

ROBOTIC TORSO FOR INWARD LEAKAGE TEST OF PAPR

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A robotic torso, with a movable head and arms, connected with a breathing machine has been developed for the test of inward leakage (IL) of powered air purifying respirators (PAPR). The head, which conforms to JIS, moves to both 30 degree backward and forward displacement from the upright position at a frequency of 17 times/min and to both 50 degree right-side and left-side displacement at a frequency of 11 times/min. The arms move from 10 to 130 degrees from the vertically hung down position at a frequency of 7 times/min. A respiratory inlet opening of the head form is connected to the breathing machine. One PAPR of a faceshield type and another of a hood type were examined for IL against NaCl aerosol using this torso installed in a chamber. The breathing machine was driven at two modes; 1.5 L/stroke at 20 strokes/min and 1.6 L/stroke at 25 strokes/min. The blower of the hood type PAPR generated an air flow from 80 L/min to 120 L/min and that of the faceshield type from 80 L/min to 160 L/min. When the robotic torso was driven in the sequence of no movement (stage 1), head movement back-and-forth (stage 2), head movement right-and-left (stage 3) and arm movement (stage 4) IL of hood type PAPR showed no significant change between the stages. IL of faceshield type PAPR showed the highest IL at stage 3. The air flow rate sent by the blower showed inverse relationship with IL and the higher breathing rate showed larger IL for both types of PAPR.