



OH COW

Occupational Health Clinics
for Ontario Workers Inc.



Time weighted average Humidex Calculations

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Humidex-Based Heat Response Plan

Training Outcome Items:

Training Outcome

The worker(s) / supervisor:

- 1. train everyone to recognize sign & symptoms and know how to respond to them**
2. measure temperature & relative humidity & convert to Humidex
3. adjust for clothing and radiant heat (sun)
4. find response on chart

- ☐ can explain what heat rash is and how to treat it
- ☐ knows the symptoms of heat syncope and how to respond
- ☐ are aware of the cause of muscle cramps and know what to drink to counter these symptoms
- ☐ can recognize the symptoms of heat exhaustion – realize need for immediate medical attention
- ☐ understands the danger of heat stroke and the need to watch others for unusual behaviour or collapse
- ☐ understand that heat stroke is a life-or-death medical emergency
- ☐ knows who is responsible to contact EMS in the event of a medical emergency
- ☐ knows the heat stress limit for body temperature
- ☐ understands that heart rate can also be monitored
- ☐ knows how much water to drink
- ☐ knows how to check the adequacy of their hydration status (colour of urine)
- ☐ knows where to get water when they need it
- ☐ understands the need to drink more than by thirst alone
- ☐ knows the amount of water to drink every 20 minutes
- ☐ are aware of the emergency procedures should someone faint, collapse or become confused
- ☐ understands that the body generates heat during activity and realize that slowing down/resting will control heat stress
- ☐ realize that personal cooling options are available and need to be customized to the individual
- ☐ know the physical and health conditions that pose risk factors for heat stress

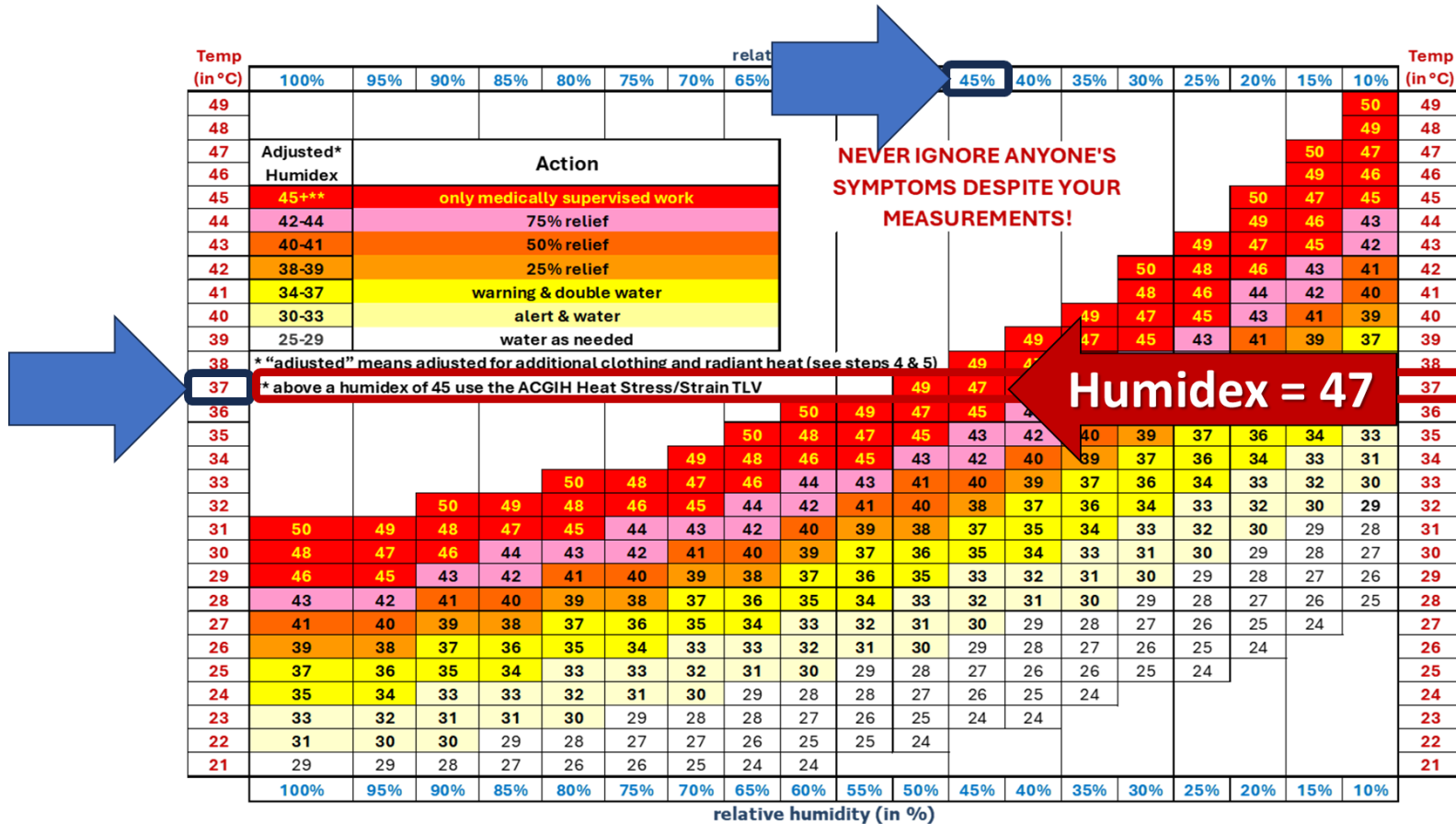
Humidex-Based Heat Response Plan

1. train everyone to recognize sign & symptoms and know how to respond to them
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Humidex-Based Heat Response Plan

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Humidex-Based Heat Response Plan

Annex 3: Clothing Adjustment Values

1. train everyone to recognize sign & symptoms and know how to respond to them
2. measure temperature & relative humidity & convert to Humidex
3. **adjust for clothing and radiant heat (sun)**
4. find response on chart



ACGIH clothing adjustment values	°C WBGT	Humidex
Short Sleeves and Pants of Woven Material	-1.0	-2
Work Clothes (Long Sleeve Shirt and Pants)	0.0	0
Cloth (woven material) Coveralls over underwear	0.0	0
thin disposable SMS Polypropylene Coveralls over underwear	+0.5	+1
disposable polyolefin (Tyvek) coveralls over underwear	+1.0	+2
Adding a Hood (Full Head and Neck Covering; not Face)	+1.0	+2
Double Layer Woven Clothing (e.g., coveralls over work clothes)	+3.0	+6
Limited-Use Vapor-Barrier Coveralls with Hood	+11.0	+22
derived clothing adjustment values	°C WBGT	Humidex
impervious gloves	+0.2	+0.4
impervious apron	+0.3	+0.6
additional protective sleeves	+0.2	+0.4
leather welding jacket	+1.5	+3.0
medical mask	+0.05	+0.1
N95 disposable respirator	+0.1	+0.2
half face piece elastomeric demand respirator	+0.2	+0.4
ear muffs	+0.1	+0.2
toque	+0.6	+1.2
hard hat	+0.2	+0.4
goggles	+0.1	+0.2
face shield	+0.1	+0.2
woven fabric hospital gown	+1.5	+3.0

Humidex-Based Heat Response Plan

1. train everyone to recognize sign & symptoms and know how to respond to them
2. measure temperature & relative humidity & convert to Humidex
3. adjust for clothing and radiant heat (sun)
4. **find response on chart**

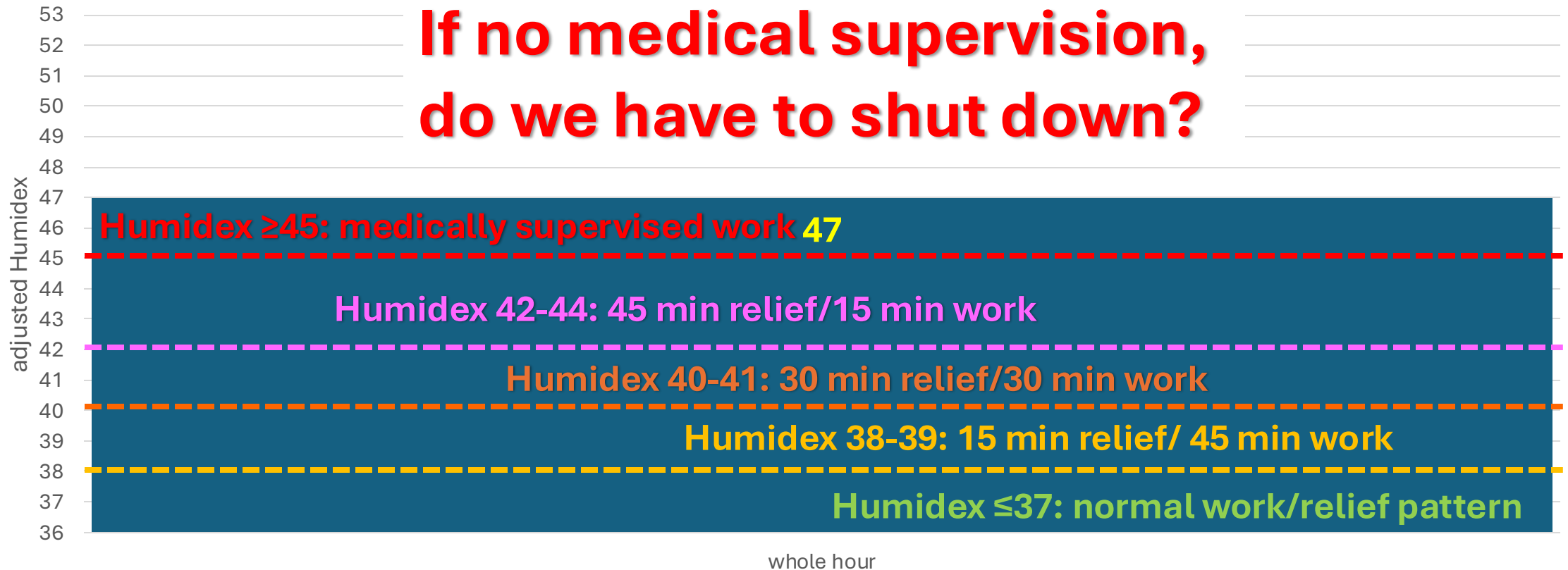
Adjusted* Humidex	Response
25 – 29	supply water to workers on an “as needed” basis
30 – 33	post Heat Stress Alert notice; encourage workers to drink extra water; start recording hourly temperature and relative humidity
34 – 37	post Heat Stress Warning notice; notify workers that they need to drink extra water; ensure workers are trained to recognize symptoms
38 – 39	work with 15 minutes relief per hour can continue; provide adequate cool (10-15°C) water; at least 1 cup (240 mL) of water every 20 minutes worker with symptoms should seek medical attention
40 – 41	work with 30 minutes relief per hour can continue in addition to the provisions listed previously
42 – 44	if feasible, work with 45 minutes relief per hour can continue in addition to the provisions listed above
45** or over	only medically supervised work can continue

* “adjusted” means adjusted for additional clothing and radiant heat

** at Humidex above 45, heat stress to be managed as per the ACGIH TLV®

Measured Humidex = 47 (37°C; 45% RH);
assume it applies to the whole hour

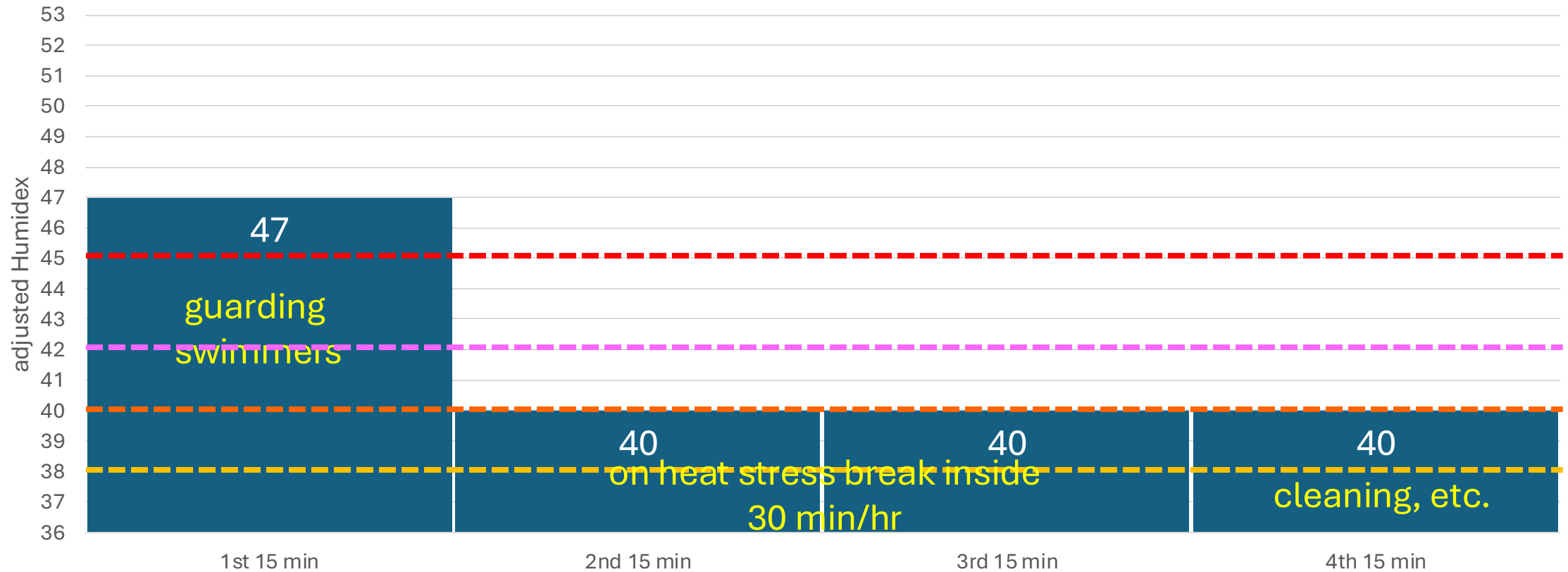
**If no medical supervision,
do we have to shut down?**



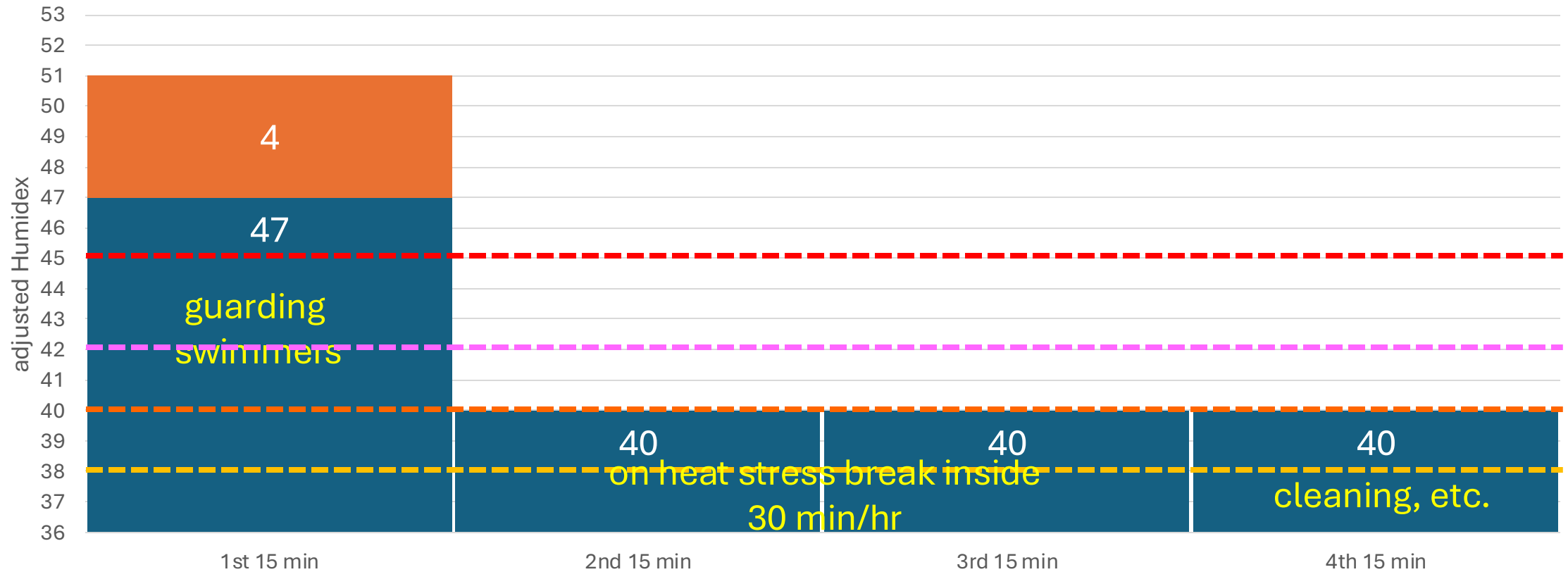
Scenario #1:

- Outdoor Humidex 47 (37°C; 45% RH; sunny; wind speed 20 km/hr)
- Lifeguard sitting in chair watching swimmers for 15 minutes per hour – no shade, T-shirt, bathing suit, water shoes
- Working inside cleaning up, sweeping (30°C; 65% RH; Humidex = 40)
- Half hour heat stress break in non-air conditioned inside lunchroom (30°C; 65% RH; Humidex = 40)
- Working inside cleaning up, sweeping (30°C; 65% RH; Humidex = 40)

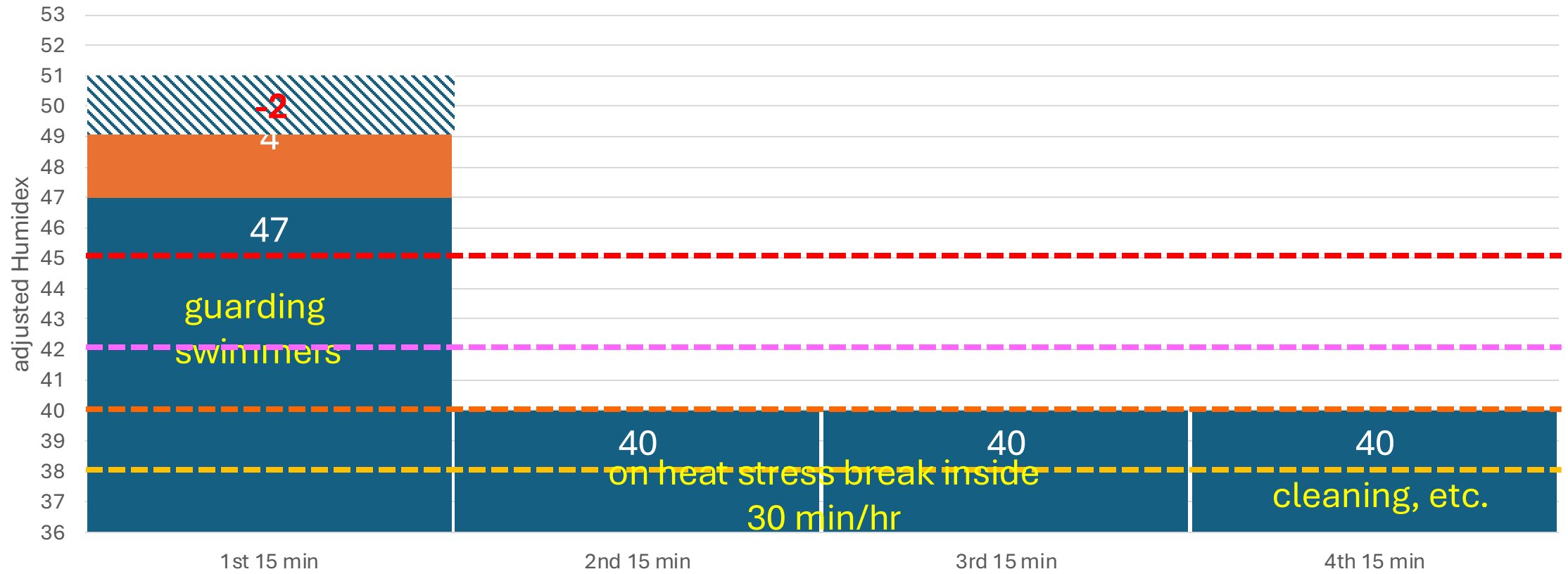
Measured outdoor Humidex (=47) and indoor Humidex (=40)



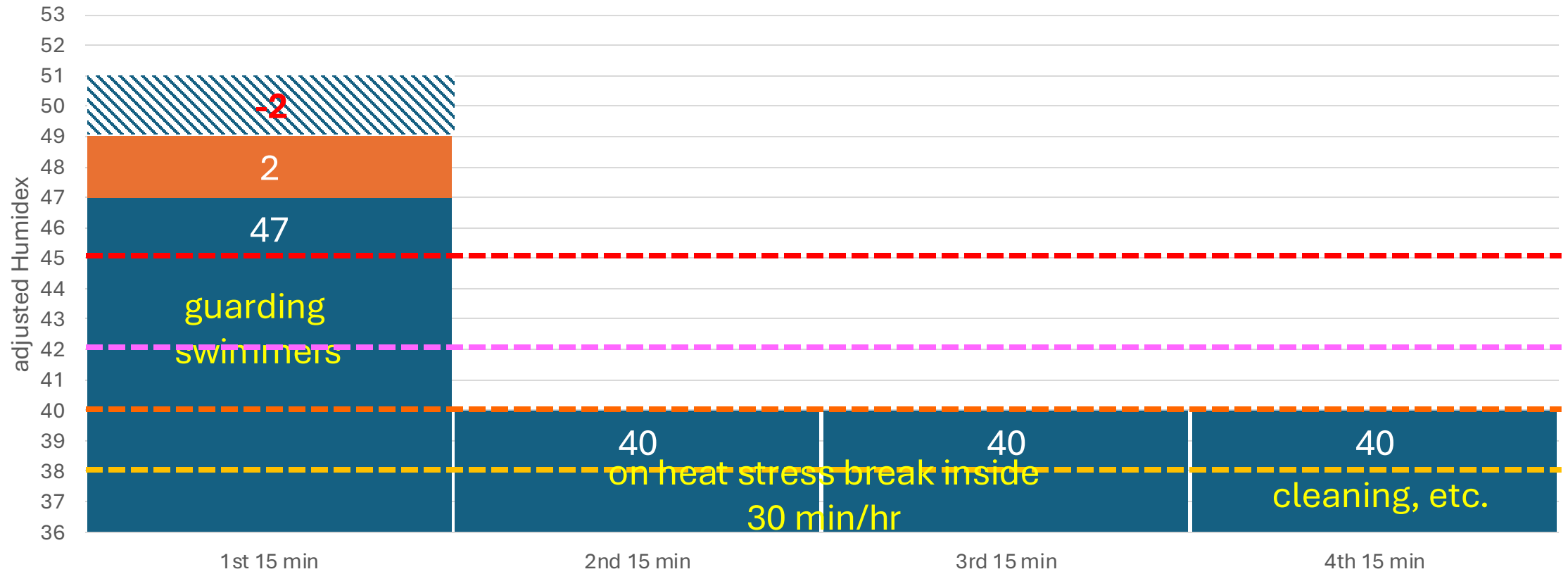
Measured outdoor Humidex (=47) & sunlight (47+4 = 51)



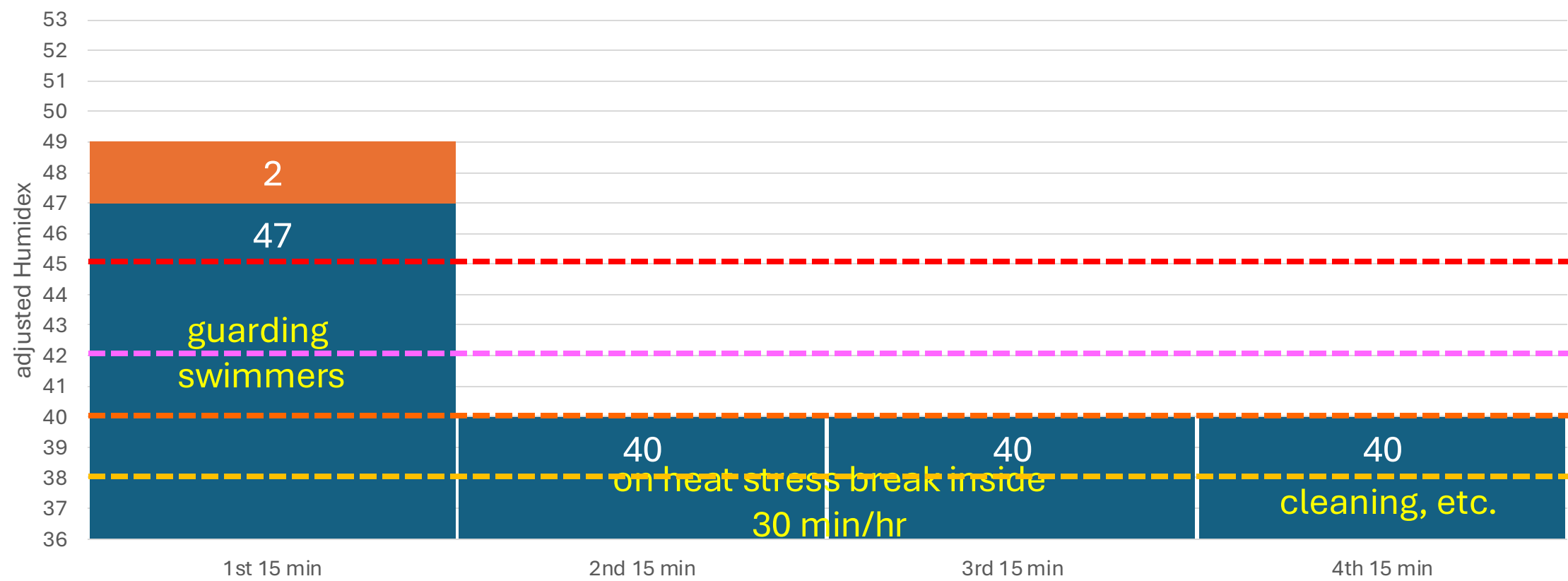
Measured outdoor Humidex (=47) & sunlight
($47+4 = 51$) but wearing shorts ($51-2=49$)



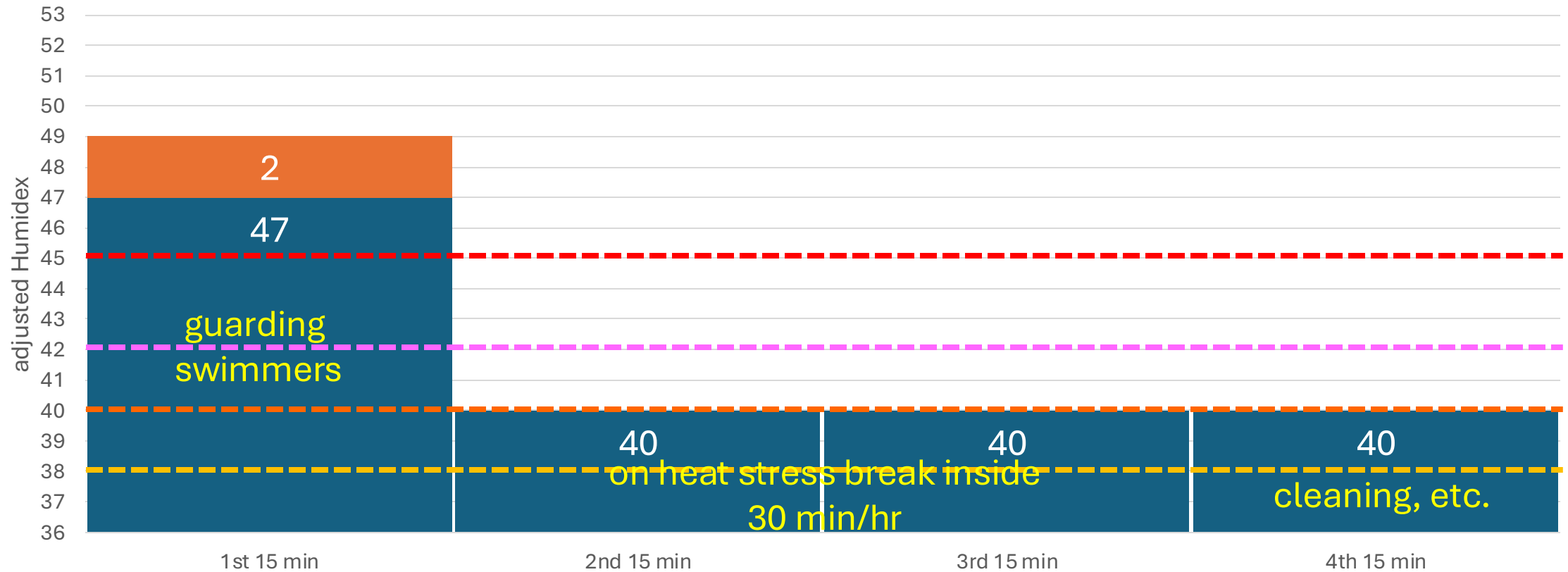
Measured outdoor Humidex (=47) & sunlight
($47+4 = 51$) but wearing shorts ($51-2=49$)



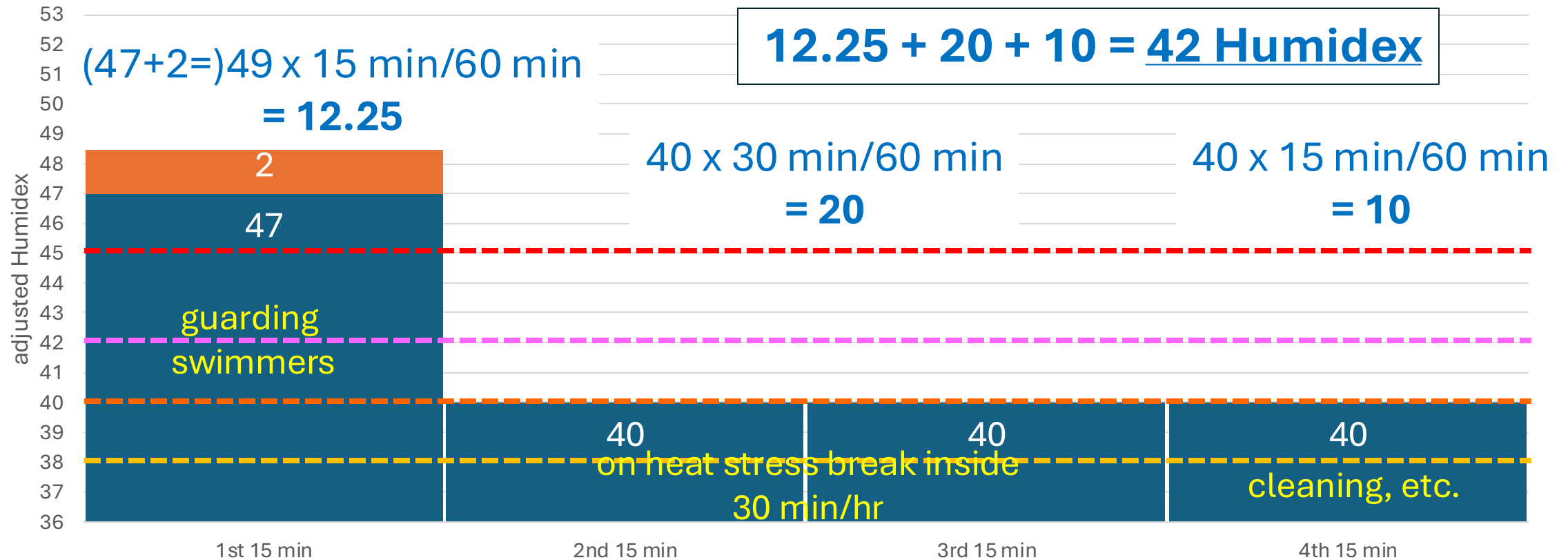
Measured outdoor Humidex (=47) & sunlight & wearing shorts ($47 + 4 - 2 = 47 + 2 = 49$)



Outdoor Humidex (with sunlight & wearing shorts = 49); Indoor Humidex = 40

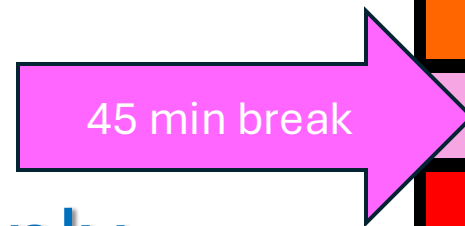


Outdoor Humidex (with sunlight & wearing shorts = 49);
 Indoor Humidex = 40;
calculate the time-weighted average (TWA)



TWA Humidex = 42

Find response on chart:



... but, we're only
taking 30 min breaks ...

Adjusted* Humidex	Response
25 – 29	supply water to workers on an “as needed” basis
30 – 33	post Heat Stress Alert notice; encourage workers to drink extra water; start recording hourly temperature and relative humidity
34 – 37	post Heat Stress Warning notice; notify workers that they need to drink extra water; ensure workers are trained to recognize symptoms
38 – 39	work with 15 minutes relief per hour can continue; provide adequate cool (10-15°C) water; at least 1 cup (240 mL) of water every 20 minutes worker with symptoms should seek medical attention
40 – 41	work with 30 minutes relief per hour can continue in addition to the provisions listed previously
42 – 44	if feasible, work with 45 minutes relief per hour can continue in addition to the provisions listed above
45** or over	only medically supervised work can continue

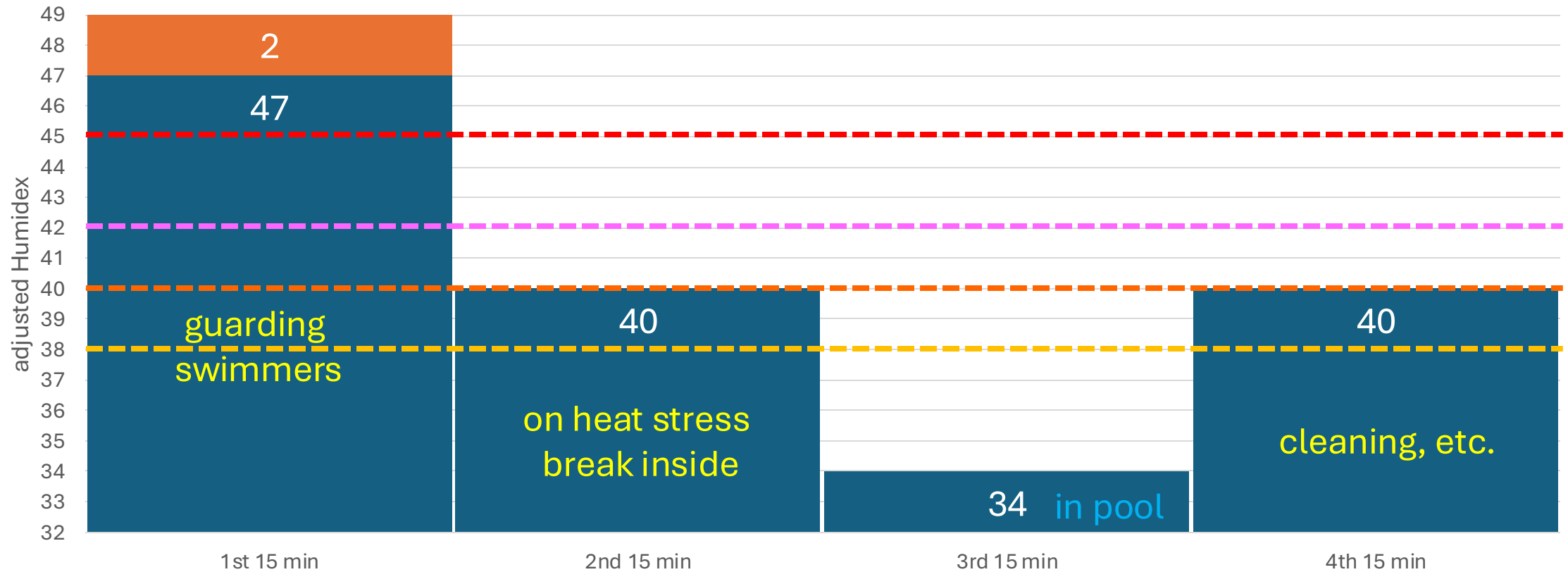
* “adjusted” means adjusted for additional clothing and radiant heat

** at Humidex above 45, heat stress to be managed as per the ACGIH TLV®

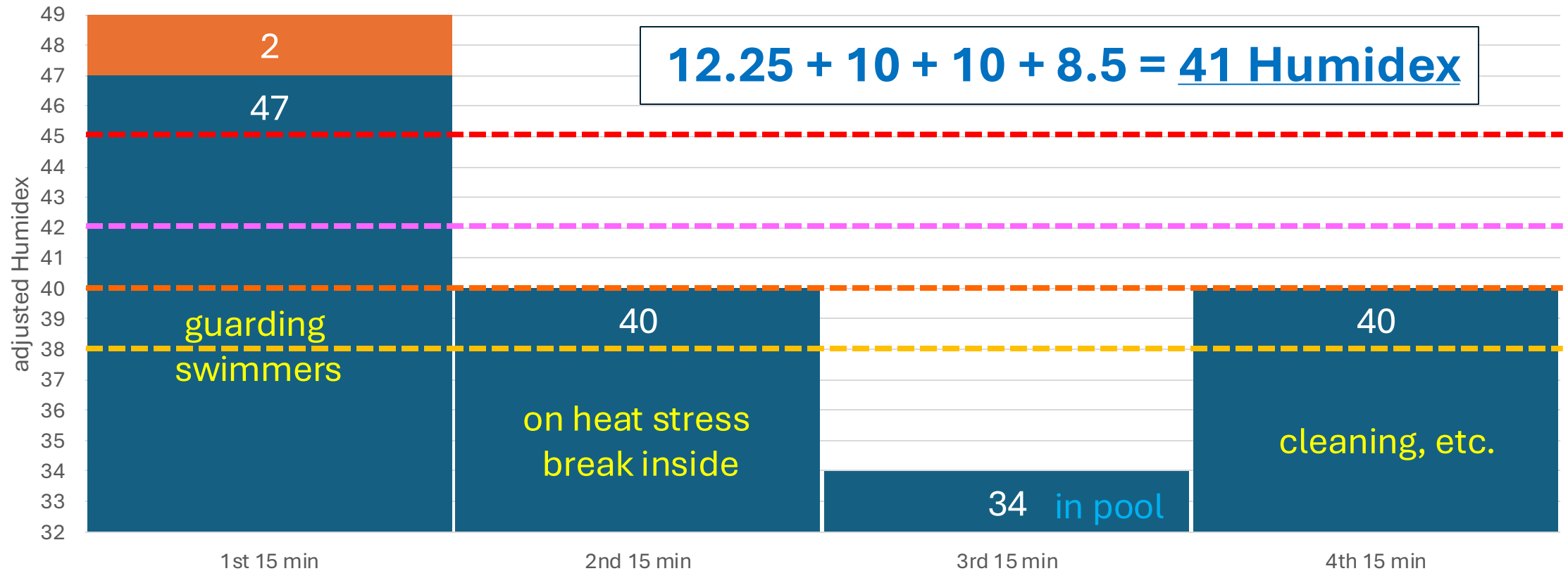
Scenario #2 (same as #1 except for last item):

- Outdoor Humidex 47 (37°C; 45% RH; sunny; wind speed 20 km/hr)
- Lifeguard sitting in chair watching swimmers for 15 minutes per hour – no shade, T-shirt, bathing suit, water shoes
- Working inside cleaning up, sweeping (30°C; 65% RH; Humidex = 40)
- 15 min of heat stress break in non-air conditioned inside lunchroom (30°C; 65% RH; Humidex = 40)
- Jumps in pool to cool down (water temperature = 23.5°C; assume 100% RH; Humidex = 34)

Outdoor Humidex (with sunlight & wearing shorts) = 49;
Indoor Humidex = 40; “In Pool” Humidex = 34



Outdoor Humidex (with sunlight & wearing shorts) = 49;
Indoor Humidex = 40; Pool Humidex = 34
calculate time-weighted average (TWA)



$49 \times 15 \text{ min} / 60 \text{ min}$	$40 \times 15 \text{ min} / 60 \text{ min}$	$34 \times 15 \text{ min} / 60 \text{ min}$	$40 \times 15 \text{ min} / 60 \text{ min}$
= 12.25	= 10	= 8.5	= 10

TWA Humidex = 41

Find response on chart:



Adjusted* Humidex	Response
25 – 29	supply water to workers on an “as needed” basis
30 – 33	post Heat Stress Alert notice; encourage workers to drink extra water; start recording hourly temperature and relative humidity
34 – 37	post Heat Stress Warning notice; notify workers that they need to drink extra water; ensure workers are trained to recognize symptoms
38 – 39	work with 15 minutes relief per hour can continue; provide adequate cool (10-15°C) water; at least 1 cup (240 mL) of water every 20 minutes worker with symptoms should seek medical attention
40 – 41	work with 30 minutes relief per hour can continue in addition to the provisions listed previously
42 – 44	if feasible, work with 45 minutes relief per hour can continue in addition to the provisions listed above
45** or over	only medically supervised work can continue

... now we're consistent with
taking 30 min breaks ...

* “adjusted” means adjusted for additional clothing and radiant heat

** at Humidex above 45, heat stress to be managed as per the ACGIH TLV®

Resources:

Humidex-Based Heat Response Plan:

https://www.ohcow.on.ca/wp-content/uploads/2024/06/HumidexBasedHeatResponsePlan_July2024.pdf

Calculator:

<https://www.ohcow.on.ca/resources/apps-tools-calculators/heat-stress-calculator/>

Practical Guide: <https://www.ohcow.on.ca/wp-content/uploads/2024/05/hst-prevention-toolsandstrategies.pdf>

The screenshot displays the OHCO website. At the top, there is a section titled "Humidex-Based Heat Response Plan" which includes a table with columns for "Adjusted Humidex", "Response", and "WBST (°C)". The table lists various humidex ranges and corresponding actions, such as "lightly water to workers on an 'as-needed' basis" for a humidex of 25-29. Below the table, there is a note about "Adjusted" meaning adjusted for additional clothing and radiant heat. The website header includes the OHCO logo and navigation links for COVID-19 resources, About, Services, Referrals, and Contact. A search bar is also present. Below the header, there is a section titled "UPDATED 2024" and "HEAT STRESS CALCULATOR and RESPONSE PLAN". This section includes a key component of the new Heat Stress Toolkit, stating that working in extreme conditions can be hazardous to health. It lists symptoms of heat stress: Weakness, Fatigue, and Dizziness, each accompanied by an icon. At the bottom, there is a section titled "The Calculator" featuring a large image of a worker in a hard hat and safety vest, with the text "HEAT STRESS Prevention Tools and Strategies 2024 EDITION". A QR code is located in the bottom right corner.

Adjusted Humidex	Response	WBST (°C)
25 - 29	lightly water to workers on an "as-needed" basis	≤ 23.8°C
30 - 33	prevent heat stress. Advise workers: encourage workers to drink extra water; start recording hourly temperatures and relative humidity; post Heat Stress Warning notice.	23.1 - 24.6°C
34 - 37	advise workers that they need to drink extra water; ensure workers are trained to recognize symptoms.	24.1 - 25.6°C
38 - 39	work with 15 minutes cooled per hour (see conditions); provide adequate cool (15-17°C) water; at least 1 cup (240 mL) of water every 20 minutes; monitor with symptoms; should seek medical attention.	25.1 - 26.6°C
40 - 43	work with 30 minutes cooled per hour (see conditions) in addition to the previously listed previously.	26.1 - 27.6°C
42 - 44	If possible, work with 45 minutes cooled per hour (see conditions) in addition to the previously listed above.	27.1 - 29.6°C
45°C or above	only medically supervised work can continue.	≥ 29.1°C or above

* "Adjusted" means adjusted for additional clothing and radiant heat (see steps #9 & #10)
** "Effective" means adjusted for clothing. Entry & Exit WBST include the clothes worn.

OHCOW
Occupational Health Clinics for Ontario Workers Inc.

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OCCUPATIONAL ILLNESS HURRY PREVENTION WORKPLACE MENTAL HEALTH WORKER PERSPECTIVE

NEWS & EVENTS APPS, TOOLS AND CALCULATORS VIEW ALL RESOURCES

UPDATED 2024

HEAT STRESS CALCULATOR and RESPONSE PLAN

A key component of the new Heat Stress Toolkit

Working in extreme conditions can be hazardous to your health. Heat and humidex are no exception.

Symptoms of heat stress include:

Weakness Fatigue Dizziness

Learn more about the symptoms of heat stress with our [Heat Stress Symptoms](#) infographic.

The Calculator

HEAT STRESS Prevention Tools and Strategies 2024 EDITION

HEAT STRESS Toolkit

Questions, comments,

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