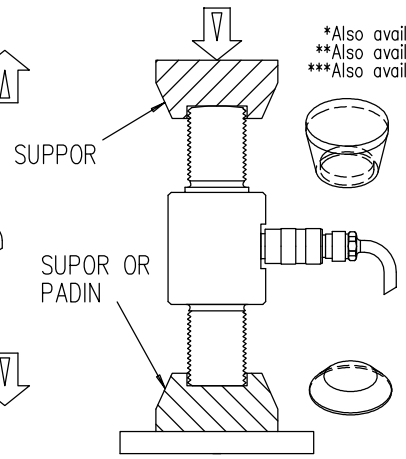


CAPACITIES	ØA	C	C2	D	E	H	RR	CL	M	H1	H2	Max.Deflexion	R Input
10 – 50 kN	50	36	26	47	3	125	75	3 m	M24x2	245	307	0.02–0.08 mm	±350 Ω
75 –100 kN	60	48	35	73	3	170	80	3 m	M30x2	320	402	0.13–0.15 mm	±350 Ω (0.25,0.1%) ±700 Ω (0.05%,0.03% or cl 1,cl 0.5,cl 00 to ISO 376
150–200 kN	75	49	44	87	4	190	350	6 m	*M45x3	398	510	0.14–0.16 mm	
300–500 kN	88.5	69	65	119	5	265	400	6 m	M64x4	560	740	0.19–0.25 mm	
0.75–1.5 MN	111	95	85	145	5	340	400	6 m	**M90x4	/	/	0.30–0.42 mm	
2 – 3 MN	150	128	128	165	7	430	600	6 m	***M125x4	/	/	0.35–0.65 mm	±700 Ω
5 MN	180	162	158	180	8	520	800	6 m	M160x6	/	/	0.73 mm	
7.5– 10 MN	220	185	185	210	10	590	1000	6 m	M200x6	/	/	0.83 mm	
15 MN	280	230	230	230	10	710	1200	12m	M250x6	/	/	1 mm	
20 MN	360	300	300	240	12	860	1500	12m	M330x6	/	/	1.2 mm	
30 MN	390	330	330	250	13	930	1500	12m	M360x6	/	/	1.6 mm	

CAPACIT.	P	CL	ØQ	R
2 – 3 t.	144	3 m	18	108
5 t.	160	3 m	24	112
7.5–10 t	240	3 m	35	170
15 –20 t	310	6 m	42	226
30 –50 t	430	6 m	58	290
75 –100t	520	12 m	80	348

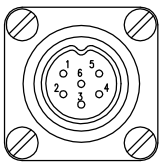






*Also available in M42x3
**Also available in M64x4 from 0.75–1MN
***Also available in M110x4

FEMALE–MALE CONNECTOR DIN 45322



CONTACT N°		
1	Excitation	– Yellow
2	Signal	+ Green
3	Signal	– White
4	Excitation	+ Brown
5	Sense	– Grey
6	Sense	+ Pink

Standard : Cable screen not connected to transducer
Option f : Cable screen connected to transducer

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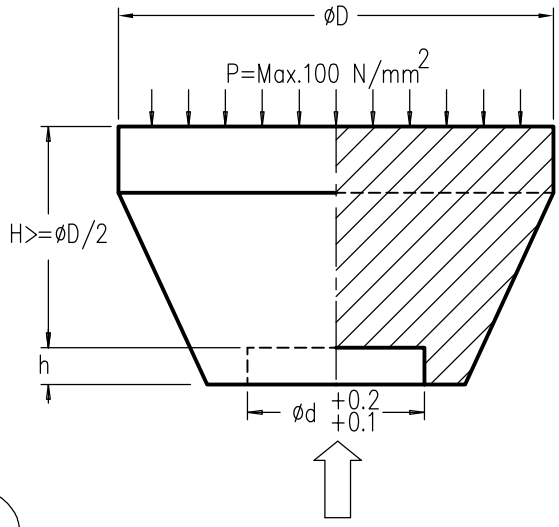
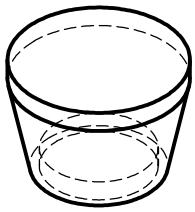
LOADING PADS

Yield strength Re = 350 N/mm²

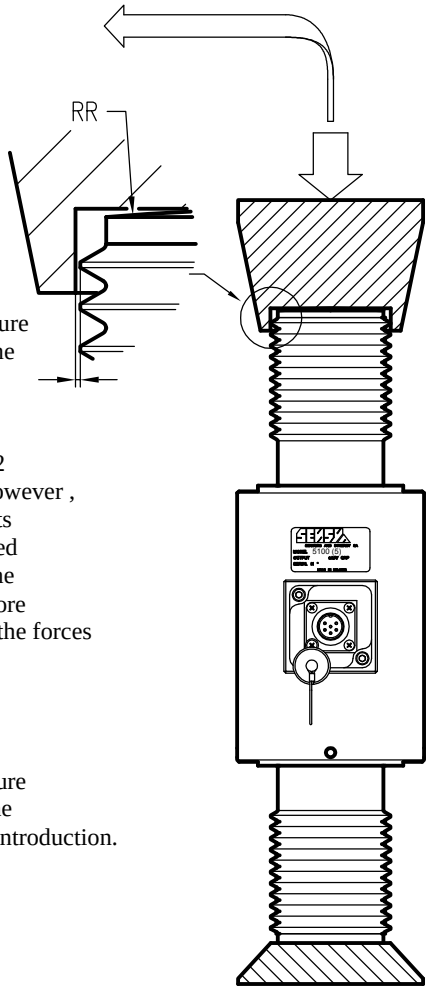
ISO 376

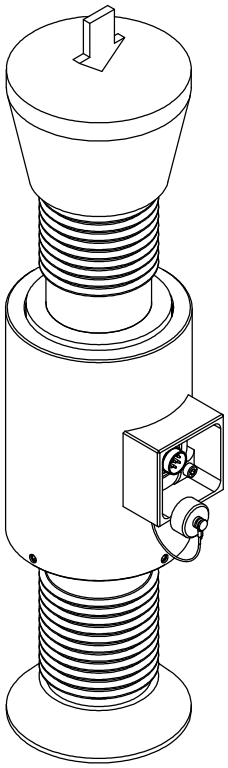
(EN 10002-3 & DIN 51301)





SUPOR



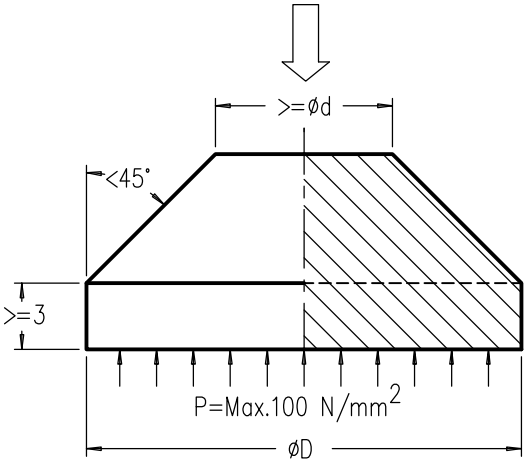


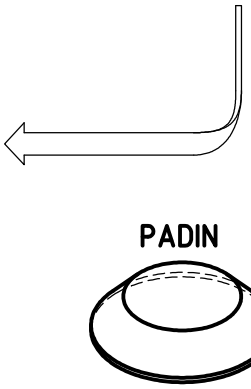
Loading pad designed so as to reduce the pressure on the compression plates of the testing machine for force transducer having a convex area of force introduction .

Height H should be equal to or greater than D/2
Height h and Ød of all loading pads should , however , be adapted to the force introduction components in such a way that the loading pad can be located both centrally and whithout lateral contact to the force introduction component . Ød shall therefore be 0.1 to 0.2 mm greater than the diameters of the forces introduction component.

Loading pad designed so as to reduce the pressure on the compression plates of the testing machine for force transducer having a flat area of force introduction.

ØD shall be greater or equal than the diameter of the force introduction component.





PADIN

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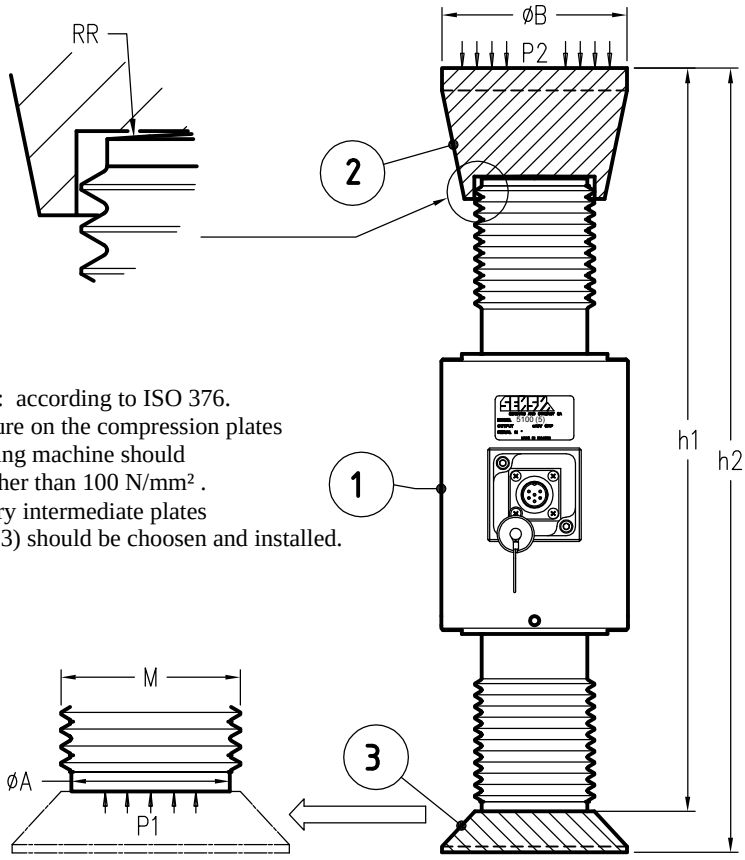
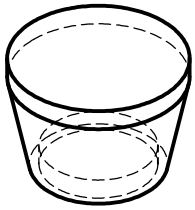
CHOICE OF THE LOADING PADS FOR MODEL 5100(5)

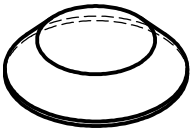
ISO 376
(EN 10002-3 & DIN 51301)

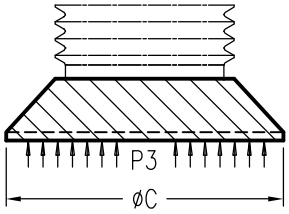




SUPOR

PADIN





Principles: according to ISO 376.
The pressure on the compression plates of the testing machine should not be higher than 100 N/mm² .
If necessary intermediate plates "PADIN"(3) should be choosen and installed.

CAPACITY ①	M	øA	Section øA mm²	Pressure P1 N/mm²	TYPE ②	øB	Section øB mm²	Pressure P2 N/mm²	TYPE ③	øC	Section øC mm²	Pressure P3 N/mm²	h1	h2
10 kN	24 X 2	21.8	373	26.8	SUPOR 24	59	2734	3.7	NOT NECES-SARY				155	
15 kN				40.2				5.5						
20 kN				53.6				7.3						
30 kN				80.4				11						
50 kN				134				18.3	PADIN 24	59	2734	18.3		177
75 kN	30 X 2	27.8	607	123.6	SUPOR 30	64	3217	23.3	PADIN 30	64	3217	23.3	205	227
100 kN				164.7				31.1				31.1		
150 kN	42X3	38.8	1182	126.9	SUPOR 42	74	4301	34.9	PADIN 42	74	4301	34.9	225.5	245.5
200 kN				169.2				46.5				46.5		
150 kN	45 X 3	41.8	1372	109.3	SUPOR 45	79	4902	30.6	PADIN 45	79	4902	30.6	231	252
200 kN				145.8				40.8				40.8		
300 kN	64 X 4	59.7	2799	107.2	SUPOR 64	99	7698	39	PADIN 64	99	7698	39	312	334
500 kN				178.6				65				65		
0.75 MN	64X4	59.7	2799	268	SUPOR 64	99	7698	97	PADIN 64	99	7698	97	387	409
1 MN				357	SUPOR 64E	114	10207	98	PADIN 64E	129	13070	76.5	398	423
0.75 MN	90 X 4	85.7	5768	130	SUPOR 90	129	13070	57.4	PADIN 100	129	13070	57.4	402	427
1 MN				173.4				76.5				76.5		
1.5 MN				260.1				114.8				114.8		
2 MN	110X4	105	8775	228	SUPOR 110	195	29865	67	PADIN 110E	195	29865	67	520	571
3 MN				341				100.5				100.5		
2 MN	125 X 4	120.7	11442	174.8	SUPOR 125A	158	19607	102	PADIN 125A	158	19607	102	505	530
3 MN				262.2	SUPOR 125B	195	29865	100.5	PADIN 125B	195	29865	100.5	520	565
5 MN	160 X 6	153.5	18506	270.2	SUPOR 160	248	48305	103.5	PADIN 160	248	48305	103.5	646	706
7.5 MN	200 X 6	193.5	29407	255	SUPOR 200A	308	74506	100.7	PADIN 200A	308	74506	100.7	745	812
10 MN				340.1	SUPOR 200B	353	97868	102.2	PADIN 200B	353	97868	102.2	770	860
15 MN	250 X 6	243.5	46568	322.1	SUPOR 250A	438	150674	100	PADIN 250	438	150674	100	930	1010
20 MN	330 X 6	323.5	82194	243.3	SUPOR 330	503	198713	101	PADIN 365	503	198713	101	1105	1185

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