

# *HEARING LOSS* *PREVENTION PROGRAM*



*M.Saraei*

# Chronic NIHL

## ■ Hearing Conservation Programs

- Assessment of Noise Levels
- Engineering Controls
- Administrative Controls
- Personal Hearing Protectors
- Serial Audiograms
- Education



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# Education

- First and the most important step
- For all managers, supervisors and employees.
- Should cover: Importance of HCP, effects of noise on health, aims, annual audiometry noise survey and all about PPE
- Importance of live and face to face education
- Even before noise measurement and controlling actions

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# Hearing Conservation Program (HCP)

- implemented whenever employee noise exposures equal or exceed an 8-hour time-weighted average (TWA) of 85 dBA without attenuation from use of hearing protectors.

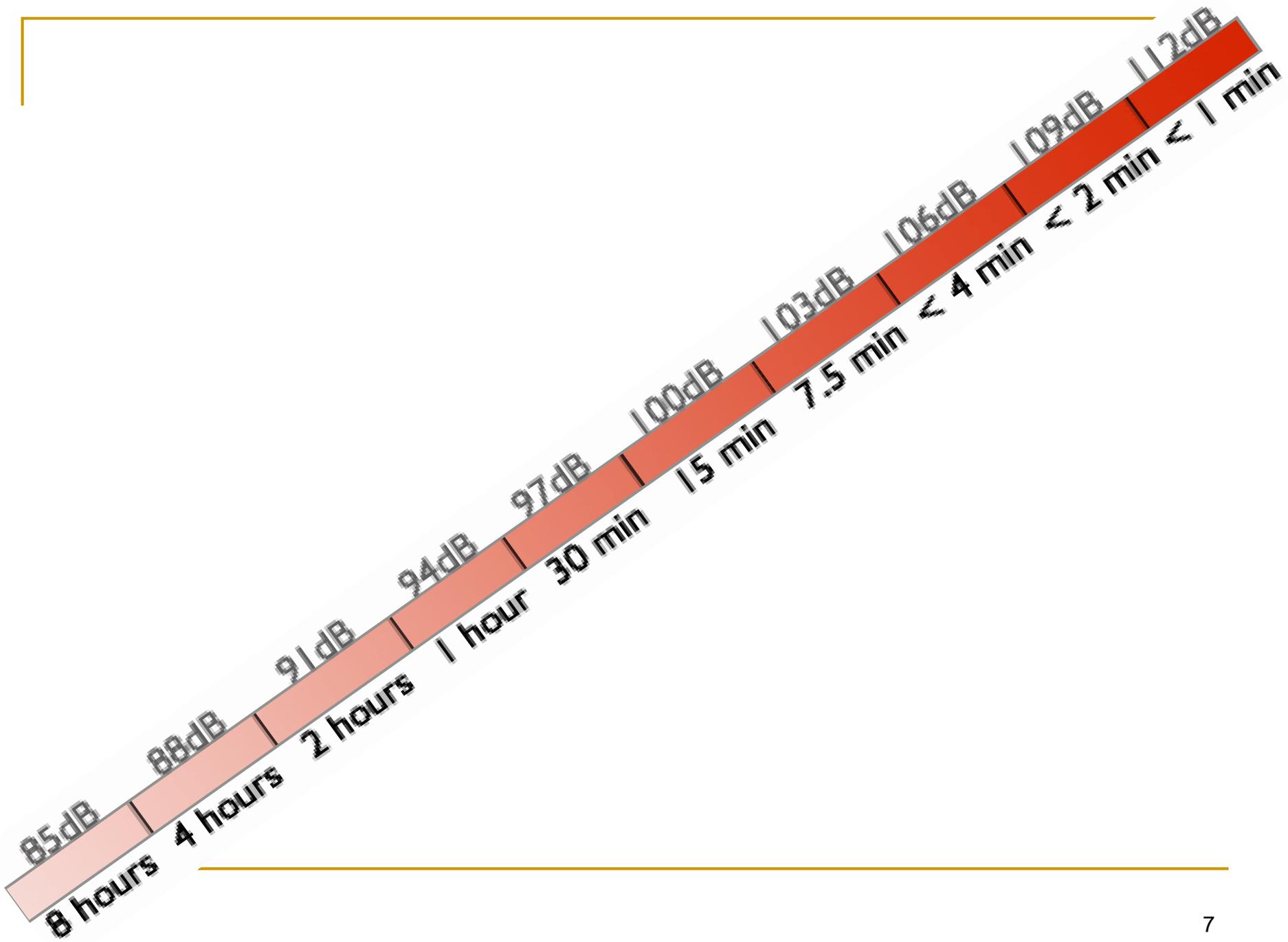
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# Rule of Thumb

- ⦿ When you feel the need to shout in order to be heard 3 feet away, the noise levels are probably 85 dB or more and hearing protectors are recommended.
- ⦿ End shift tinnitus

## Accepted exposure times for noise before damage occurs

Noise Exposure dB(A)	Duration per day before damage occurs
<b>85</b>	<b>8 hours</b>
<b>88</b>	<b>4</b>
<b>91</b>	<b>2</b>
<b>94</b>	<b>1</b>
<b>97</b>	<b>30 min</b>
<b>100</b>	<b>15</b>
<b>103</b>	<b>8</b>
<b>106</b>	<b>4</b>
<b>109</b>	<b>2</b>
<b>115</b>	<b>30 secs</b>



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# Noise survey

- Usually every year
- After qualitative assessment (walk through survey)
- 3 types:
  - Basic survey (with SLM): in continuous exposures
  - Detail survey (with Dosimeter) Variable exposure rate and moving of workers
  - Engineering survey (using SLM and octave band analyzing): For control measures

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# **Noise measurement**

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- *Area noise measurements*
  - *Spot noise measurements*
  - *Personal exposure measurements*
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# Noise-measuring equipment

- *Sound level meters*
    - *non integrating (Basic SLM)*
    - *integrating*
  
  - *Noise dosimeters*
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# *Basic Sound Level Meters*

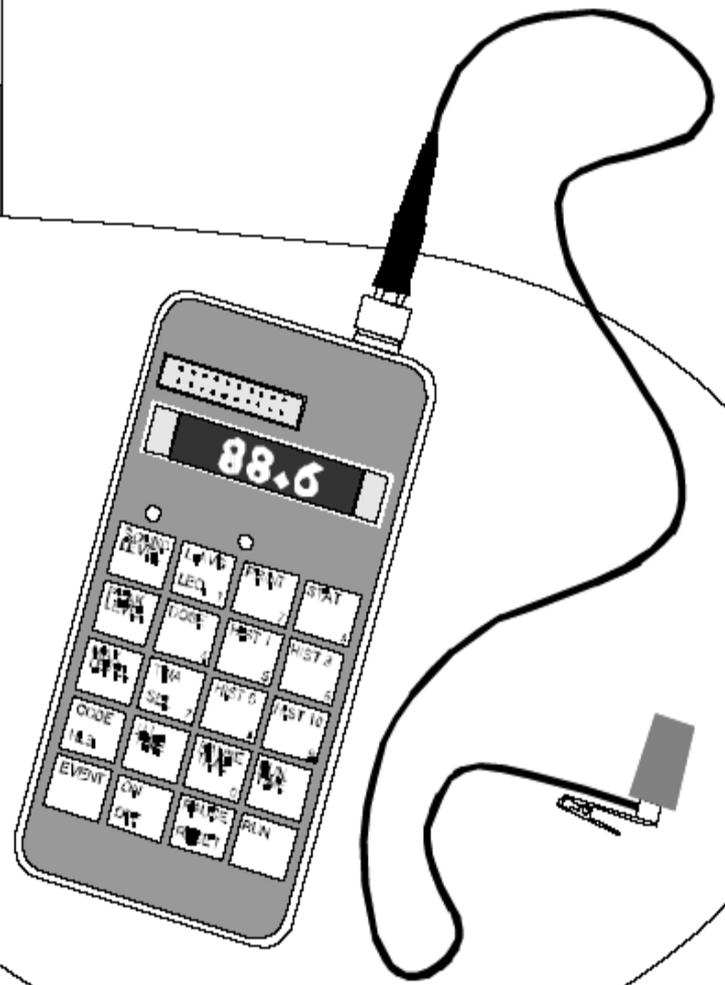


# *Sound level meters (integrating)*



# *Noise dosimeter*







# When should noise measurements be redone?

- Machinery being installed or removed
- Workload or equipment operating conditions changing, causing significant changes in noise levels
- A building's structure changing, (e.g., a wall removed or added)
- The length of time employees spend in noisy areas

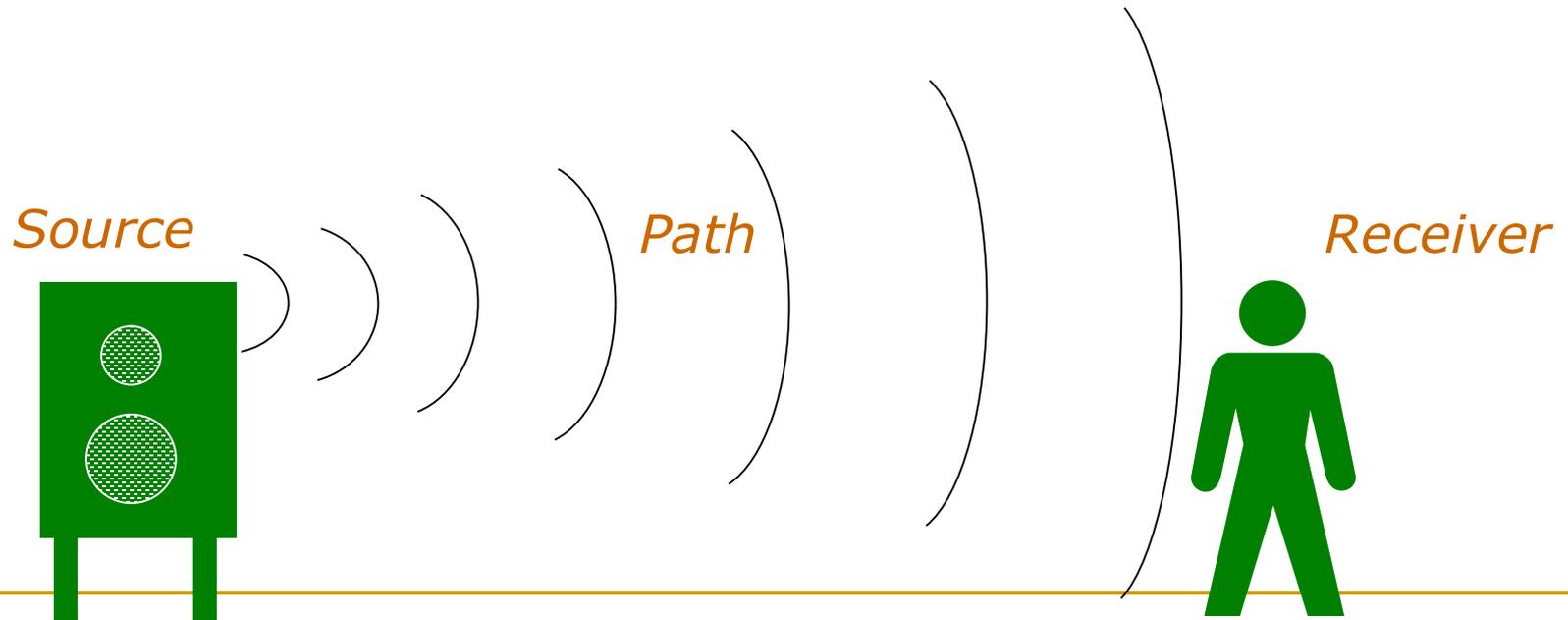
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# Engineering controls

- *Based on the information collected during noise monitoring.*
  - *Possible engineering solutions:*
    - The source*
    - The path*
    - The receivers*
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# Noise control options

- ❑ Control at source
- ❑ Control the noise path
- ❑ Protect the receiver



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# Engineering controls

- *The noise controls may involve the use of:*

*Enclosures*

*Barriers*

*Distance*

- Engineering controls are preferred but are not always feasible because of their **costs** and **limits in technology**.
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# Curtain



# Curtain

Soundmesh G8  
Acoustic Curtain



# Screen



# Screen



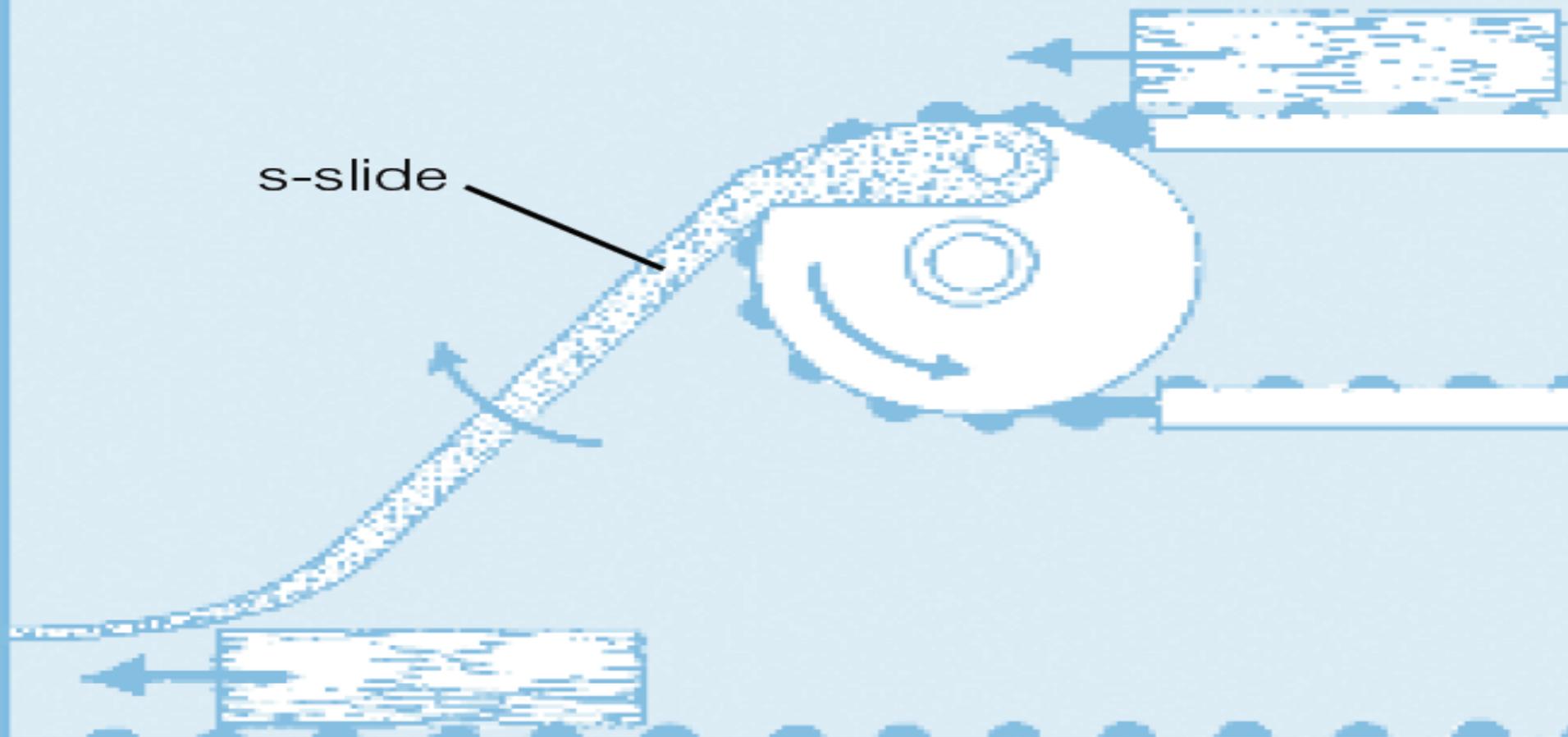
# silencer



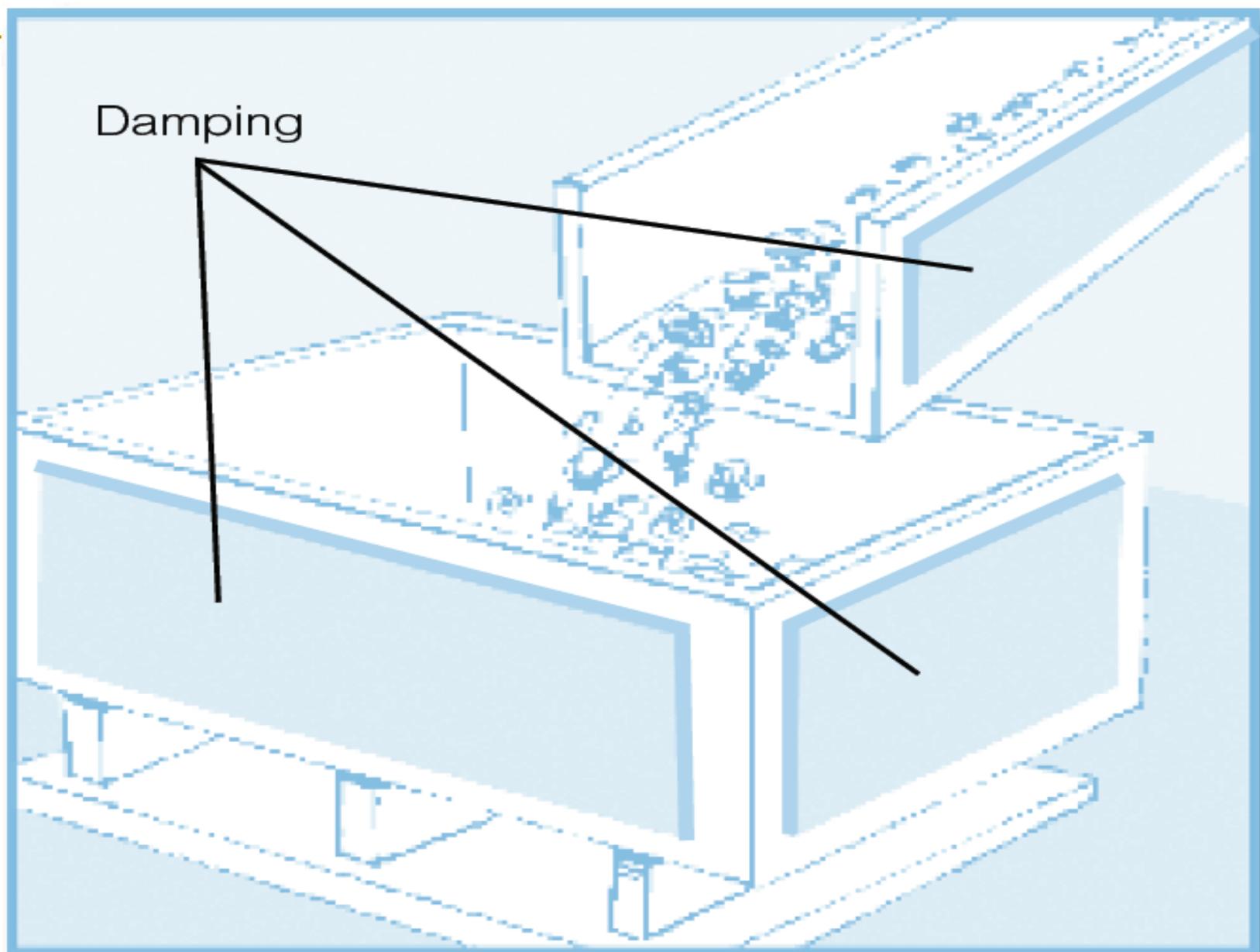
# Noise absorber (for reflected sounds)



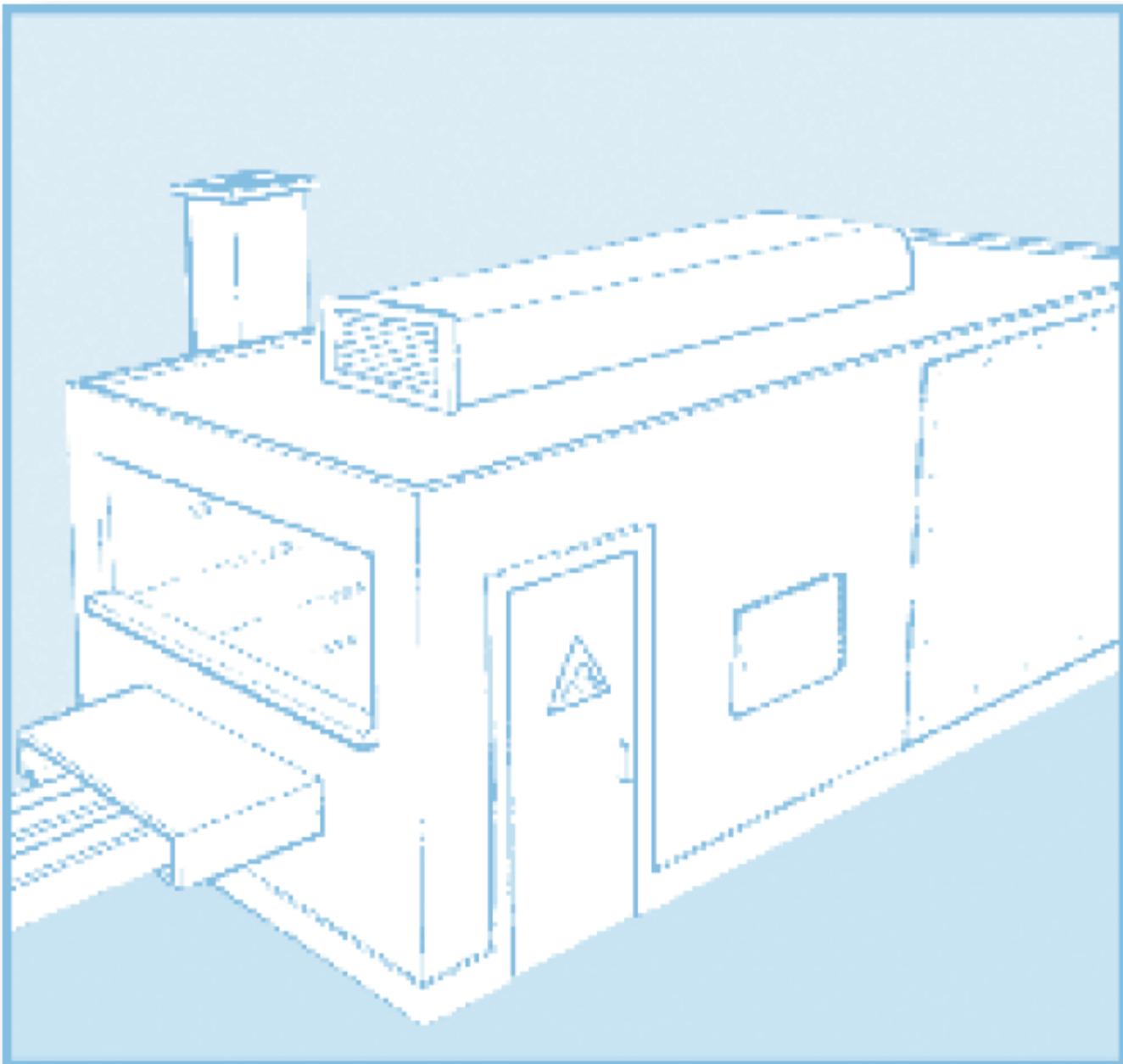
s-slide



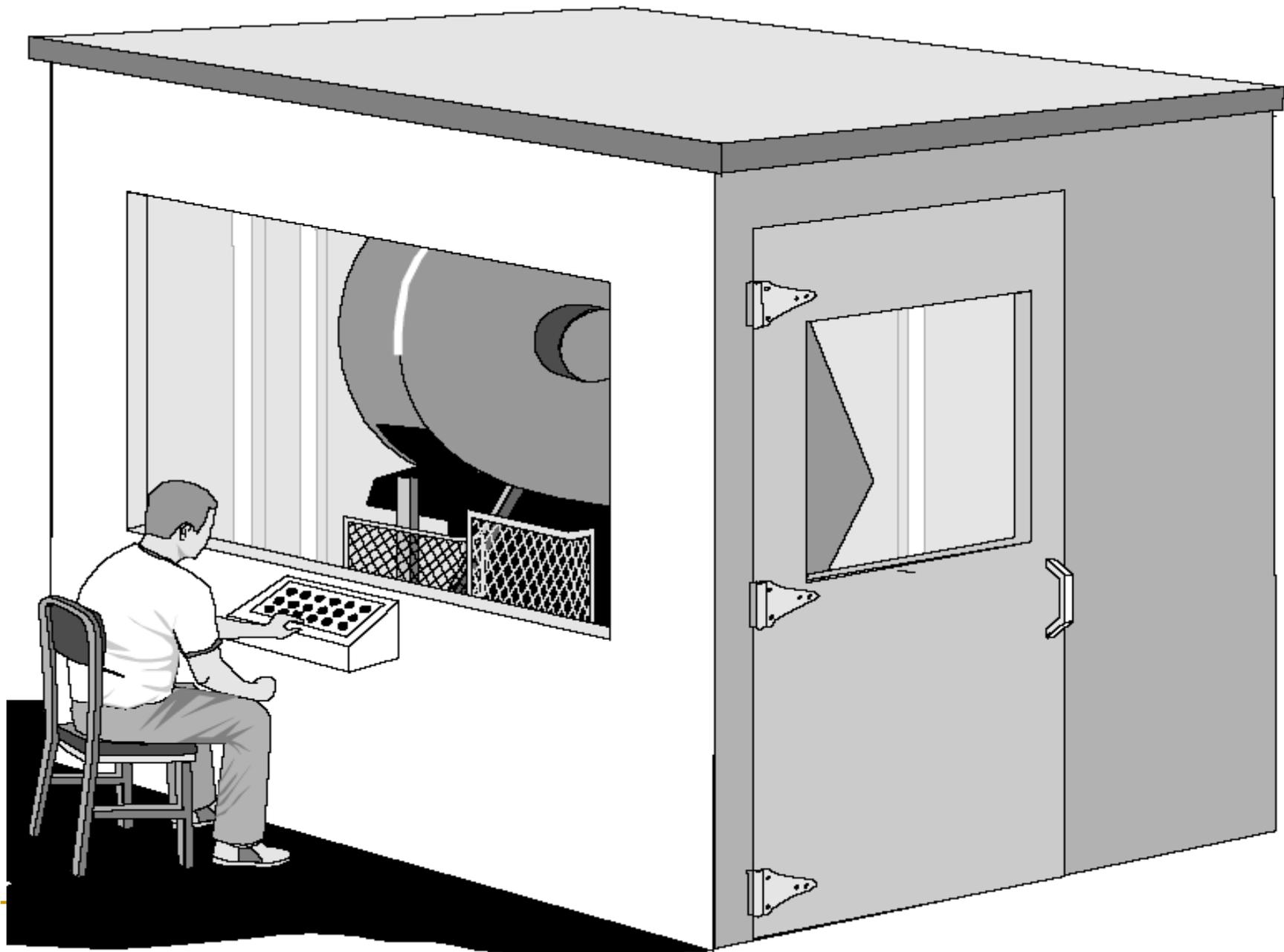
***An s-slide will reduce drop height and deliver material quietly.***

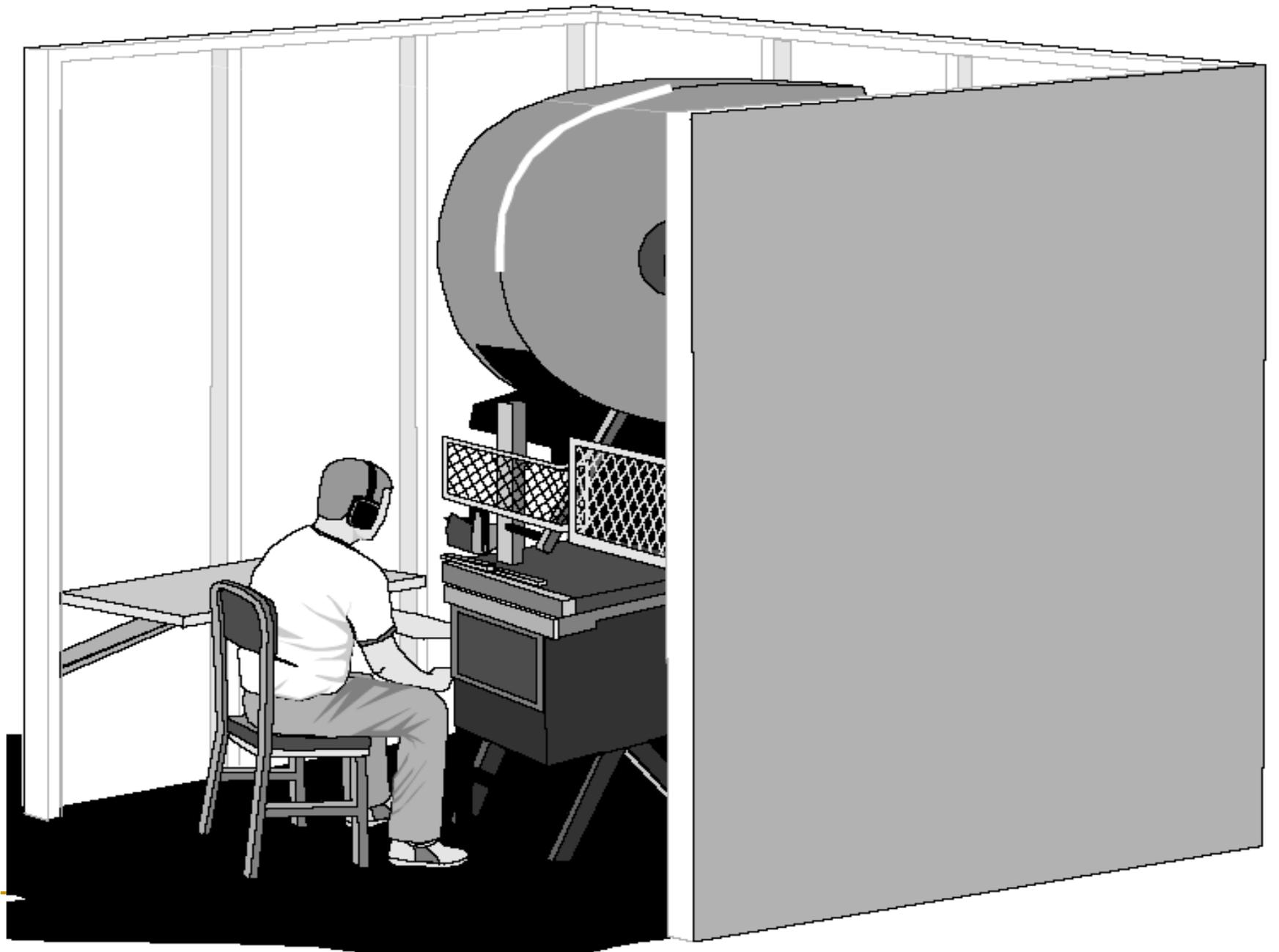


***Damping applied to delivery chutes and bins will reduce noise.***



*Enclosing machinery will reduce noise levels.*





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# Administrative Controls

- Operate noisy equipment on second or third shifts.
- Rotate employees through high-noise areas.
- Modify existing machinery.
- Maintain equip. in good condition.
- Use noise control when installed.
- Reporting noisy equip. to supervisor for repair.



# Hearing Protection



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# Hearing Protection Devices

- *Use of HPDs by employee exposed to TWA noise levels of 85 dBA or greater is recommended.*
  - *HPDs MUST attenuate worker exposure to an 8-h TWA at or below 90 dBA.*
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# When should be used?

- **90 dBA (CON) & 140 dBC (Impulse)**
- **85 dBA and 135 dBC (Impulse noise) if:**
  - **STS**
  - **Not on-time basic audiometry**
  - **Hearing loss due to other reasons**

# Selection of PPE

- راحتی
- کاهش‌دهنده‌ی مناسب
- قابل استفاده با شرایط محیط کار
- قابل استفاده برای خصوصیات آناتومیکی و پاتولوژیکی فرد
- عدم کاهش صداهای مفید
- قابل استفاده همراه با سایر PPE ها

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# *Hearing protection devices*

***There are three basic types of HPDs :***

- (1) Ear plugs or "aurals" (premolded, formable, and custom molded)*
  - (2) Caps or "semiaurals" (with a band that compresses each end against the entrance of the ear canal)*
  - (3) Ear muffs or "circumaurals"*
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# Chronic NIHL

- Personal Hearing Protectors

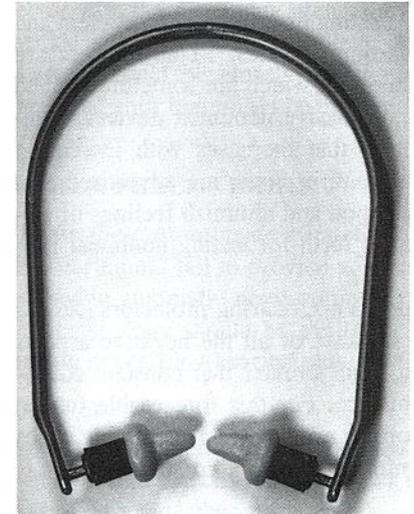
## Earplugs

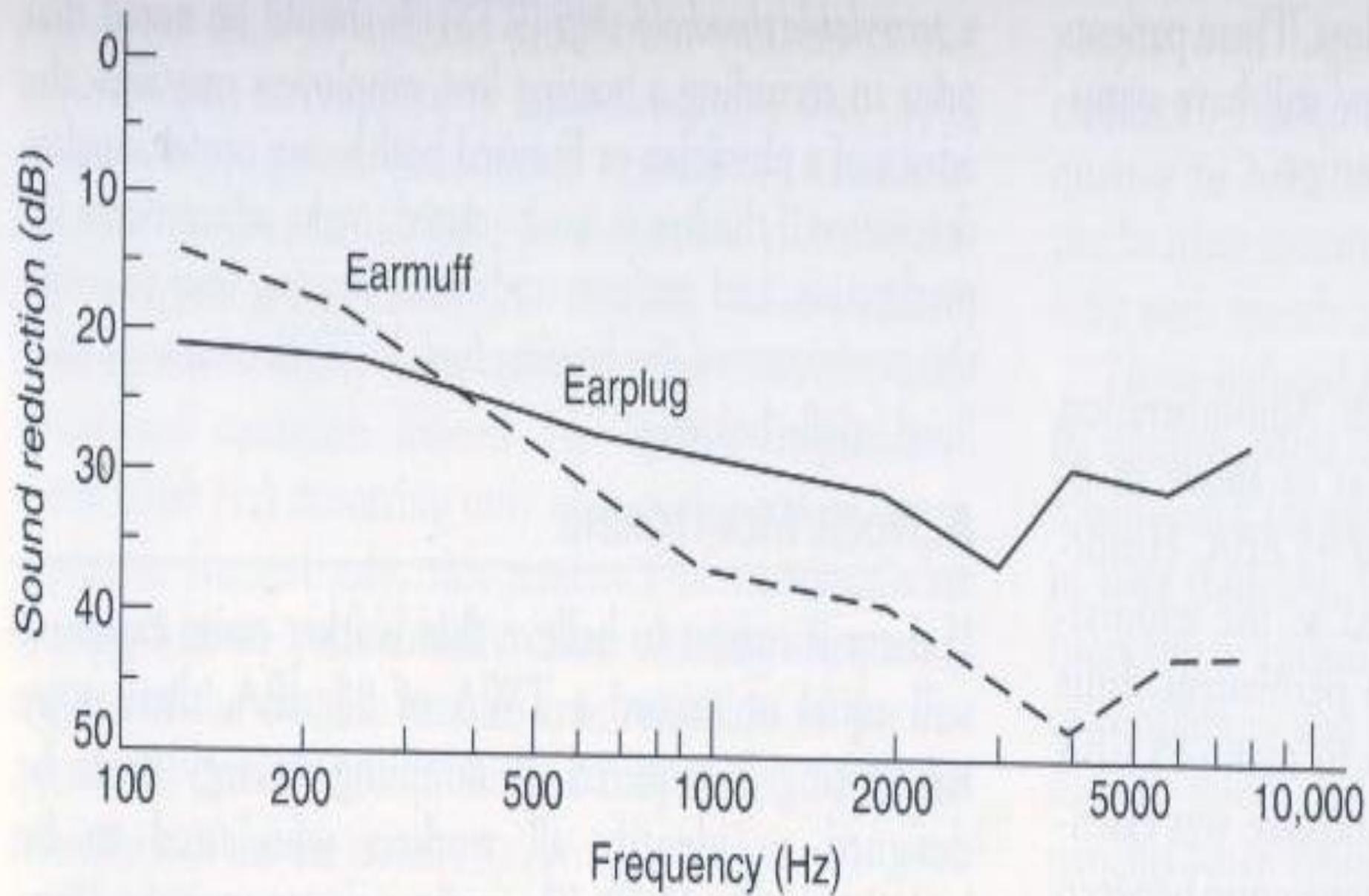


## Earmuffs



## Canal Caps



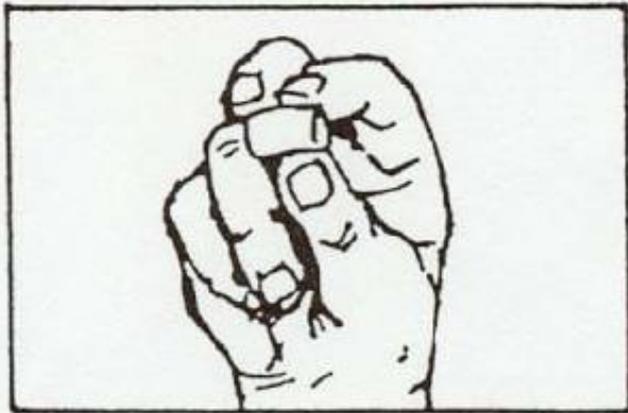


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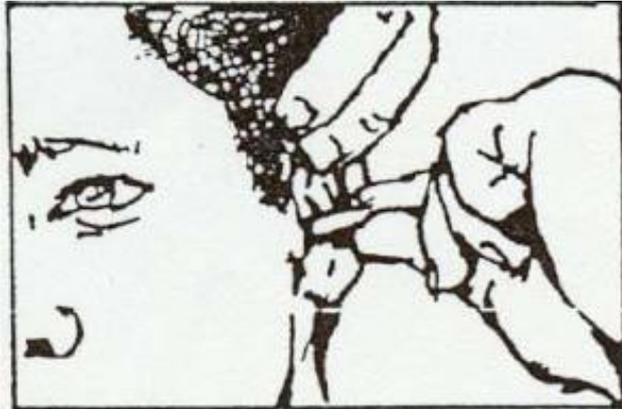
# Ear plug

- PPE of choice among most workers.
- Protection strongly depends on Fitting
- 3 types:
  - Foam
  - Pre molded
  - Custom molded

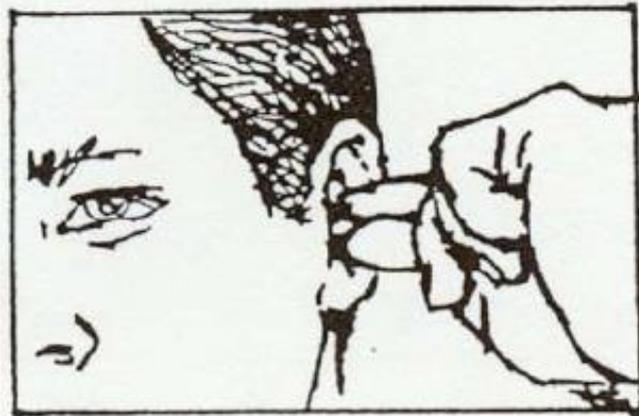
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- ◎ **Roll** the earplug into a tight cylinder (most important step)
  - **pull** the top of your ear to open the canal by the opposite hand
  - ◎ **Insert** earplug into the open canal. If you opened the ear canal properly, you should be able to slide the earplug in easily. If the canal isn't open enough, you will find yourself trying to squish the earplug into place.
  - **Hold** earplug in place until the form expands.



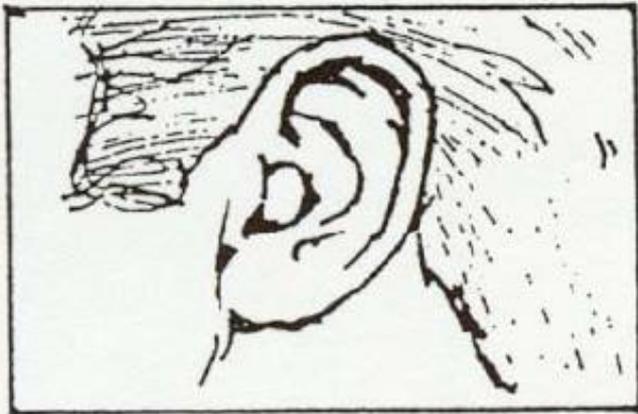
1. Using clean hands, roll and compress the **entire** earplug into a thin cylinder.



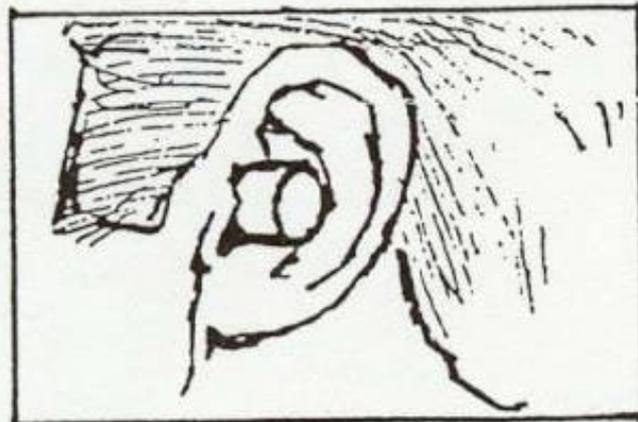
2. To make insertion easier, pull back and up on outer part of ear.



3. Insert earplug into ear canal and hold in place for a few seconds until it expands and blocks out noise.



4. Properly inserted.



5. Not properly inserted.



*Straighten the ear canal before inserting the plug.*

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# Foam earplug



# Foam earplug

- پی وی سی یا پلی اورتان
- برای مناطق گرم و مرطوب
- یک بار مصرف
- آموزش صحیح جاگذاری
- استفاده از ایرپلاگ های اسفنجی در مشاغلی که امکان آلودگی دستها وجود دارد مانند سوهان کاری، فرزکاری، معادن و در محیطهایی که تماس با مواد سوزاننده و محرک وجود دارد مناسب نمی باشد.

# Earplugs

## مزایا

- حمل راحت
- ارزان
- قابل استفاده با سایر وسایل  
فردی
- حرکت راحت سر و گردن

## معایب

- جایگذاری سخت تر
- محدودیت در مشکلات  
گوش و آناتومی
- نیاز به معاینه قبل از  
استفاده

# Pre-molded earplug



# Pre-molded earplug

- لاستیک با روکش سیلیکون
- تعداد پره و رنگهای متفاوت (سبز، نارنجی، آبی)
- قابل شستشو
- قابل حمل

# Pre-molded earplug

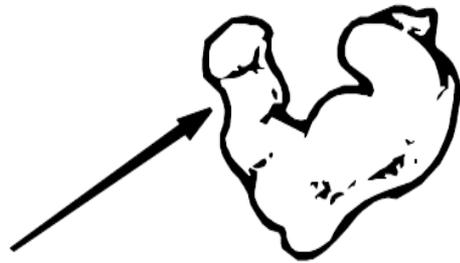
## مزایا

- حمل راحت
- قابلیت استفاده مکرر
- قابلیت شستشو و بادوام

## معایب

- نیاز به معاینه پزشکی قبل از استفاده
- کاهش اثر حفاظتی در جریان صحبت کردن، جویدن ...
- تحریک و آزار گوش در جاگذاری مکرر

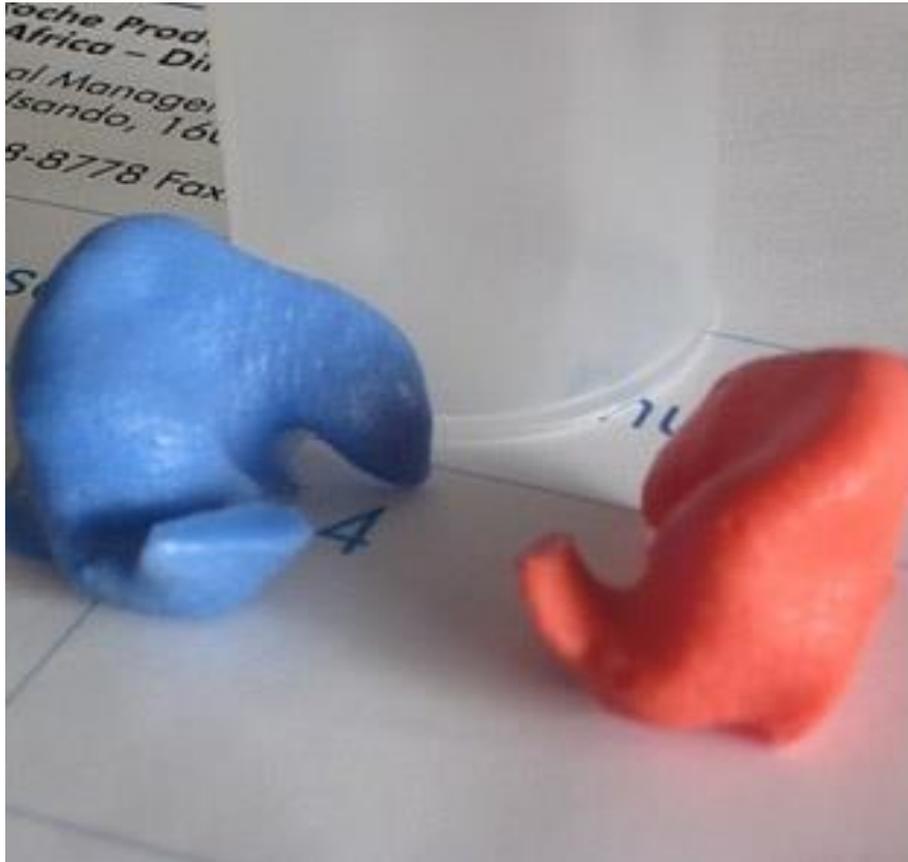
## Custom Molded



Portion that  
enters ear canal



# Custom molded Earplug



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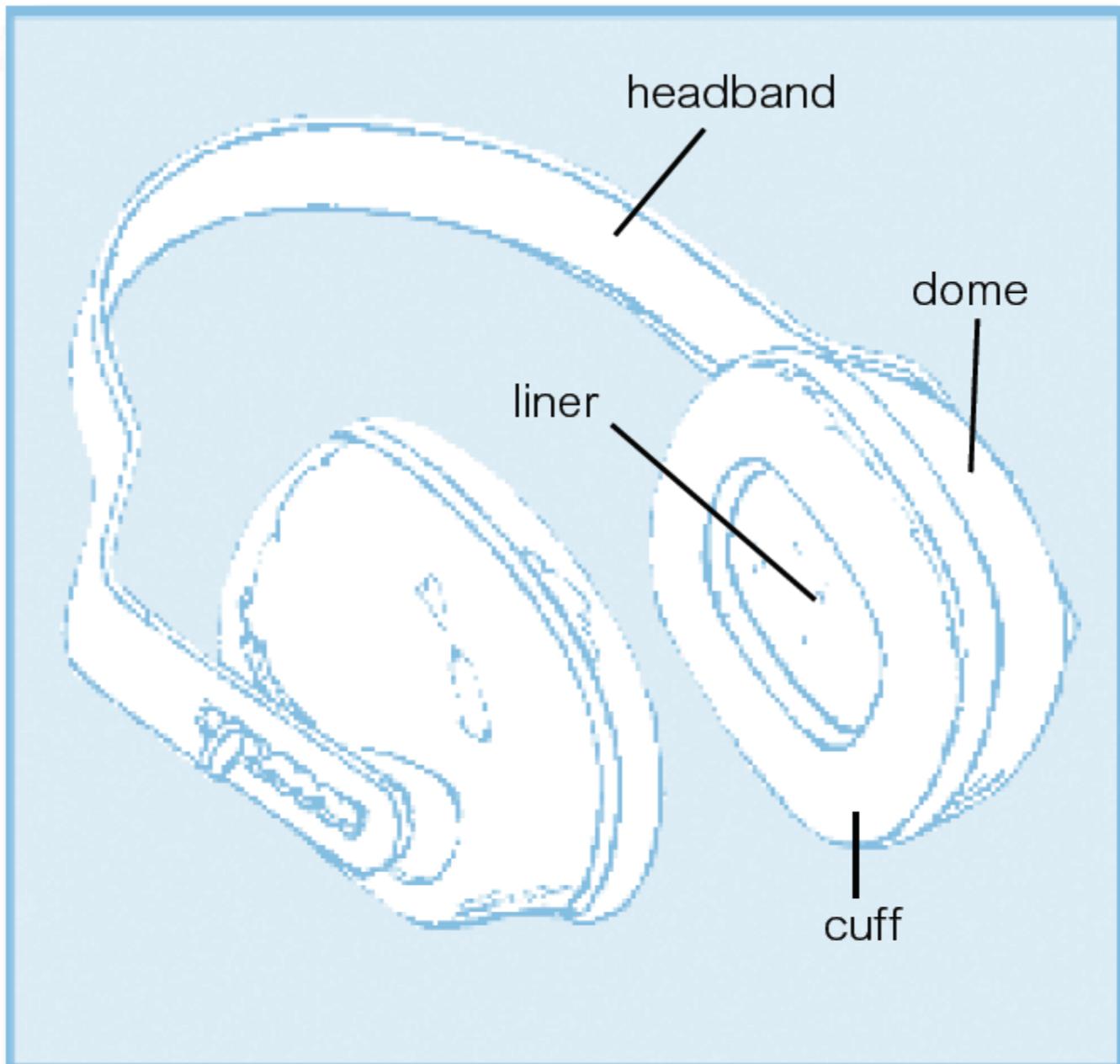
# *Earplugs Maintaining*

- *Compressible earplugs* usually are **discarded** at the end of the day.
  - *Reusable, custom-molded plugs and canal caps* should be **washed at least once a week** to remove wax build up.
  - Use **hand soap and warm water** for washing.
  - *Reusable plugs* should last **6 months to one year** and *custom-molded plugs* should last **2 – 5 years**.
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# *Earmuffs*





*These are the key parts of a typical earmuff.*

# Hearing protection devices



*Earmuff headbands may be worn over the head, behind the head, or under the chin.*

# Earmuff

## مزایا

- حفاظت مناسب
- کنترل مناسب
- عدم نیاز به معاینه

## معایب

- گران
- سنگین
- ناراحتی در گرما و رطوبت
- مشکلات استفاده توام با سایر وسایل
- کم کفایتی در موارد وجود موی بلند و ریش

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- مواجهه با گاز ازن تولید شده توسط بعضی از ژنراتورها و در جریان جوشکاری می توانند سبب سفت شدن فوم موجود در **DOME** ایرماف شوند .
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# *Earmuffs maintaining*

- The hard plastic domes are **wiped with a damp cloth.**
  - The domes should last approximately **2 years.**
  - Cuff replacement is recommended every **6 months.**
  - If the liner is discolored, hardened, or extremely solid or mildewed, it should be *replaced*.
  - Headbands should be *adjusted or replaced* as required to maintain adequate pressure.
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## Protection Outcomes at Various Resulting Sound Levels

*Sound level resulting from the use of the protector (dBA)*

*Protection outcome*

85+

Insufficient

80–85

Acceptable

75–80

Optimal or Ideal

70–75

Acceptable

Less than 70

Overprotection

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- Workers whose 8 Hour TWA exposure is  $> 100$  dBA should use double protection