

# LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

- LIGO -

CALIFORNIA INSTITUTE OF TECHNOLOGY  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

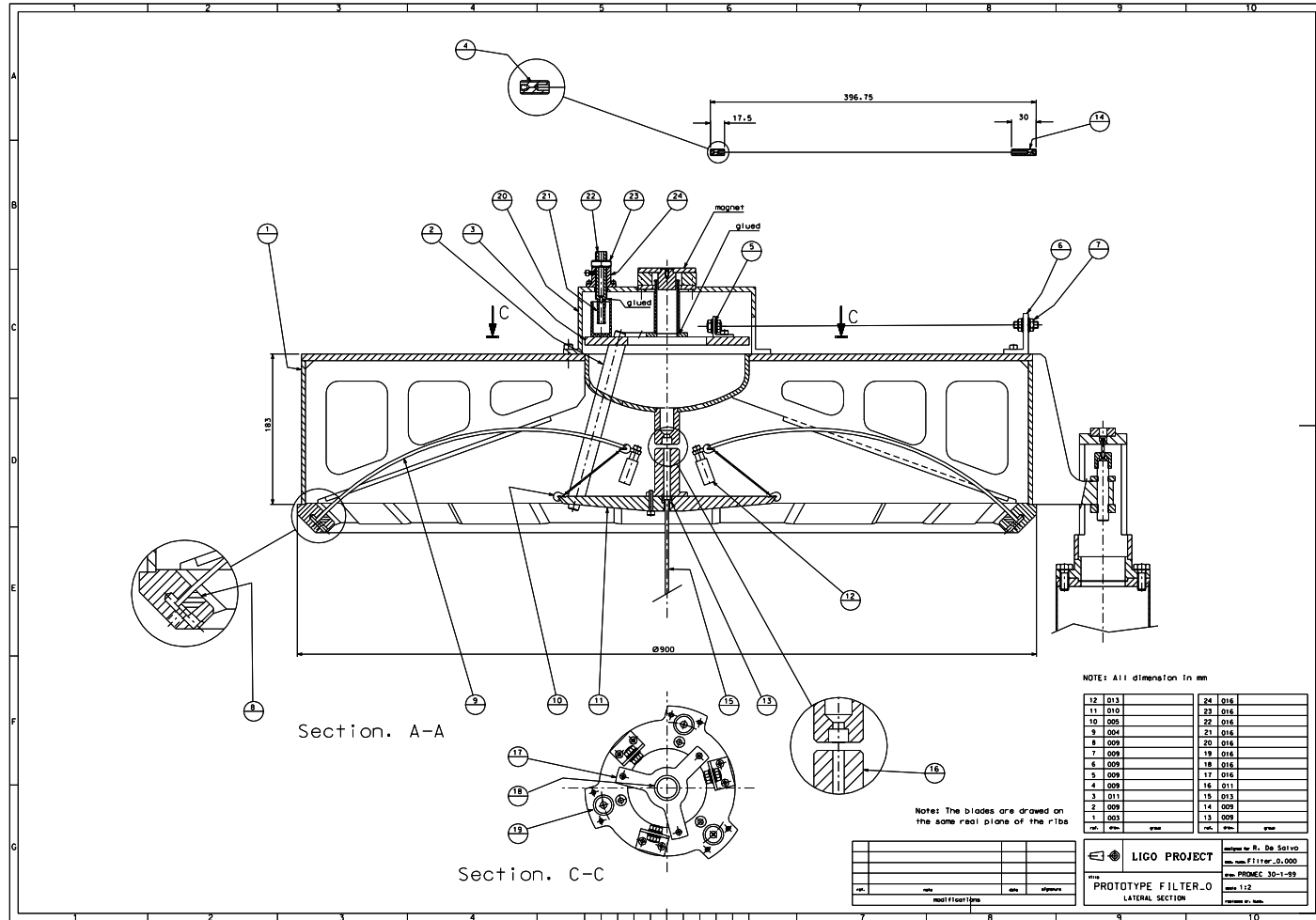
|   |   |                                       |
|---|---|---------------------------------------|
| Document Type<br><b>Technical Note</b>  | DCC Number<br><b>LIGO-D-010241-00-R</b> | Date<br>30 <sup>th</sup> October 2001 |
| <b>LIGO-II Seismic Attenuation System (SAS) test tower</b><br><br><b>Filter 0 Mechanical drawings</b> |   |                                       |
| <b>Gianni Gennaro, Tatiana Zelenova (PROMEC), Riccardo DeSalvo (LIGO)</b>                             |   |                                       |

Distribution of this draft: TBD  
This is an internal working note  
of the LIGO Project.

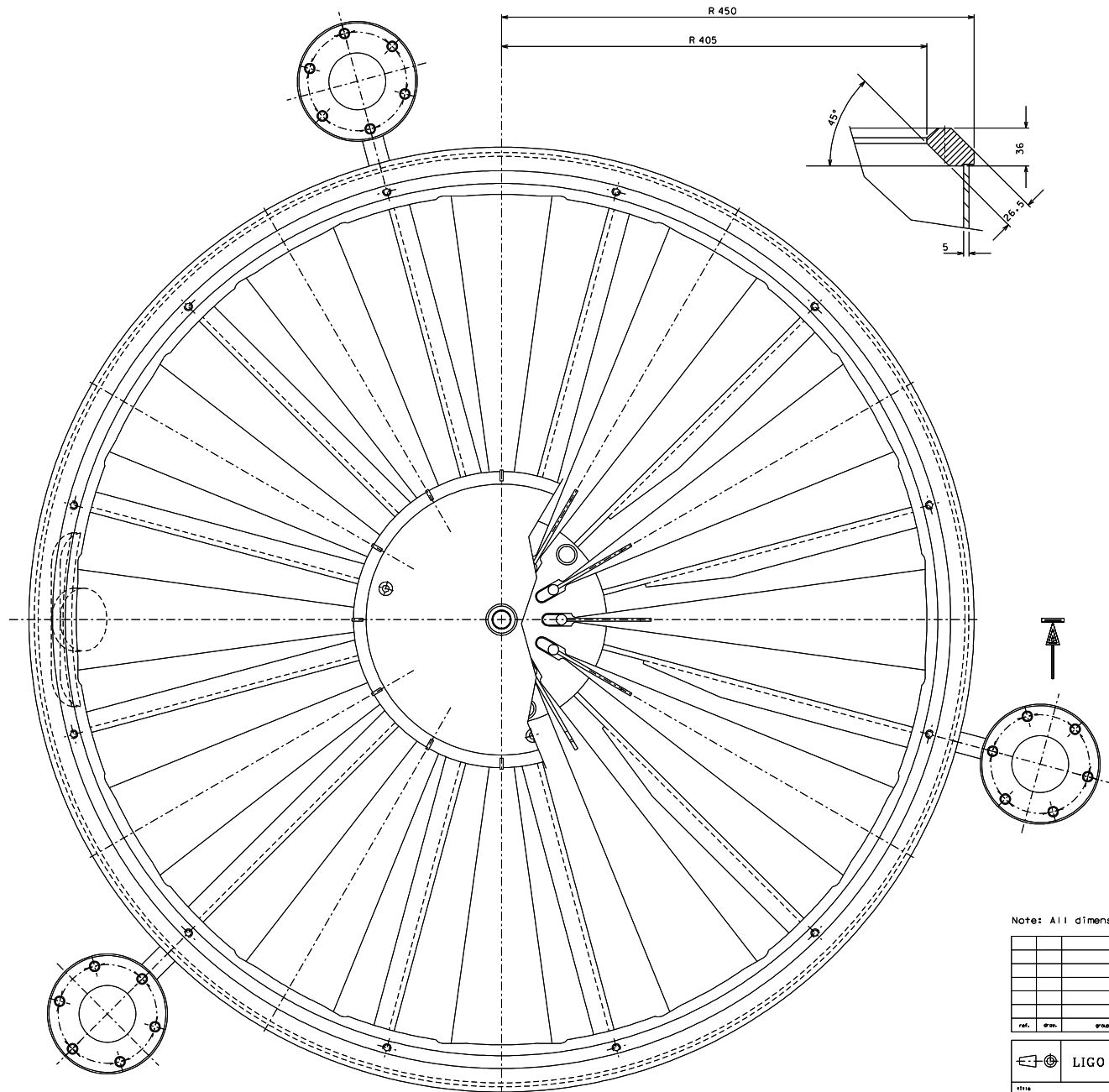
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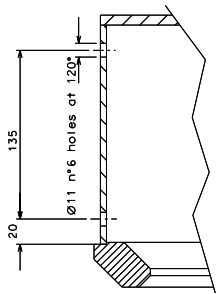
Live!!!: A+B+D



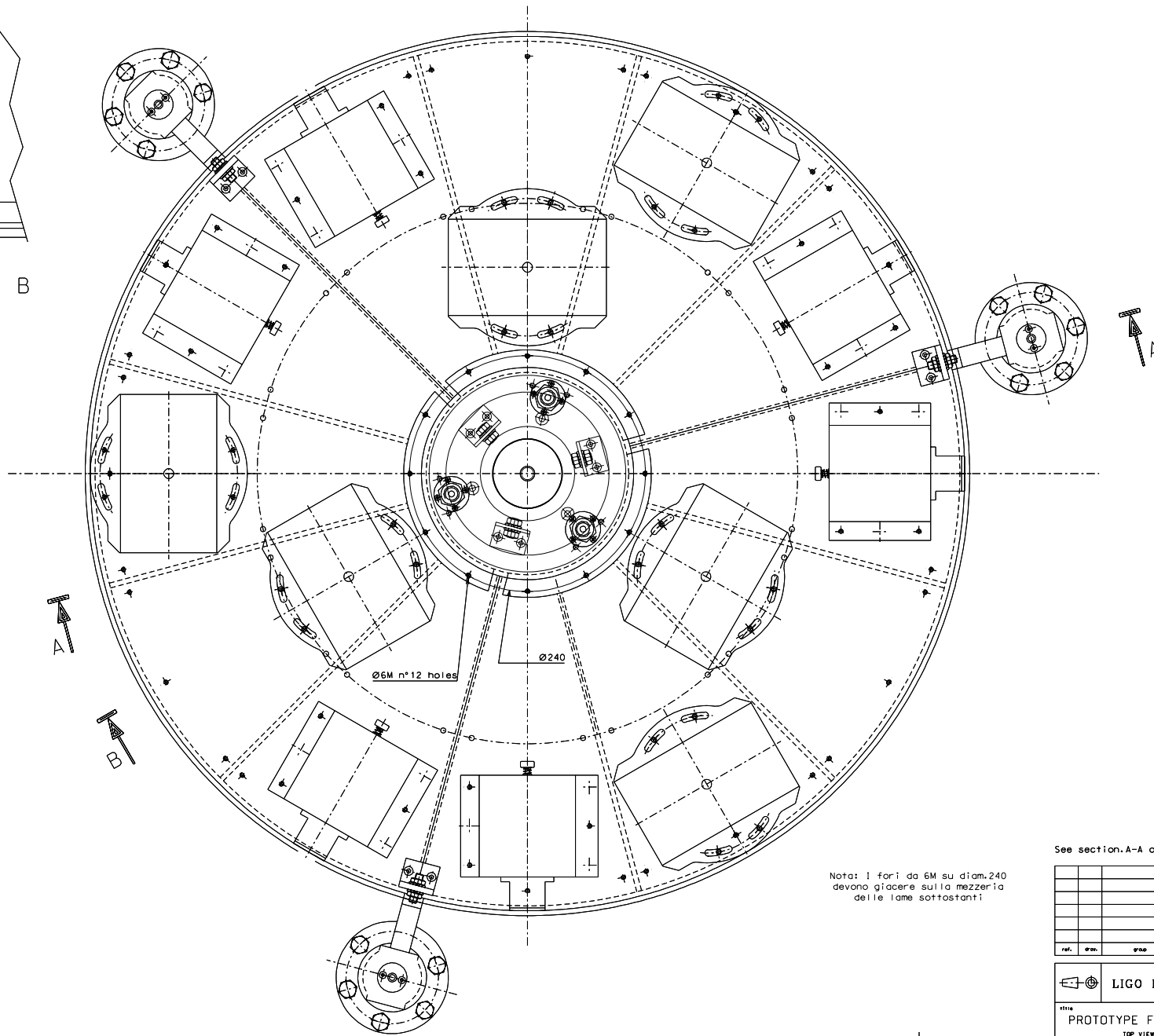
Note: All dimensions in mm

|      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|
|      |      |      |      |      |      |      |      |
|      |      |      |      |      |      |      |      |
|      |      |      |      |      |      |      |      |
|      |      |      |      |      |      |      |      |
|      |      |      |      |      |      |      |      |
| ref. | qnt. | grp. | ref. | qnt. | grp. | ref. | qnt. |

|             |                     |                                    |
|-------------|---------------------|------------------------------------|
|             | <b>LIGO PROJECT</b> | designed for R. De Salvo           |
|             |                     | title<br><b>PROTOTYPE FILTER_0</b> |
| BOTTOM VIEW |                     | ser. num. Filter_0.001             |
|             |                     | org. PROMEC 30-1-99                |
|             |                     | scale 1:2                          |
|             |                     | replaced or. Num.                  |



Section B

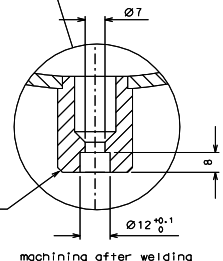
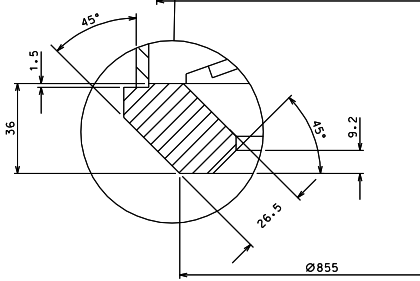
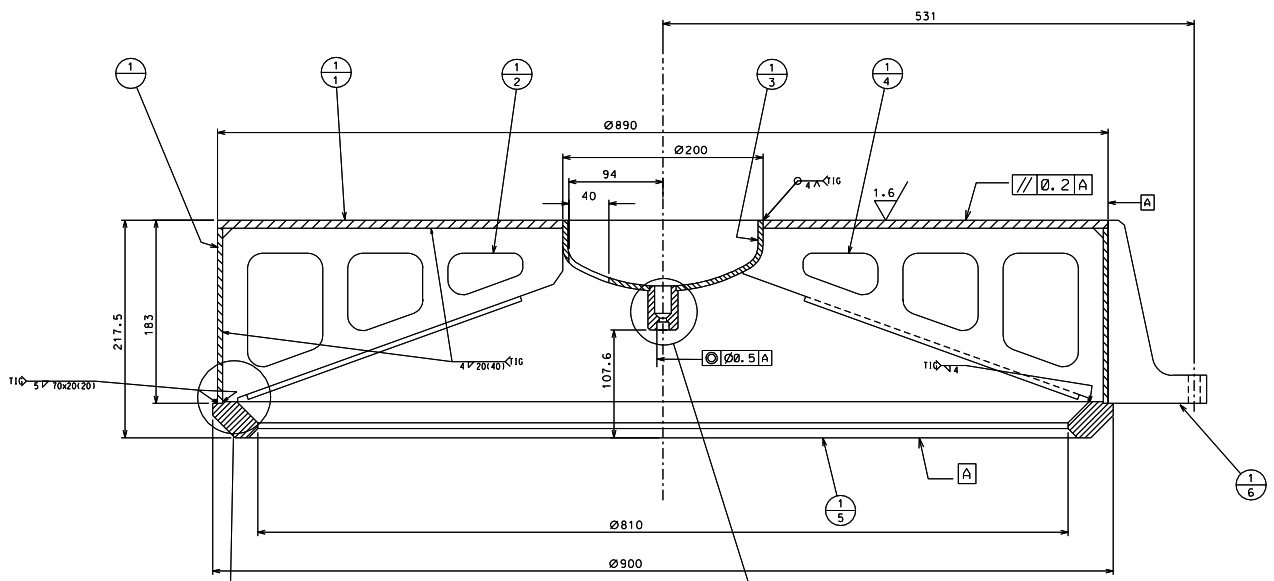
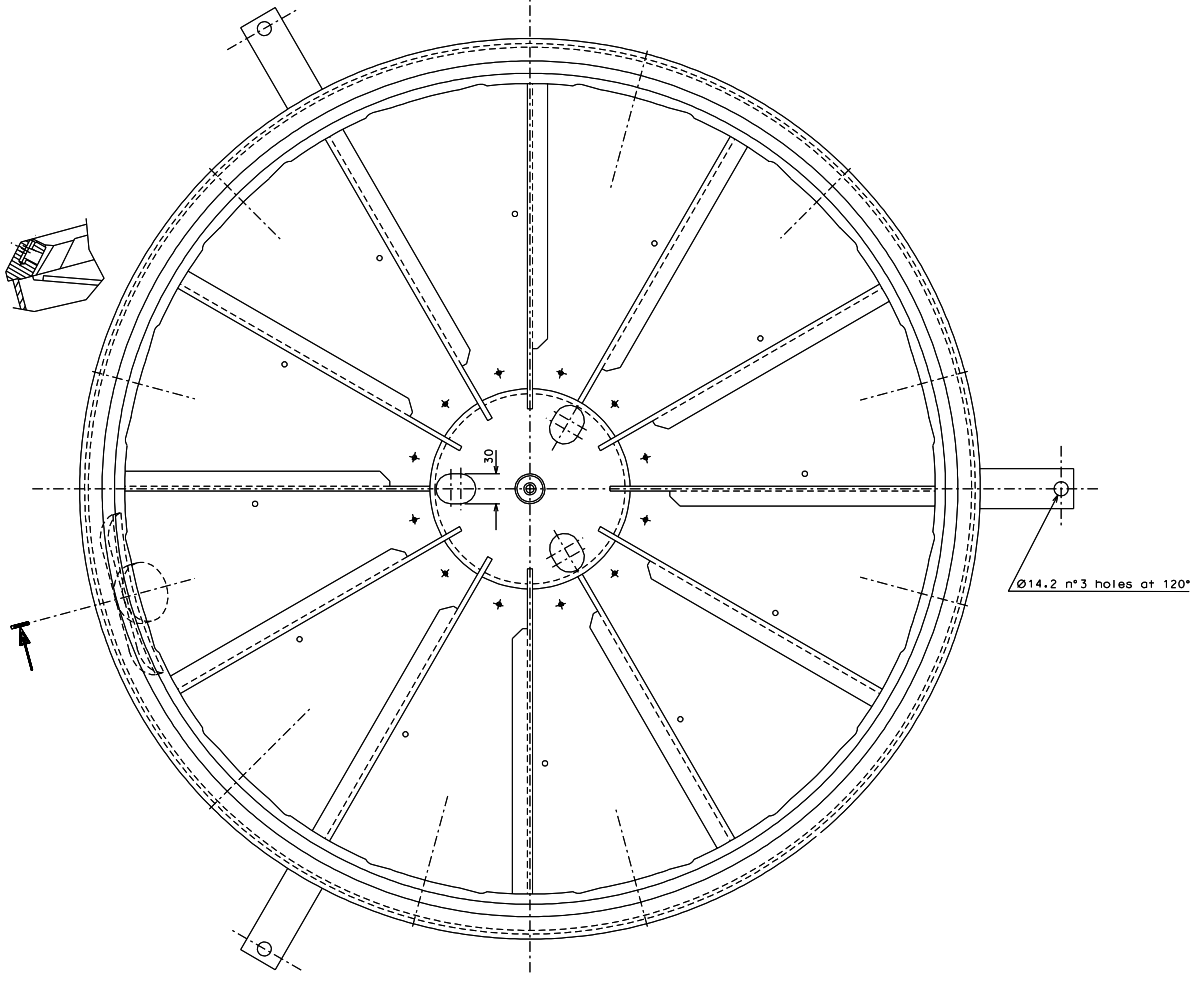


Nota: I fori da 6M su diam.240 devono giocare sulla mezzeria delle lame sottostanti

See section.A-A on the drawing 000

|      |      |       |      |      |       |
|------|------|-------|------|------|-------|
|      |      |       |      |      |       |
|      |      |       |      |      |       |
|      |      |       |      |      |       |
|      |      |       |      |      |       |
|      |      |       |      |      |       |
|      |      |       |      |      |       |
| ref. | qnt. | grup. | ref. | qnt. | grup. |

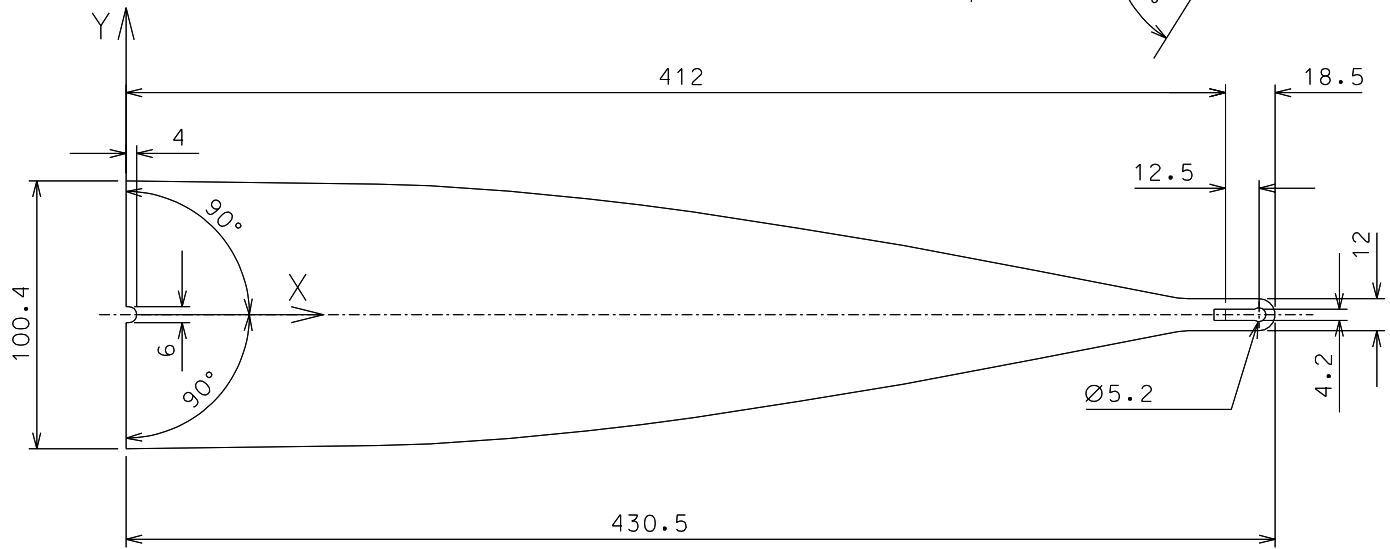
|  |  |  |
|--|--|--|
|  | <b>LIGO PROJECT</b><br>titolo<br><b>PROTOTYPE FILTER_0</b><br>TOP VIEW | designed for R. De Salvo<br>des. num. Filter_0.002<br>des. PROMEC 30-1-99<br>scale 1:2<br>revision n. Num. |
|  |  |  |



|      |      |       |      |      |       |
|------|------|-------|------|------|-------|
| 1.6  | 007  |       |      |      |       |
| 1.5  | 007  |       |      |      |       |
| 1.4  | 008  |       |      |      |       |
| 1.3  | 008  |       |      |      |       |
| 1.2  | 008  |       |      |      |       |
| 1.1  | 006  |       |      |      |       |
| 1    | 012  |       |      |      |       |
| ref. | q'ty | group | ref. | q'ty | group |

**LIGO PROJECT**  
 des. por R. De Salvo  
 des. num. Filter\_0.003  
 des. PRIMEC 30-1-99  
 scale 1:2.5  
 ref. des. num.

Note: Dimensions for turning



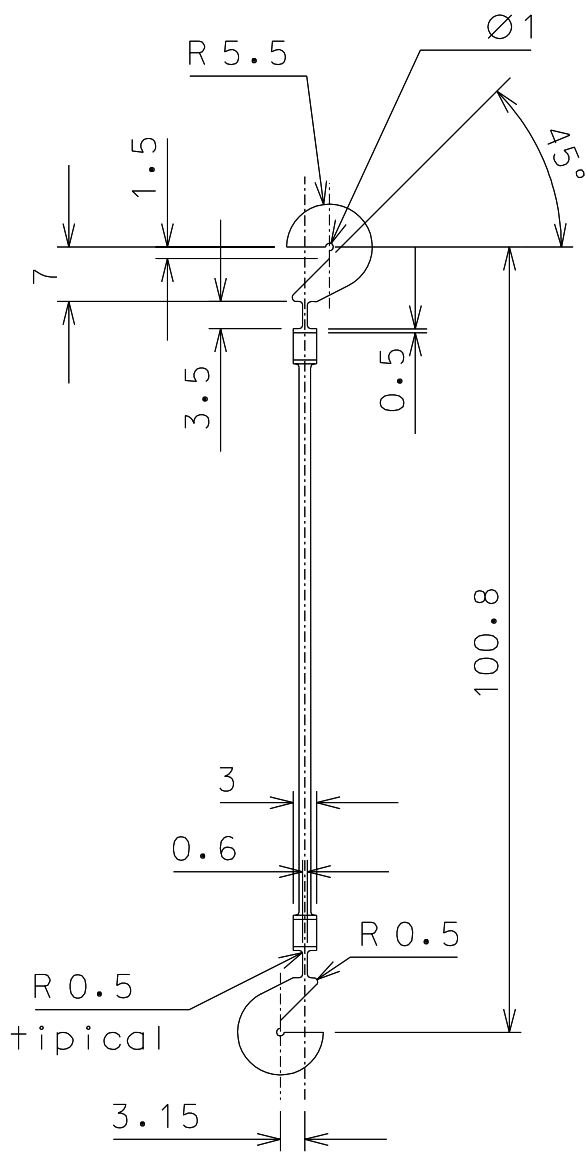
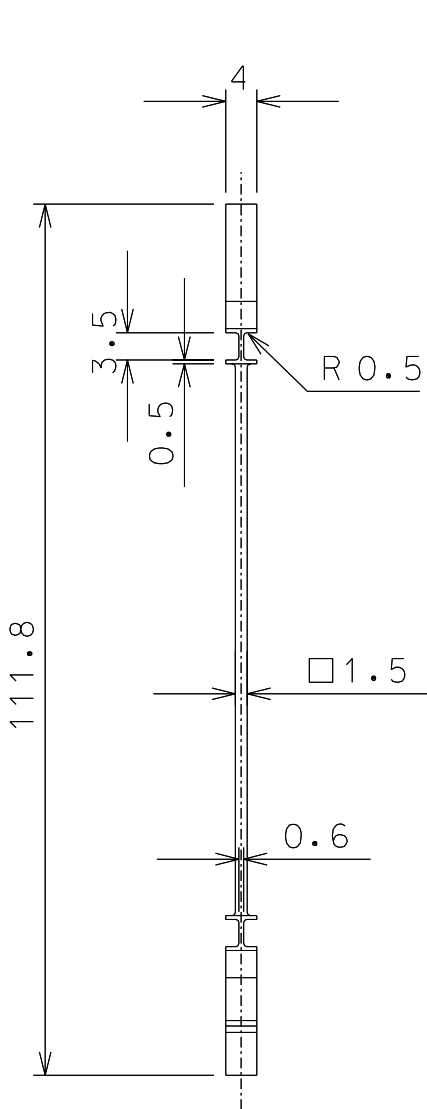
| X     | Y    |
|-------|------|
| 0.0   | 50.2 |
| 94.0  | 49.0 |
| 173.0 | 43.5 |
| 212.5 | 38.5 |
| 291.5 | 26.0 |
| 390.2 | 7.0  |
| 398.1 | 6.0  |
| 412   | 6.0  |

|      |        |                     |       |
|------|--------|---------------------|-------|
|      |        |                     |       |
|      |        |                     |       |
|      |        |                     |       |
| 9    | 12     | marval 18           | 1:2   |
| ref. | pieces | mat. and treatments | scale |

|      |        |                     |       |
|------|--------|---------------------|-------|
|      |        |                     |       |
|      |        |                     |       |
|      |        |                     |       |
|      |        |                     |       |
|      |        |                     |       |
| ref. | pieces | mat. and treatments | scale |

| General machining tolerances UNI 5307-63 |       |       |         |                                     |           |            |            |       |
|--|-------|-------|---------|-------------------------------------|-----------|------------|------------|-------|
| Dimensions                               | < 6   | >6-30 | >30-120 | >120-315                            | >315-1000 | >1000-2000 | >2000-4000 | >4000 |
| linear Toll.                             | ± 0.1 | ± 0.2 | ± 0.3   | ± 0.5                               | ± 0.8     | ± 1.2      | ± 2        | ± 3   |
| angular Toll.                            | ± 1'  | ± 30' | ± 20'   | ± 10' referred to the shortest side |           |            |            |       |

|  |                      |                     |                          |
|--|----------------------|---------------------|--------------------------|
|  |                      | <b>LIGO PROJECT</b> | designed for R. De Salvo |
|  |                      |                     | N. Filter_0.004          |
| title<br><b>PROTOTYPE FILTER_0<br/>BLADE</b> | draw. PROMEC 30-1-99 |                     |                          |
|  | details from 000     |                     |                          |
|  | replaces dr. Numb.   |                     |                          |

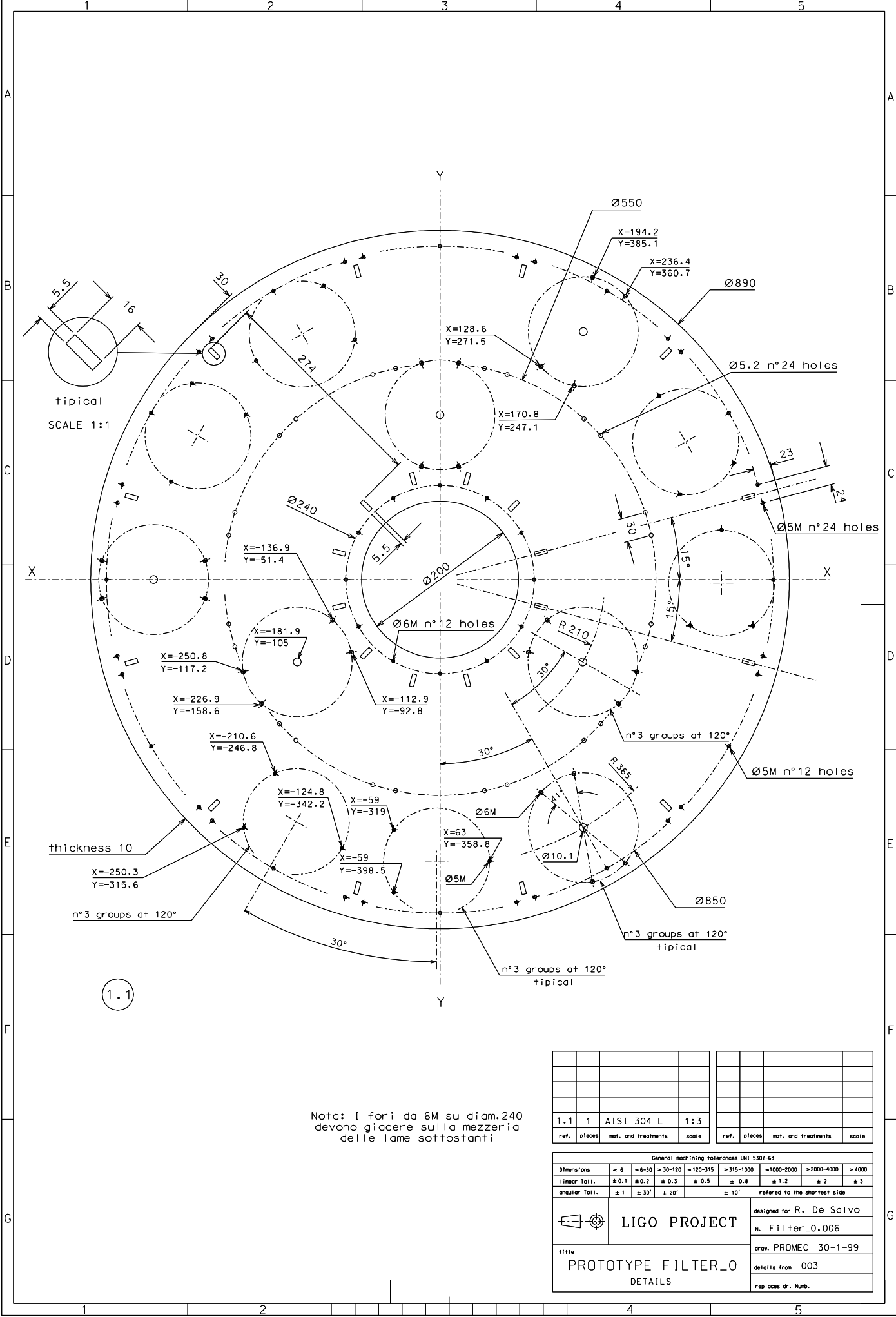


|      |        |                     |       |
|------|--------|---------------------|-------|
| 10   | 12     | marval 18           | 1:1   |
| ref. | pieces | mat. and treatments | scale |

|      |        |                     |       |
|------|--------|---------------------|-------|
|      |        |                     |       |
| ref. | pieces | mat. and treatments | scale |

| General machining tolerances UNI 5307-63 |       |        |          |                                     |            |             |             |        |
|--|-------|--------|----------|-------------------------------------|------------|-------------|-------------|--------|
| Dimensions                               | < 6   | > 6-30 | > 30-120 | > 120-315                           | > 315-1000 | > 1000-2000 | > 2000-4000 | > 4000 |
| linear Toll.                             | ± 0.1 | ± 0.2  | ± 0.3    | ± 0.5                               | ± 0.8      | ± 1.2       | ± 2         | ± 3    |
| angular Toll.                            | ± 1   | ± 30'  | ± 20'    | ± 10' referred to the shortest side |            |             |             |        |

|                                     |              |                      |                          |
|-------------------------------------|--------------|----------------------|--------------------------|
|                                     | LIGO PROJECT |                      | designed for R. De Salvo |
|                                     |              |                      | n. Filter_0.005          |
| title<br>PROTOTYPE FILTER_0<br>WIRE |              | draw. PROMEC 30-1-99 |                          |
|                                     |              | details from 000     |                          |
|                                     |              | replaces dr. Numb.   |                          |



typical  
SCALE 1:1

thickness 10

1.1

Nota: I fori da 6M su diam.240 devono giacere sulla mezzeria delle lame sottostanti

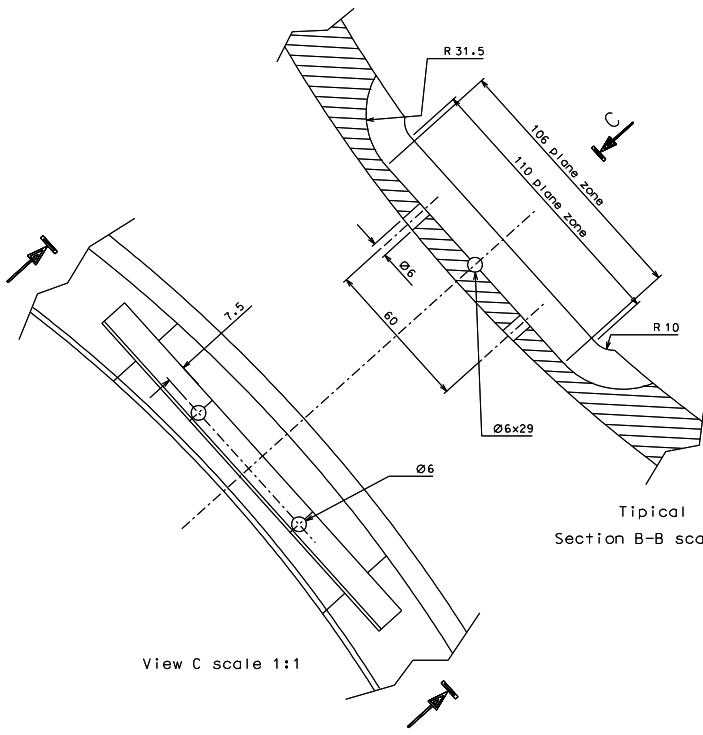
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|------|--------|---------------------|-------|------|--------|---------------------|-------|
|      |        |                     |       |      |        |                     |       |
| 1.1  | 1      | AISI 304 L          | 1:3   |      |        |                     |       |
| ref. | pieces | mat. and treatments | scale | ref. | pieces | mat. and treatments | scale |

| General machining tolerances UNI 5307-63 |       |        |          |                                     |            |             |             |
|--|-------|--------|----------|-------------------------------------|------------|-------------|-------------|
| Dimensions                               | < 6   | > 6-30 | > 30-120 | > 120-315                           | > 315-1000 | > 1000-2000 | > 2000-4000 |
| linear Toli.                             | ± 0.1 | ± 0.2  | ± 0.3    | ± 0.5                               | ± 0.8      | ± 1.2       | ± 2         |
| angular Toli.                            | ± 1   | ± 30'  | ± 20'    | ± 10' referred to the shortest side |            |             |             |

|                    |                |
|--------------------|----------------|
| designed for       | R. De Salvo    |
| n.                 | Filter_0.006   |
| draw.              | PRÓMEC 30-1-99 |
| details from       | 003            |
| replaces dr. Numb. |                |

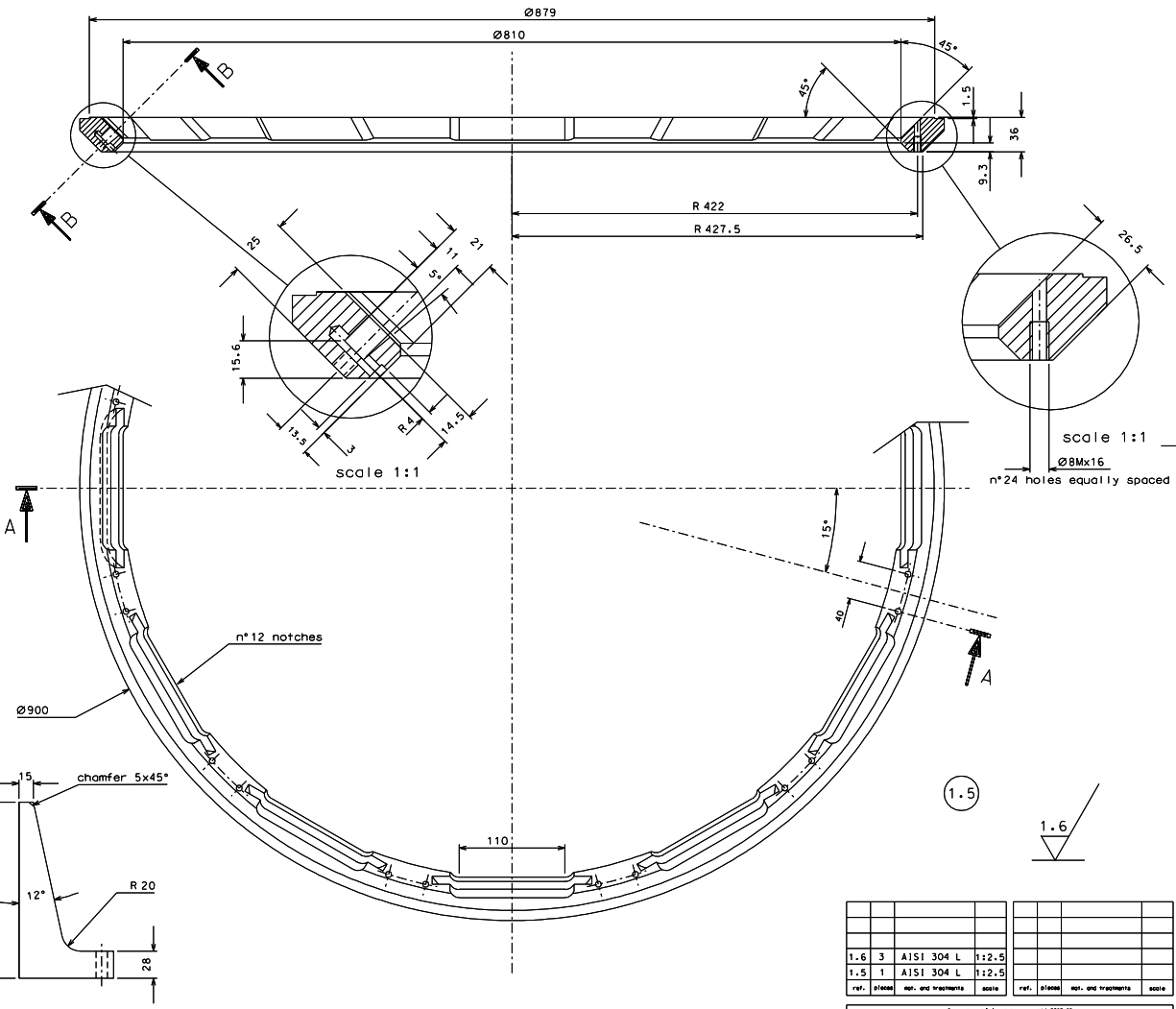
**LIGO PROJECT**  
title  
**PROTOTYPE FILTER\_0**  
DETAILS





Typical Section B-B scale 1:1

View C scale 1:1

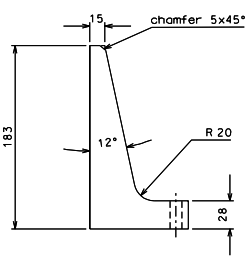


scale 1:1

Ø8Mx16  
n°24 holes equally spaced

1.5

1.6



1.6

Notes: Machining after welding

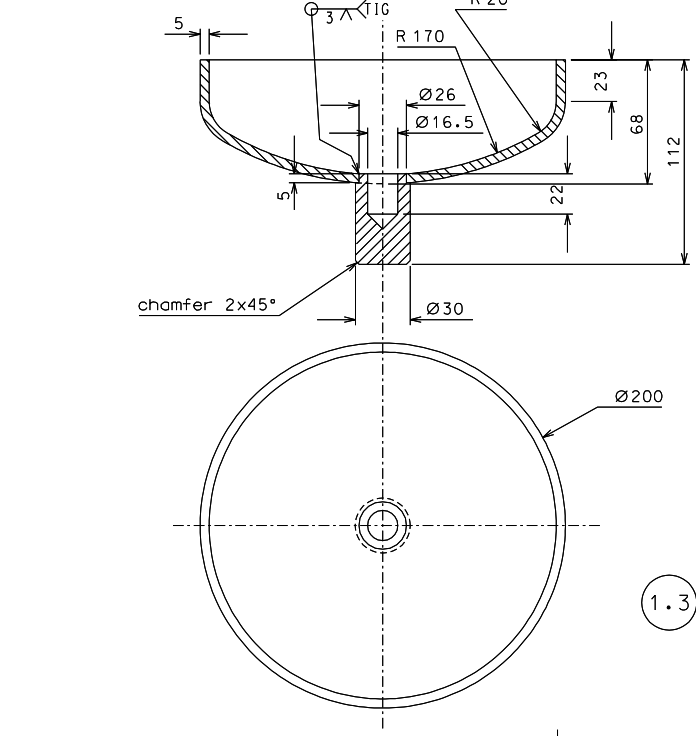
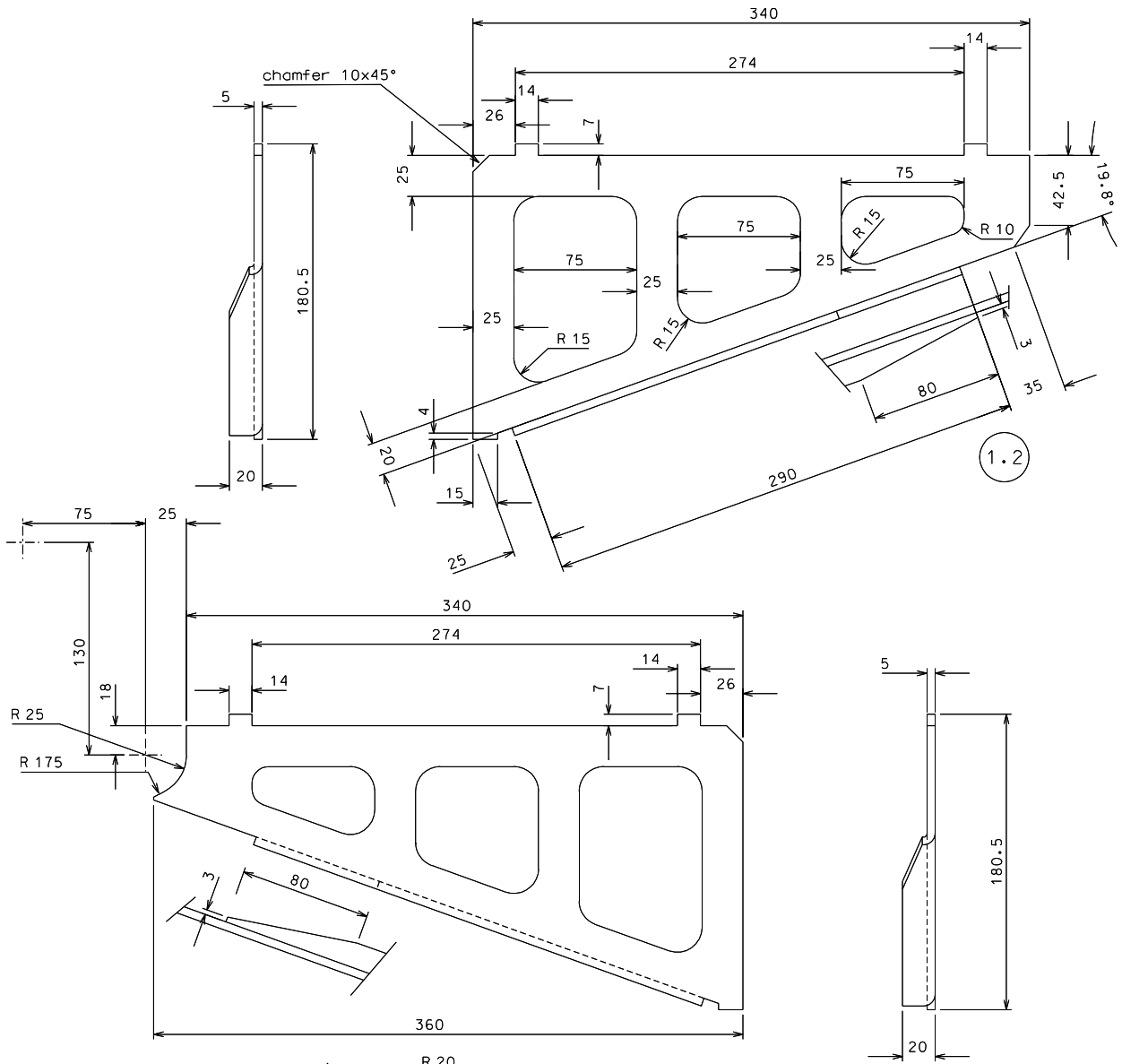
|      |        |                     |       |      |        |                     |       |  |  |
|------|--------|---------------------|-------|------|--------|---------------------|-------|--|--|
| 1.6  | 3      | AISI 304 L          | 1:2.5 |      |        |                     |       |  |  |
| 1.5  | 1      | AISI 304 L          | 1:2.5 |      |        |                     |       |  |  |
| ref. | pieces | mat. and treatments | scale | ref. | pieces | mat. and treatments | scale |  |  |

| General machining tolerances UNI 5201-43 |      |       |        |         |          |           |           |        |      |
|--|------|-------|--------|---------|----------|-----------|-----------|--------|------|
| Dimension                                | < 6  | 6-30  | 30-120 | 120-315 | 315-1000 | 1000-2000 | 2000-4000 | > 4000 |      |
| Linear Size                              | ±0.1 | ±0.15 | ±0.2   | ±0.3    | ±0.4     | ±0.5      | ±0.6      | ±0.7   | ±0.8 |
| Angular Size                             | ±1'  | ±30"  | ±30"   | ±30"    | ±30"     | ±30"      | ±30"      | ±30"   | ±30" |

|                            |  |                          |
|----------------------------|--|--------------------------|
| LIGO PROJECT               |  | designer for R. De Salvo |
|                            |  | n. Filter_0.007          |
| Title                      |  | draw. PRIMEC 30-1-99     |
| PROTOTYPE FILTER_0 DETAILS |  | details from 003         |
|                            |  | reference or. num.       |



the incomplete dimensions like detail 1.2

|      |        |                     |       |      |        |                     |       |
|------|--------|---------------------|-------|------|--------|---------------------|-------|
| 1.4  | 9      | AISI 304 L          | 1:2   |      |        |                     |       |
| 1.3  | 1      | "                   | "     |      |        |                     |       |
| 1.2  | 3      | "                   | "     |      |        |                     |       |
| ref. | pieces | mat. and treatments | scale | ref. | pieces | mat. and treatments | scale |

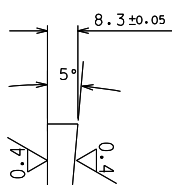
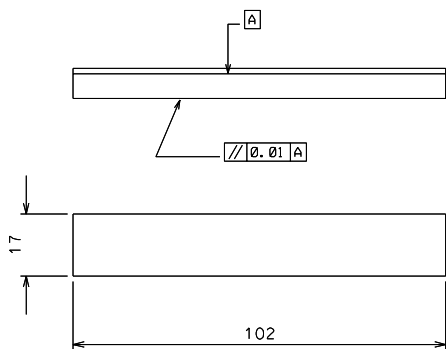
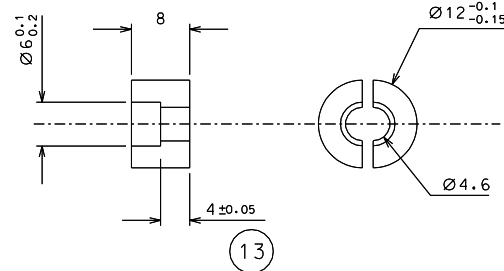
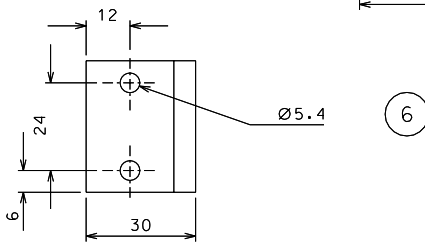
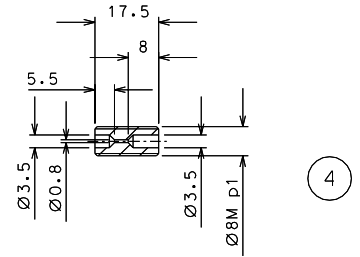
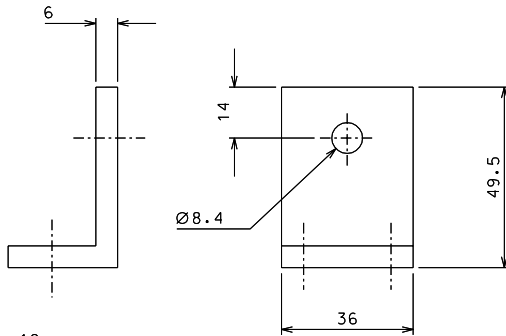
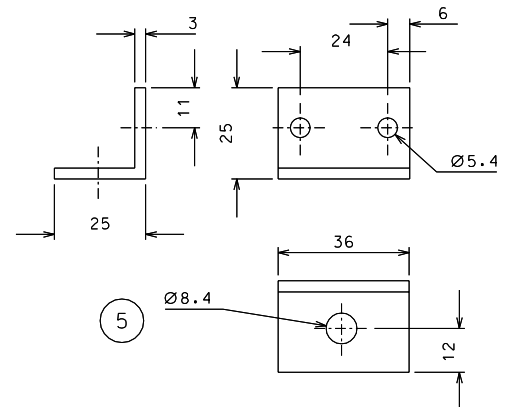
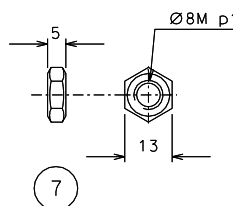
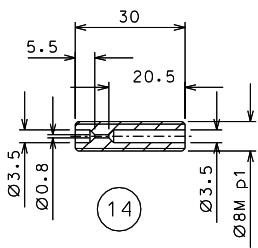
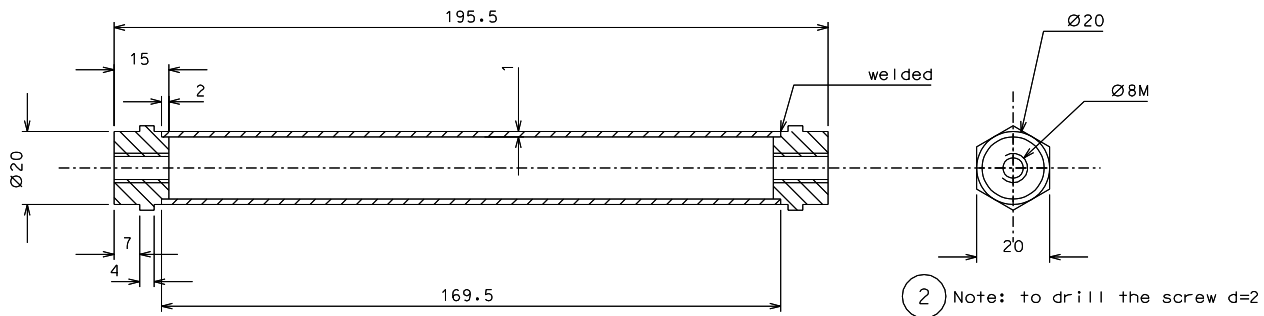
| General machining tolerances UNI 5307-63 |       |       |         |                                     |           |            |            |       |
|--|-------|-------|---------|-------------------------------------|-----------|------------|------------|-------|
| Dimensions                               | < 6   | >6-30 | >30-120 | >120-315                            | >315-1000 | >1000-2000 | >2000-4000 | >4000 |
| linear Toli.                             | ± 0.1 | ± 0.2 | ± 0.3   | ± 0.5                               | ± 0.8     | ± 1.2      | ± 2        | ± 3   |
| angular Toli.                            | ± 1   | ± 30' | ± 20'   | ± 10' referred to the shortest side |           |            |            |       |

designed for R. De Salvo  
 N. Filter\_0.008  
 draw. PROMEC 30-1-99  
 details from 003  
 replaces dr. Num.

1.3

1.4

1.2



|      |        |                     |       |      |        |                     |       |
|------|--------|---------------------|-------|------|--------|---------------------|-------|
| 7    | 12     | stainless steel     | 1:1   |      |        |                     |       |
| 6    | 9      | AISI 304            | 1:1   |      |        |                     |       |
| 5    | 3      | "                   | 1:1   | 14   | 3      | bronze B14          | 1:1   |
| 4    | 3      | bronze B14          | 1:1   | 13   | 2      | C40 hardened        | 2:1   |
| 2    | 3      | AISI 304 L          | 1:1   | 8    | 24     | "                   | 1:1   |
| ref. | pieces | mat. and treatments | scale | ref. | pieces | mat. and treatments | scale |

| General machining tolerances UNI 5307-63             |           |           |           |   |            |             |             |
|--|-----------|-----------|-----------|---|------------|-------------|-------------|
| Dimensions   | < 6       | >=6-30    | >=30-120  | >=120-315   | >=315-1000 | >=1000-2000 | >=2000-4000 |
| Linear Toli.   | $\pm 0.1$ | $\pm 0.2$ | $\pm 0.3$ | $\pm 0.5$   | $\pm 0.8$  | $\pm 1.2$   | $\pm 2$     |
| angular Toli.  | $\pm 1'$  | $\pm 30'$ | $\pm 20'$ | $\pm 10'$ referred to the shortest side   |            |             |             |
|  |           |           |           | <b>LIGO PROJECT</b><br>designed for R. De Salvo<br>n. Filter_0.009<br>draw. PROMEC 30-1-99<br>details from 000<br>replaces dr. Num. |            |             |             |
| title<br><b>PROTOTYPE FILTER_0</b><br><b>DETAILS</b> |           |           |           |   |            |             |             |

8