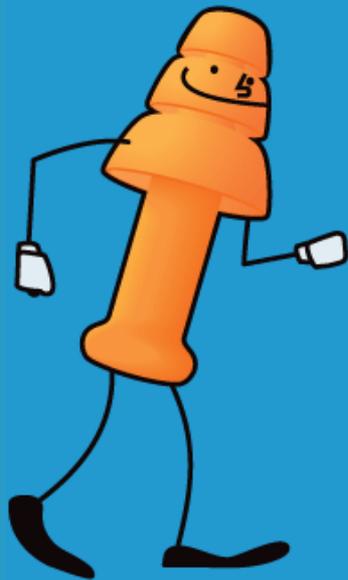
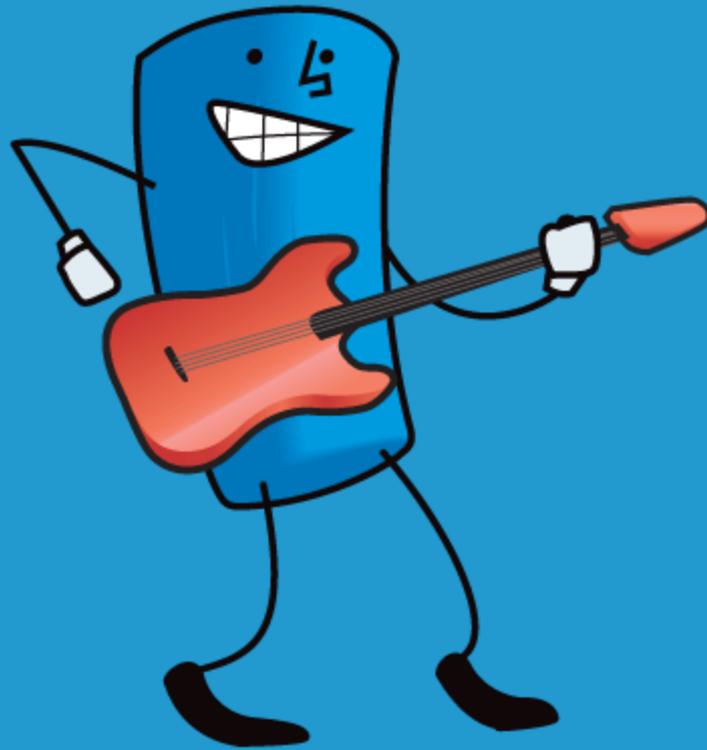


HEARING CONSERVATION

Presented by the Bacou-Dalloz Hearing Safety Group

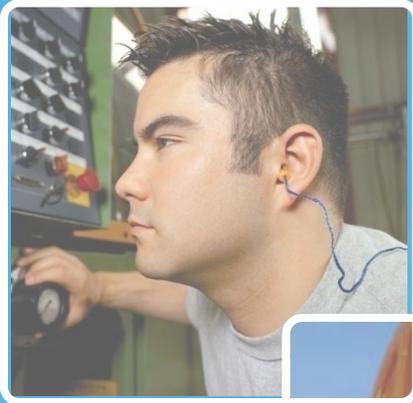


NOISE AND ACOUSTICS



NOISE AND ACOUSTICS

on the job



and off the job.



NOISE AND ACOUSTICS

Noise-Induced Hearing Loss

- Causes no pain
- Causes no visible trauma
- Leaves no visible scars
- Is unnoticeable in its earliest stages
- Accumulates with each over-exposure
- Takes years to diagnose

Is permanent and 100% preventable

NOISE AND ACOUSTICS

HOUSEHOLD NOISE

170 dB



120 dB



94 dB



74 dB



58 dB



OCCUPATIONAL NOISE

140 dB



112 dB



100 dB



85 dB



60 dB



160 dB

Immediate Physical Damage

115 dB

Unprotected Noise Exposure
of Any Duration Not Permitted
Above This Level

90 dB

Hearing Protection Required by OSHA

85 dB

Ear Damage Possible

50 dB

Comfortable

NOISE AND ACOUSTICS

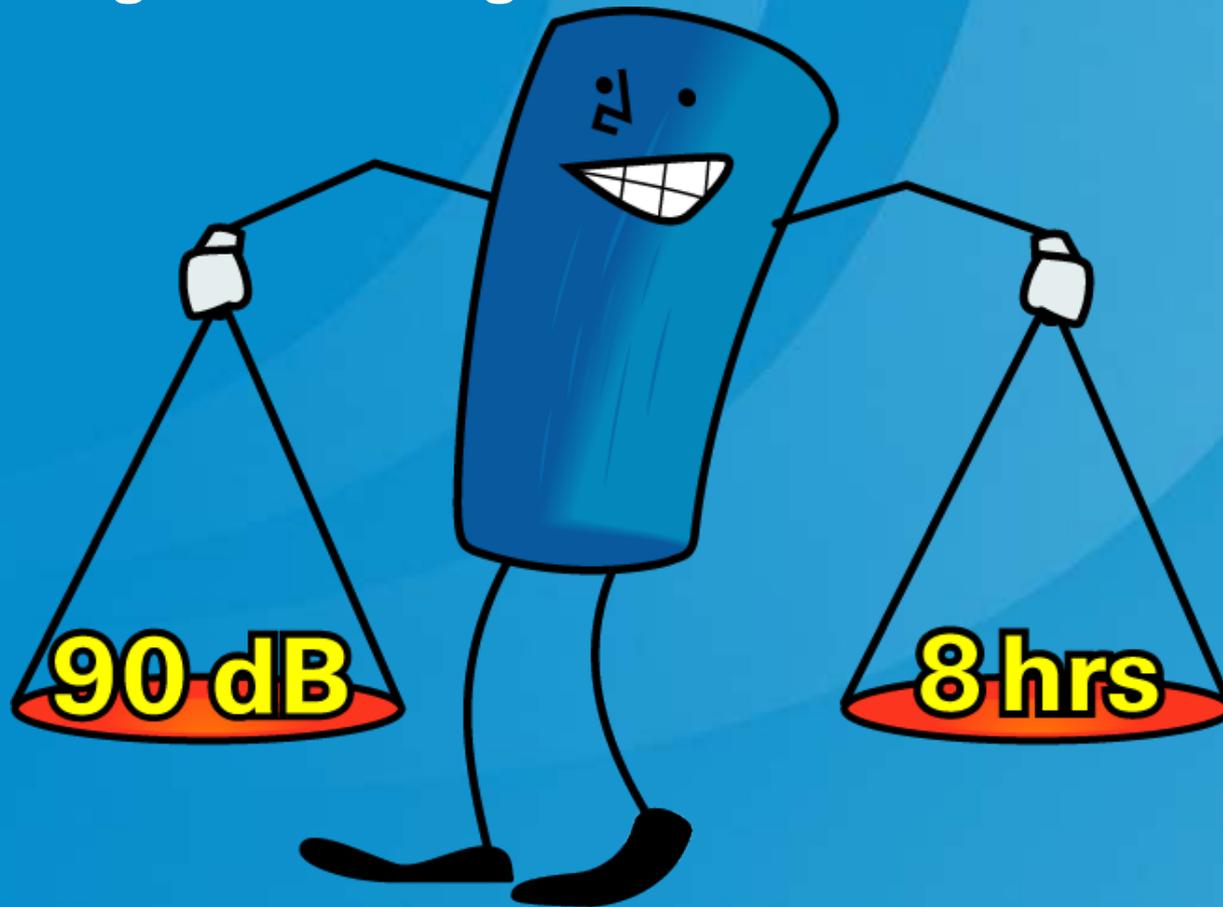
How do I know if the noise levels are hazardous?

If you must shout to be understood over the background noise when standing about one arm-length away from somebody,

that background noise is hazardous.

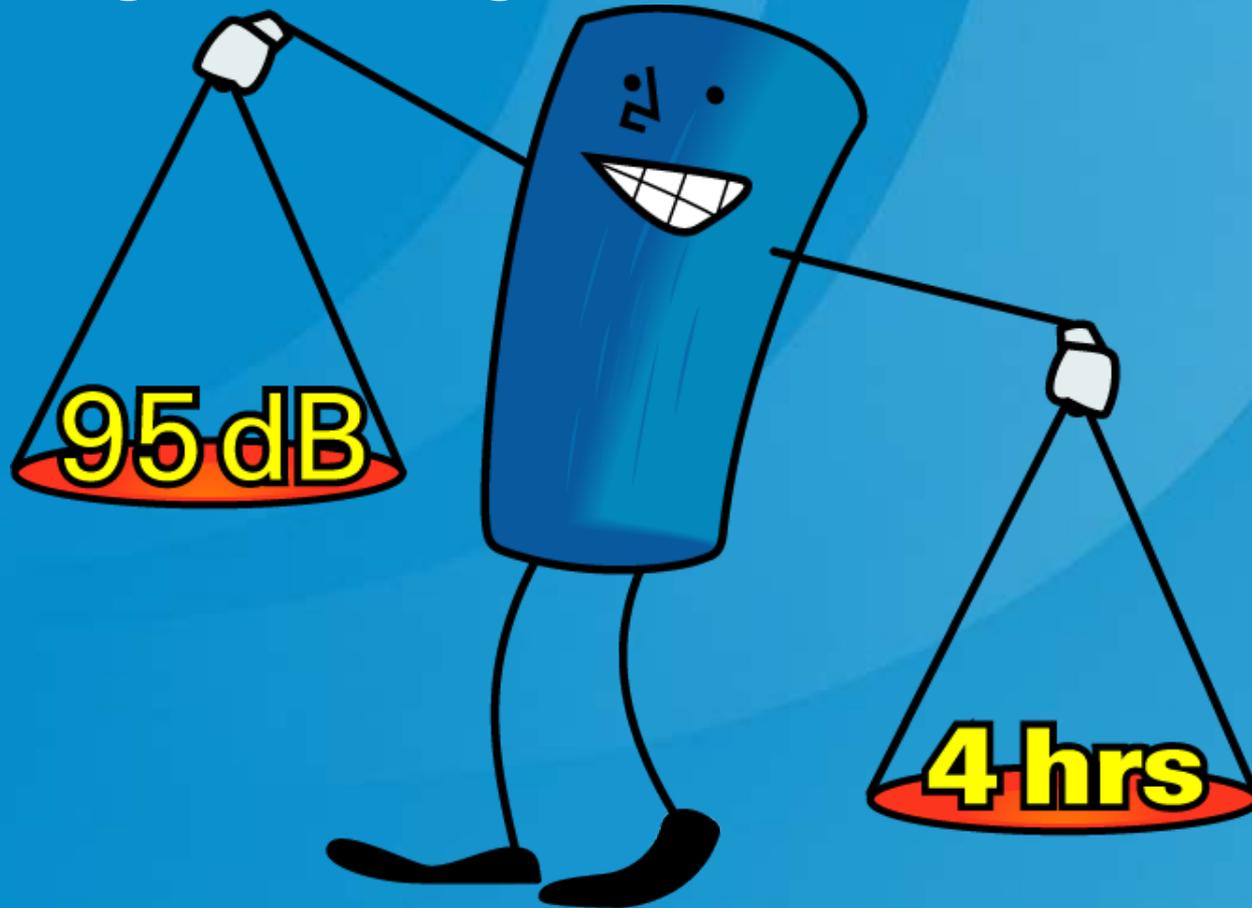
NOISE AND ACOUSTICS

Time-Weighted Average



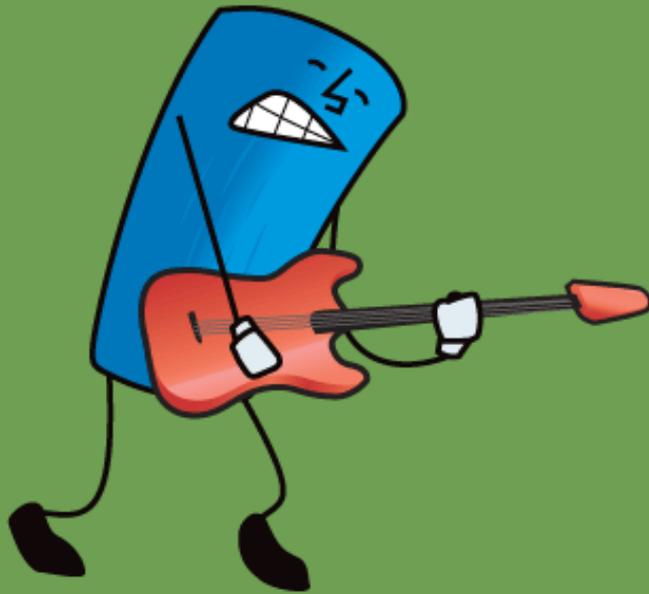
Permissible Exposure Limits

OSHA STANDARD Time-Weighted Average



Permissible Exposure Limits

HOW WE HEAR



HOW WE HEAR

- Sound waves cause the eardrum to vibrate
- Bones in middle ear transmit vibrations to cochlea
- Receptors (hair cells) in cochlea convert vibrations to electrical energy
- Brain interprets these electrical impulses as sound



HOW WE HEAR

- Nerve cells in the cochlea are tuned to specific frequencies
- Base of the cochlea is sensitive to high frequency sounds
- Tip of the cochlea is sensitive to low frequency sounds



HOW WE HEAR

17-year old girl

- Low noise exposure
- Normal cochlea
- Receptors intact



76-year old man

- Low noise exposure
- Fewer receptors but still intact



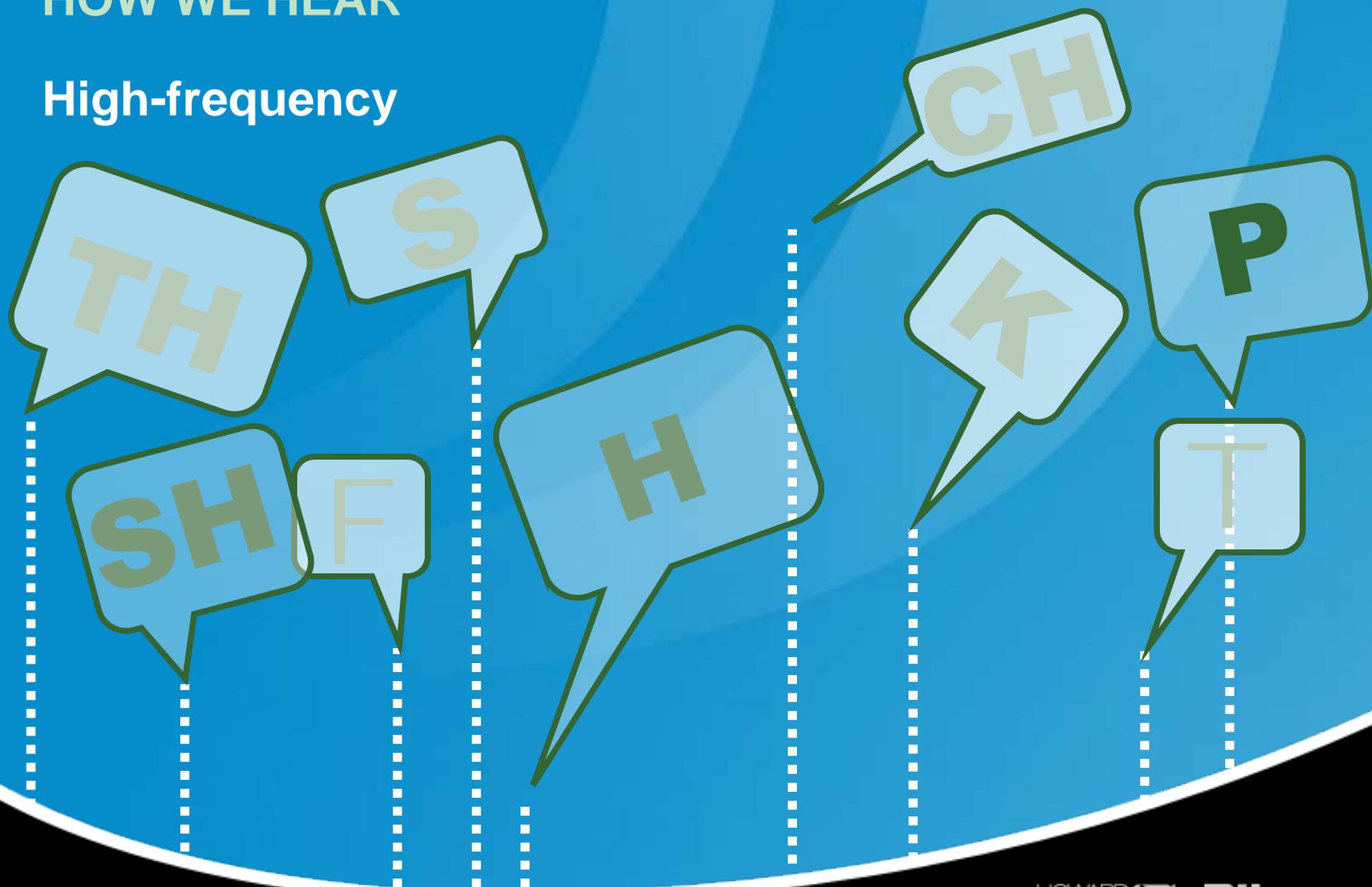
59-year old man

- High noise exposure
- Damaged cochlea
- Receptors destroyed



HOW WE HEAR

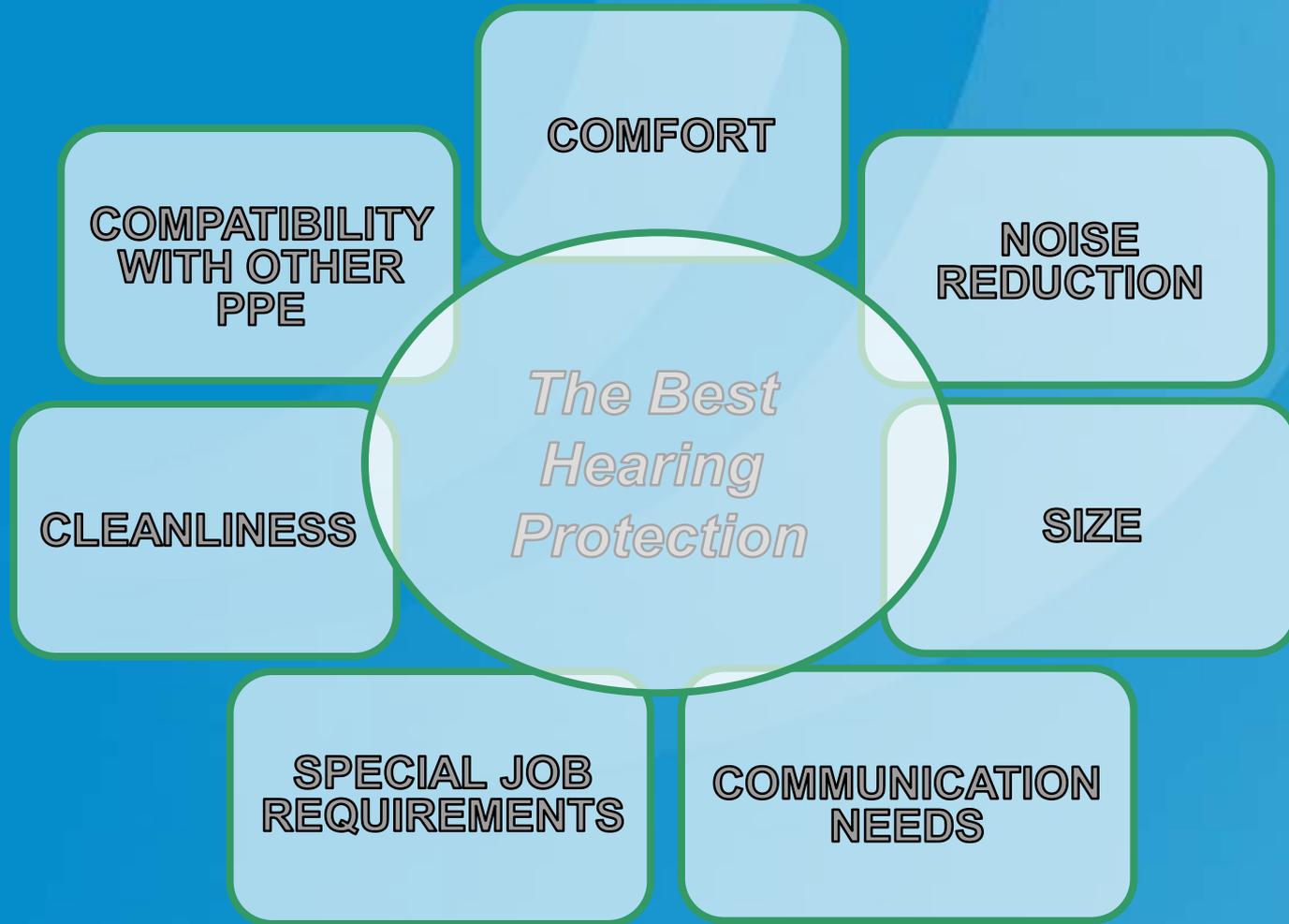
High-frequency



HPD SELECTION



HPD SELECTION



HPD SELECTION

Common Objections to Wearing HPDs

“I already lost some of my hearing, so why should I wear them?”

“Can I hurt my eardrums if I insert a plug to deeply.”

“I can’t hear my co-workers if I wear them.”

“I don’t need them, I am used to the noise.”

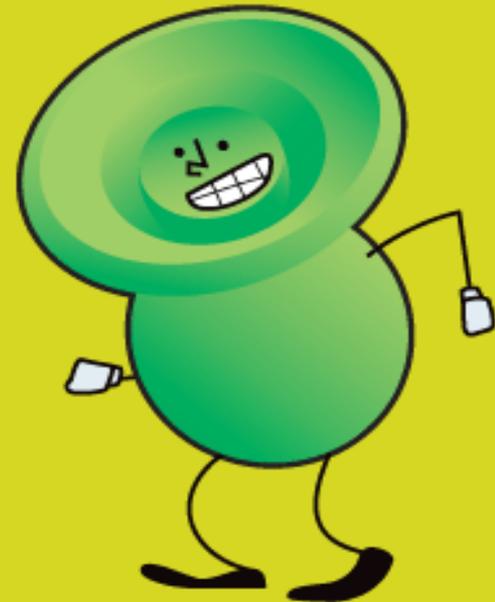
“My machine sounds different.”

“Hearing protectors are uncomfortable.”

“Won’t I get an ear infection?”

“I can always get a hearing aid.”

FITTING TIPS



FITTING TIPS

Find the Right Size



Maximum protection is only accomplished when an earplug acoustically seals in the ear canal.

No earplug fits all ear canals, so manufacturers have responded with a variety of sizes.

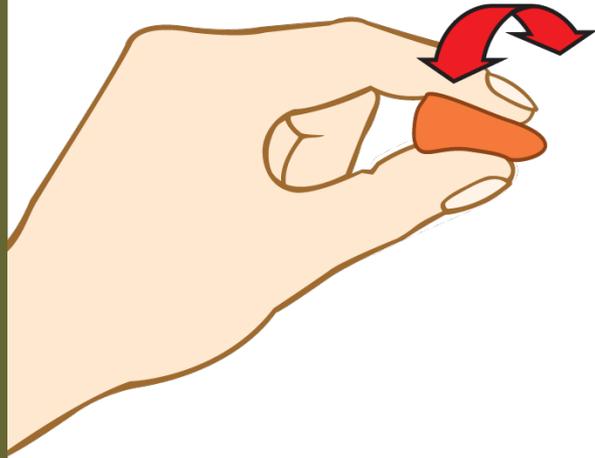
It is important to find your right size to obtain an acoustic seal

FITTING TIPS

ROLL-DOWN FOAM

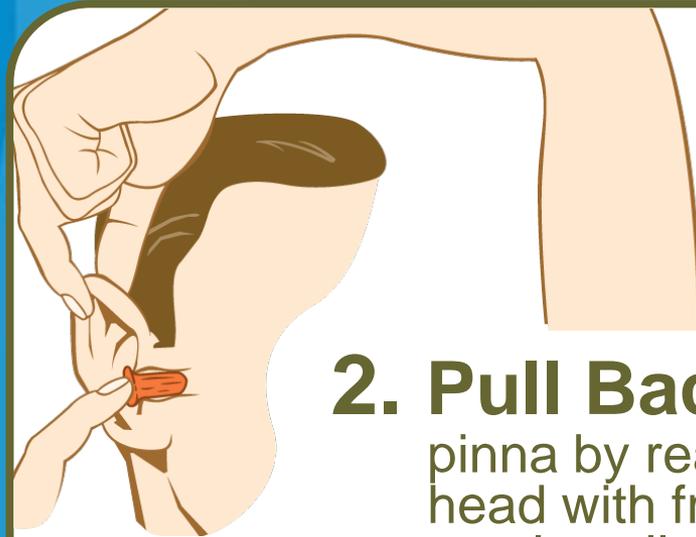
1. Roll

entire earplug into a
crease-free cylinder



2. Pull Back

pinna by reaching over
head with free hand,
gently pull top of ear up
and out



3. Insert

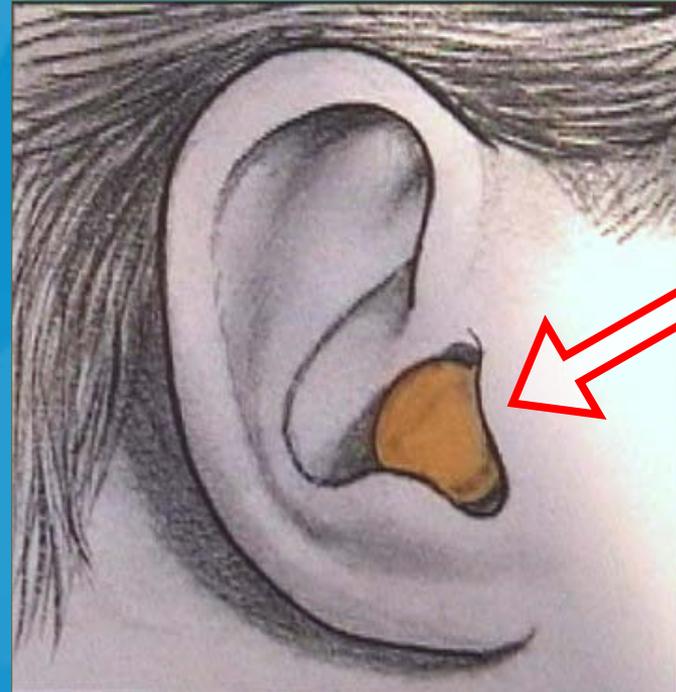
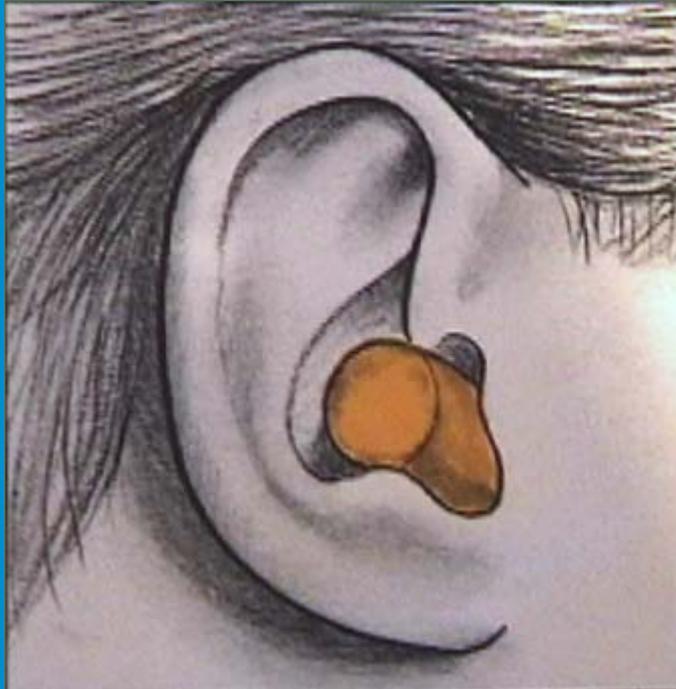
earplug well
into ear canal
and hold until
it fully expands





FITTING TIPS

Visual Check for Foam Earplugs



If properly fitted, the end of the earplugs should not extend beyond the tragus (flap of the ear canal).



NO-ROLL FOAM EARPLUGS

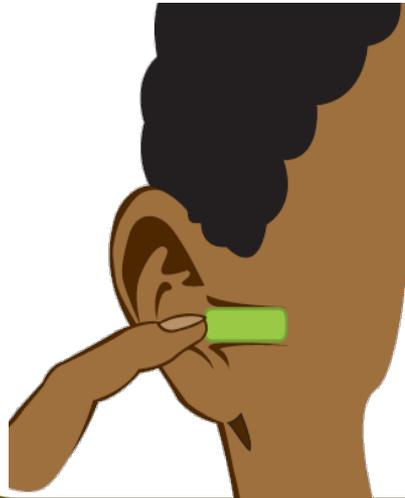
1. Reach

over head with free hand, pull ear up and back and insert earplug well inside ear canal.



2. Earplugs

should be inserted as shown in these drawings. Stop pushing earplug when finger touches the ear.



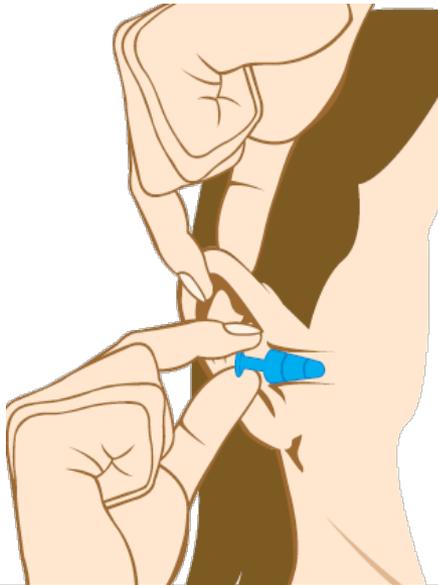
3. If properly

fitted, the end of the earplugs should not be visible to someone looking at you from the front.

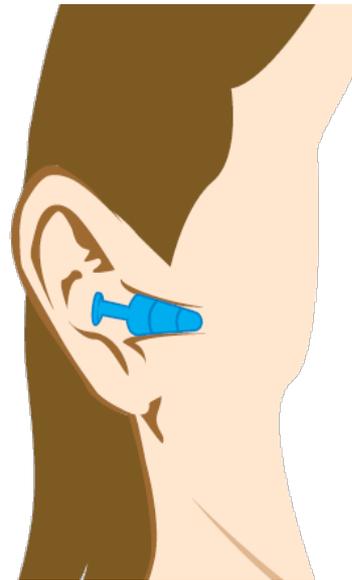


MULTIPLE-USE EARPLUGS

1. While holding the stem, reach hand overhead and gently pull top of ear up and back.



2. Insert earplug so all flanges are well inside the ear canal.



3. If properly fitted, only the stem of the earplugs should be visible to someone looking at you from the front.

EARPLUGS (ALL)

1. Visual Check - The earplug should sit well inside the ear canal and not stick out.



2. Acoustical Check - Cup hands over ears and release. Earplugs should block enough noise so that covering your ears with hands should not result in a significant noise difference.



EARMUFF INSTRUCTIONS

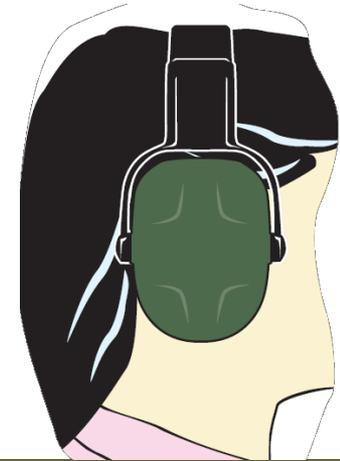
1. Place earcups over each outer ear



2. Adjust the headband by sliding the headband up or down at the attachment buttons



3. The ear cushions should seal firmly against the head



EARMUFF INSTRUCTIONS – DON'TS

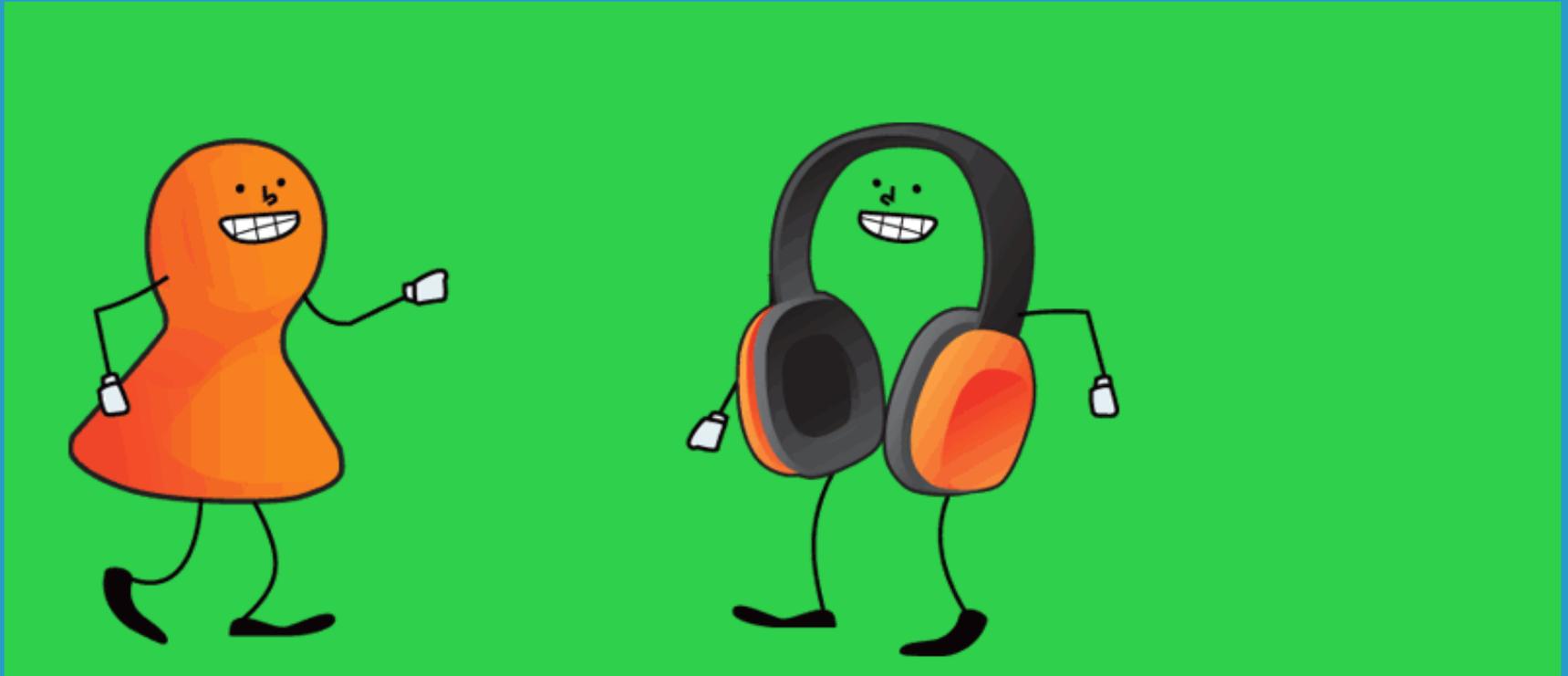
For best results, remove all hair from underneath earcup.



Ensure that the earcup creates a seal and covers the ear completely.



PRODUCTS



PRODUCTS

Types of Hearing Protectors

Earplugs

- Single-Use
- Multiple-Use
- Detectable

Banded Protectors

- Banded Earplugs
- Canal Caps

Earmuffs

- Standard (Headband)
- Cap-Mounted
- Electronic
- Special Application



PROS AND CONS OF HPDs – EARPLUGS



PRO

- Comfortable for extended use
- Disposable earplugs available
- Cooler in hot/humid environments

CON

- Attenuation highly dependent upon good fit
- Hygiene issues in dirty environments

CARE & MAINTENANCE OF HPDs – EARPLUGS



- Dispose of single-use earplugs daily
- Clean multiple-use earplugs with mild soap and water, dry thoroughly
- Inspect multiple-use earplugs for dirt, cracks or hardness, replace if damaged

PROS AND CONS OF HPDs – BANDED EARPLUGS



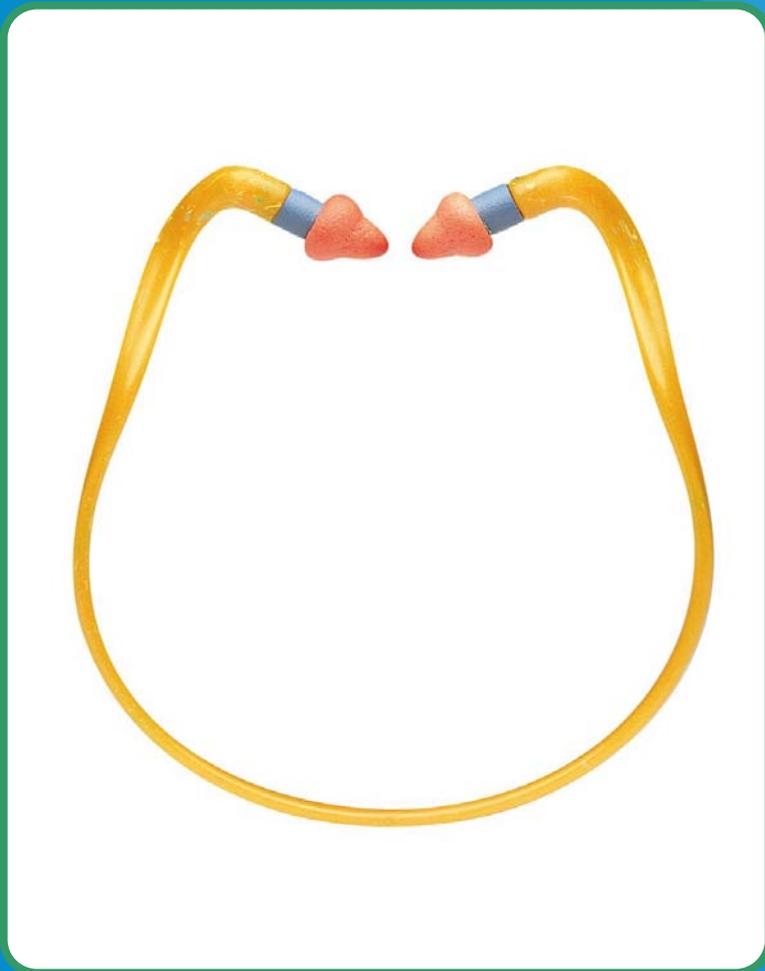
PRO

- Very convenient for intermittent noise
- Readily available around neck when not in use

CON

- Lower attenuation than most earplugs
- Some noise transmission through band

CARE & MAINTENANCE OF HPDs – BANDED EARPLUGS



- Clean and replace pods regularly

PROS AND CONS OF HPDs – EARMUFFS



PRO

- Easy to get proper fit
- Good for intermittent noise
- Radio & electronic options

CON

- Can feel hot/heavy with extended wear
- Compatibility with other PPE?

CARE & MAINTENANCE OF HPDs – EARMUFFS



- Clean ear cushions and headband regularly with mild soap and water
- Replace ear cushions and foam inserts every 6 months with normal wear, more often with heavy use or under humid/extreme conditions

Hearing Loss Due To Noise Exposure Is ...

**Painless
Permanent
Progressive**

... and very PREVENTABLE!

THE END

