

2.0 DOSIMETER DESIGN SPECIFICATIONS

The combination dosimeter and security credential holder was developed as part of the effort involved to provide an automated readout and thermoluminescent dosimetry capability at Hanford. The holder is designed to accommodate the thermoluminescent dosimeter card, appropriate filters, the security credential and a snap type clip. The body of the holder is "ABS" plastic (acrylonitrile-butadiene-styrene). The dosimeter holder and card is mold casted providing uniformity of construction.

DOSIMETER HOLDER

Figures 2.1 and 2.2 show the front and back view of the dosimeter holder, respectively. Table 2.1 summarizes the filtration over each of the 5 TLD positions from the front and from the back (Ref TLD Log Book 1, pp. 117, 118). It is apparent that the filtration for each position is different. For each position, the filtration in Table 2.1 is listed from the outside of the dosimeter holder towards the TL chip.

Historically, the filters are required to be within ± 5 mils. Filter 2 consists of 2024-T4 aluminum which has the following composition:

- ~90% Al
- ~4% Cu
- ~1% Mg
- ~1% Mn
- ~4% Other trace elements

During September 1980, the dosimeter manufacturer requested and was granted permission to use 3003 aluminum which has the following composition:

- ~97% Al
- ~3% Trace elements.

DOSIMETER CARD

The dosimeter card is shown in Figure 2.3. Each of the TL chips measures 1/8-in. square by 0.035-in. thick. Transparent teflon 2 mils thick is used to hold the chips in place. The chips are placed in a 3/8-in. hole in a 5-mil

teflon spacer. As shown in Figure 2.3, two TLD-600s and two (or three) TLD-700s are used in the Hanford dosimeter. The slanted edge on the card corresponds to a slanted edge in the dosimeter holder providing one way only insert.

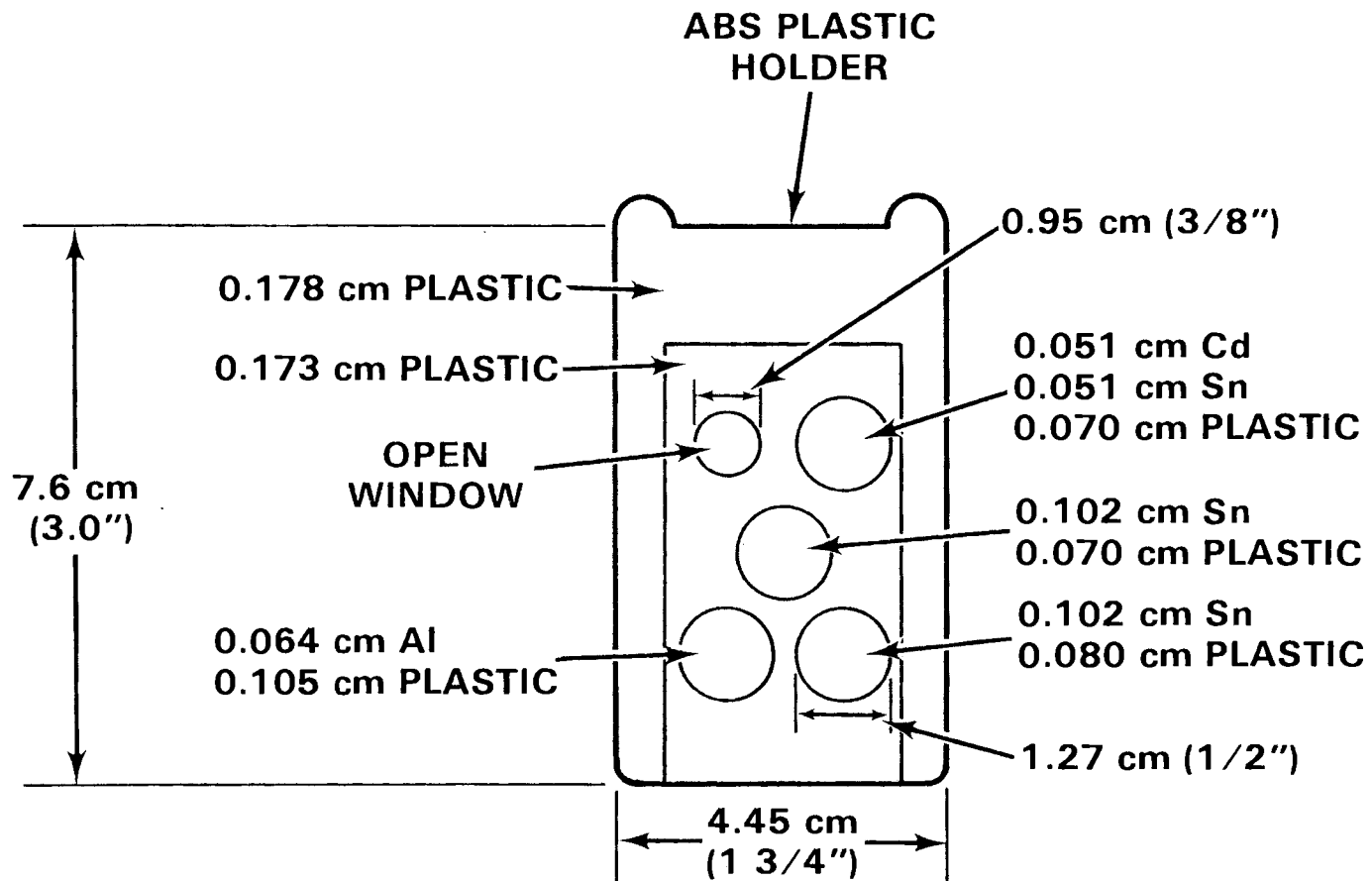


FIGURE 2.1. Front View of Dosimeter Holder (actual size)

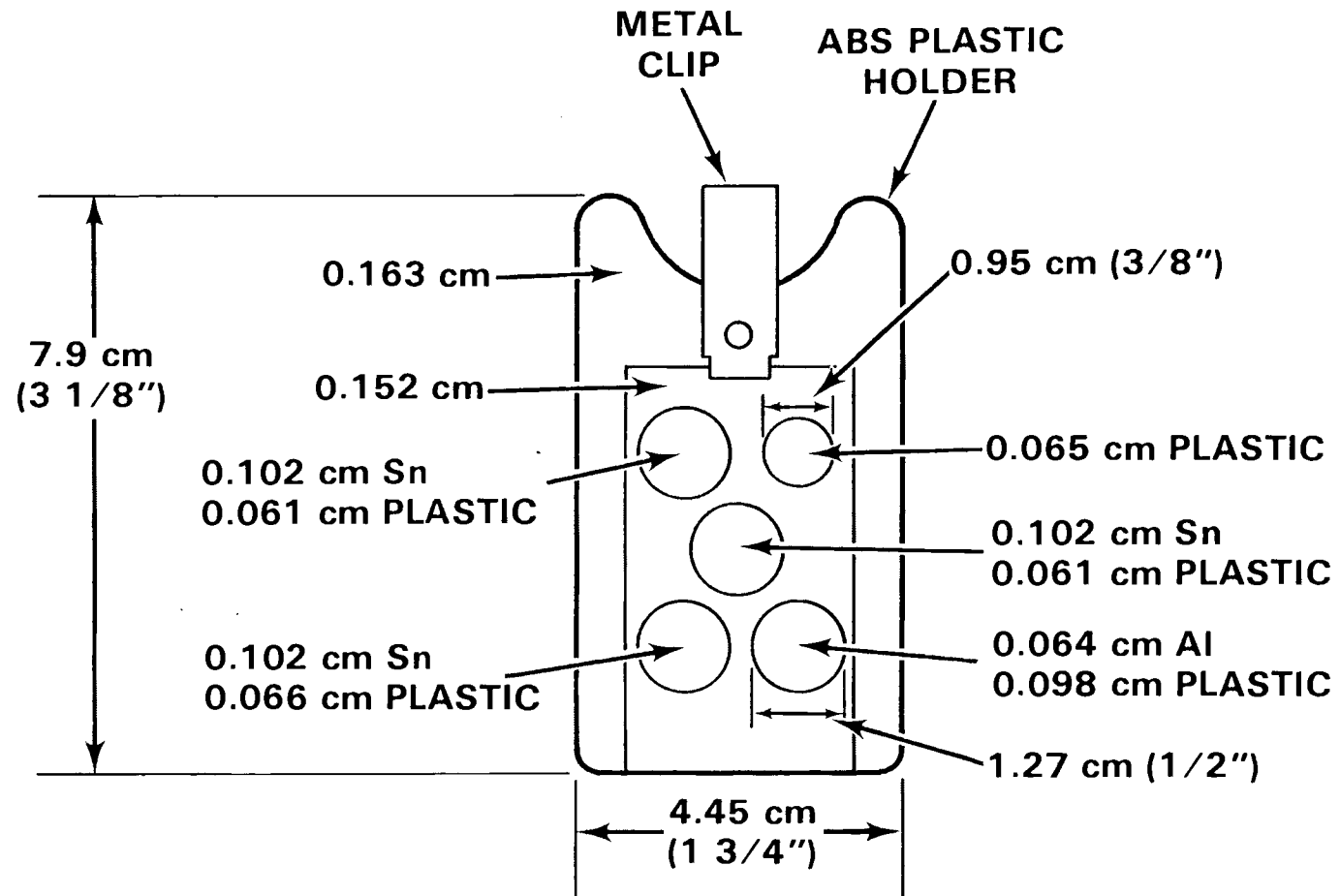


FIGURE 2.2. Back View of Dosimeter Holder (actual size)

TABLE 2.1. Filtration by Position for Hanford Personnel Dosimeter

Position	Thickness	
1. Front--Security Credential	32.6 mil	83 mg/cm ²
Dosimeter Card Teflon	2.0	5
Total		<u>88</u>
Back--Badge Holder	7.1 mil	56
Dosimeter Card Teflon	2.0	5
Total		<u>61</u>
2. Front--Security Credential	33.0 mil	84 mg/cm ²
Badge Holder	41.0	85
Aluminum Filter	26.6	182
Dosimeter Card Teflon	2.0	5
Total		<u>356</u>
Back--Badge Holder	40.6	85
Aluminum Filter	27.3	187
Dosimeter Card Teflon	2.0	5
Total		<u>277</u>
3. Front--Security Credential	33.0 mil	84 mg/cm ²
Badge Holder	25.6	53
Tin Filter	41.0	760
Dosimeter Card Teflon	2.0	5
Total		<u>902</u>
Back--Badge Holder	28.5	59
Tin Filter	41.3	766
Dosimeter Card Teflon	2.0	5
Total		<u>830</u>
4. Front--Security Credential	33.0	84 mg/cm ²
Badge Holder	25.8	54
Cadmium Filter	20.8	457
Tin Filter	21.1	391
Dosimeter Card Teflon	2.0	5
Total		<u>991</u>
Back--Badge Holder	25.8	54
Tin Filter	41.0	760
Dosimeter Card Teflon	2.0	5
Total		<u>819</u>
5. Front--Security Credential	33.0 mil	84 mg/cm ²
Badge Holder	25.8	54
Tin Filter	40.9	758
Dosimeter Card Teflon	2.0	5
Total		<u>901</u>
Back--Badge Holder	25.0	52
Tin Filter	41.4	768
Dosimeter Card Teflon	2.0	5
Total		<u>825</u>

NOTE: Densities used in calculations are:

Teflon	$\rho = 1.0 \text{ g/cm}^3$
ABS Plastic	$\rho = 0.82$
Al	$\rho = 2.70$
Cd	$\rho = 8.65$
Sn	$\rho = 7.30$

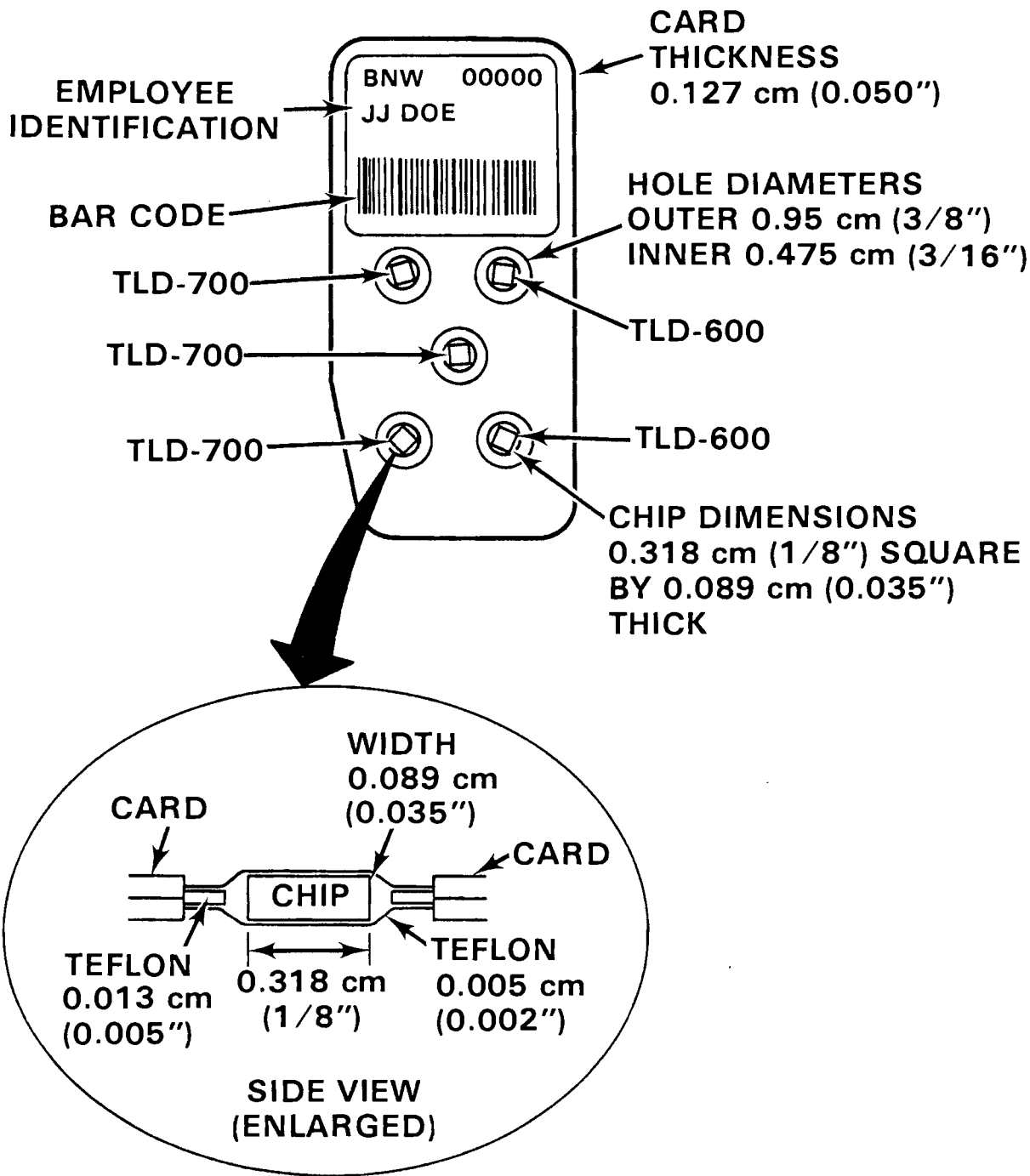


FIGURE 2.3. Front View of Dosimeter Card (actual size)