TABS/ACATS/DALTS PROCESS TRAINING OVER-VIEW AROICC ORIENTATION

Presentation By:

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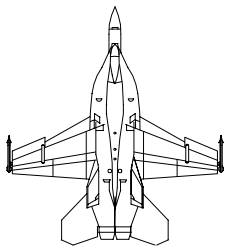
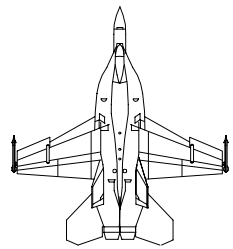
CI52RH





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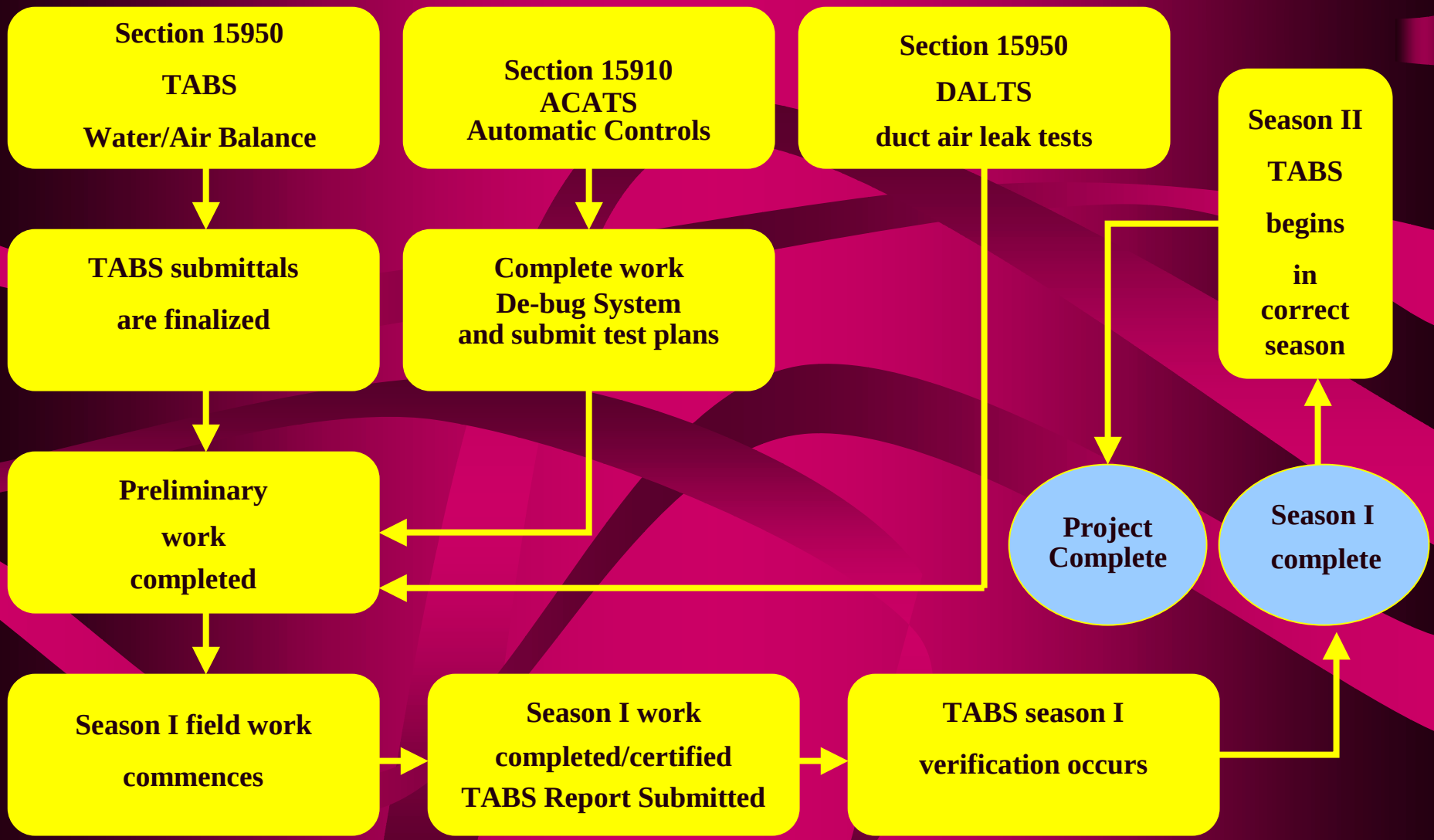
What are TABS/ACATS/DALTS?

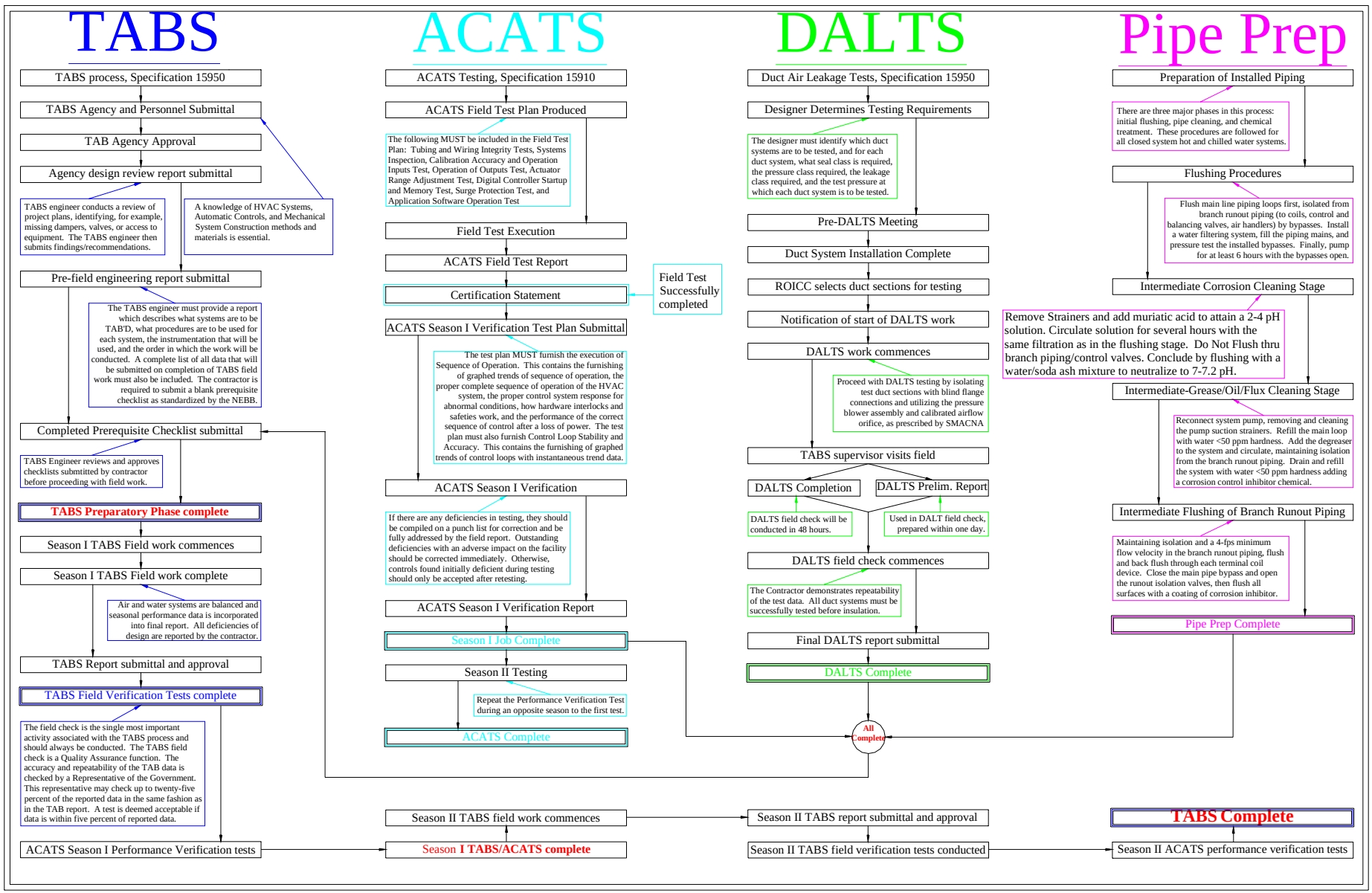
- **TABS/ACATS/DALTS** are processes which are comprised of a series of submittals and work activities used to ensure the proper installation and operation of Heating, Ventilating and Air Conditioning (HVAC) systems.
- **TABS**--An acronym, short for --"Testing, Adjusting, Balancing and start-up".
- **ACATS**--An acronym, short for --"Automatic Controls Acceptance Tests".
- **DALTS**--An acronym, short for--"Duct Air Leakage Tests" .

Why Do We Use TABS/ACATS/DALTS?

- **History of Problems:**
  - ✧ Numerous Customer Complaints
  - ✧ Excessive Construction Deficiencies
  - ✧Unresolved Design Problems
- **A desire to improve quality**
- **A need to minimize impact to operational missions.**

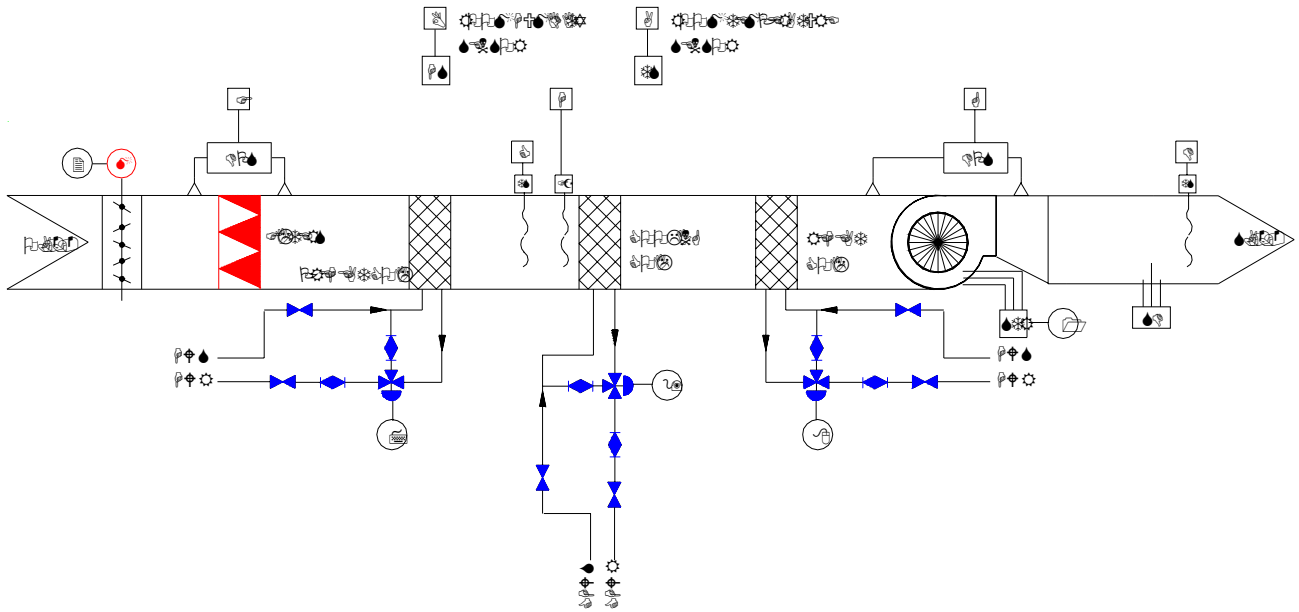
TABS/ACATS/DALTS PROCESS



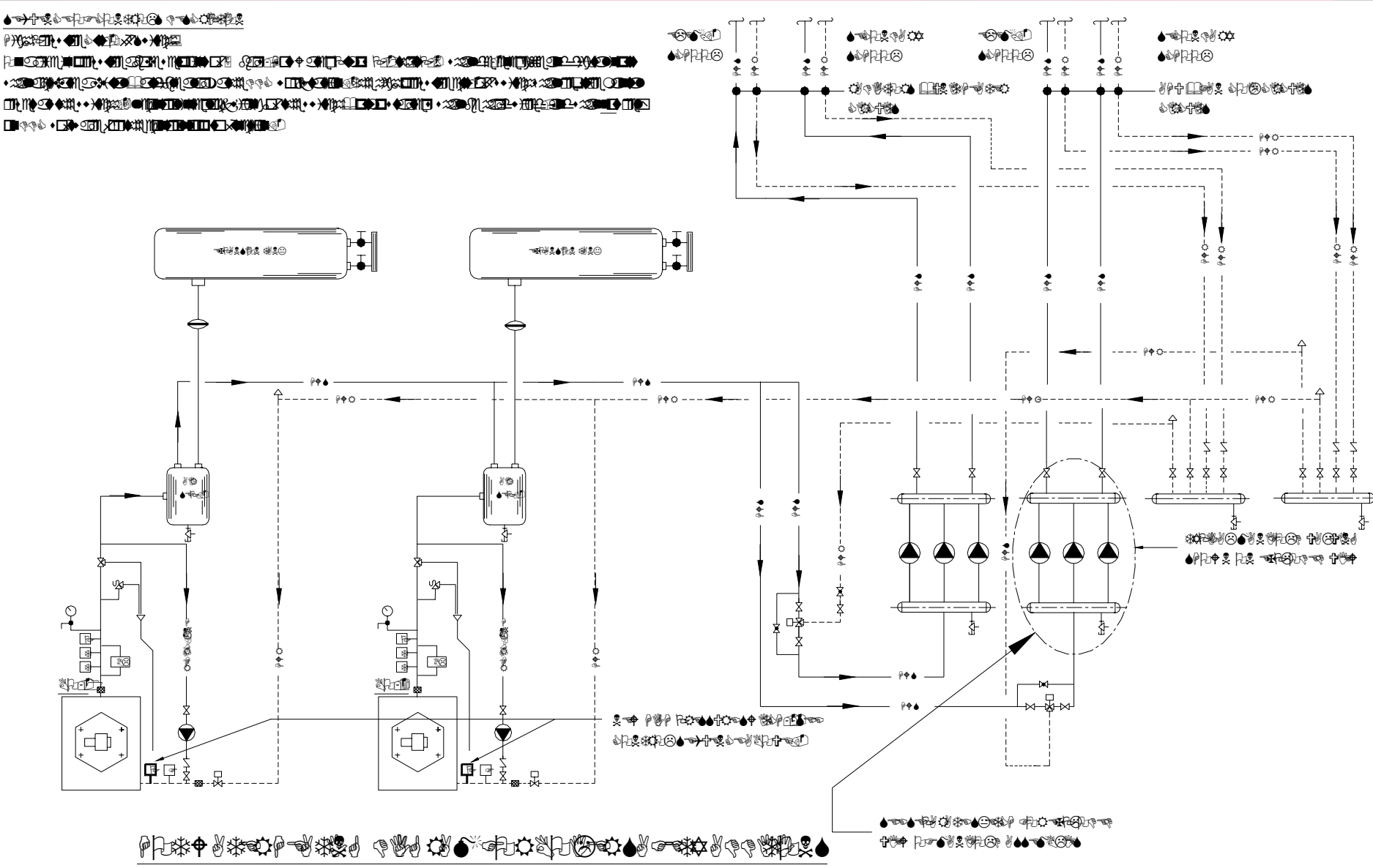

TABS
TABS process, Specification 15950
TABS Agency and Personnel Submittal
TAB Agency Approval
Agency design review report submittal
TABS engineer conducts a review of project plans, identifying, for example, missing dampers, valves, or access to equipment. The TABS engineer then submits findings/recommendations.
A knowledge of HVAC Systems, Automatic Controls, and Mechanical System Construction methods and materials is essential.
Pre-field engineering report submittal
The TABS engineer must provide a report which describes what systems are to be TAB'D, what procedures are to be used for each system, the instrumentation that will be used, and the order in which the work will be conducted. A complete list of all data that will be submitted on completion of TABS field work must also be included. The contractor is required to submit a blank prerequisite checklist as standardized by the NEBB.
Completed Prerequisite Checklist submittal
TABS Engineer reviews and approves checklists submtitted by contractor before proceeding with field work.
TABS Preparatory Phase complete
Season I TABS Field work commences
Season I TABS Field work complete
Air and water systems are balanced and seasonal performance data is incorporated into final report. All deficiencies of design are reported by the contractor.
TABS Report submittal and approval
TABS Field Verification Tests complete
The field check is the single most important activity associated with the TABS process and should always be conducted. The TABS field check is a Quality Assurance function. The accuracy and repeatability of the TAB data is checked by a Representative of the Government. This representative may check up to twenty-five percent of the reported data in the same fashion as in the TAB report. A test is deemed acceptable if data is within five percent of reported data.
ACATS Season I Performance Verification tests
ACATS
ACATS Testing, Specification 15910
ACATS Field Test Plan Produced
The following MUST be included in the Field Test Plan: Tubing and Wiring Integrity Tests, Systems Inspection, Calibration Accuracy and Operation Inputs Test, Operation of Outputs Test, Actuator Range Adjustment Test, Digital Controller Startup and Memory Test, Surge Protection Test, and Application Software Operation Test
Field Test Execution
ACATS Field Test Report
Certification Statement
Field Test Successfully completed
ACATS Season I Verification Test Plan Submittal
The test plan MUST furnish the execution of Sequence of Operation. This contains the furnishing of graphed trends of sequence of operation, the proper complete sequence of operation of the HVAC system, the proper control system response for abnormal conditions, how hardware interlocks and safeties work, and the performance of the correct sequence of control after a loss of power. The test plan must also furnish Control Loop Stability and Accuracy. This contains the furnishing of graphed trends of control loops with instantaneous trend data.
ACATS Season I Verification
If there are any deficiencies in testing, they should be compiled on a punch list for correction and be fully addressed by the field report. Outstanding deficiencies with an adverse impact on the facility should be corrected immediately. Otherwise, controls found initially deficient during testing should only be accepted after retesting.
ACATS Season I Verification Report
Season I Job Complete
Season II Testing
Repeat the Performance Verification Test during an opposite season to the first test.
ACATS Complete
Season II TABS field work commences
Season I TABS/ACATS complete
DALTS
Duct Air Leakage Tests, Specification 15950
Designer Determines Testing Requirements
The designer must identify which duct systems are to be tested, and for each duct system, what seal class is required, the pressure class required, the leakage class required, and the test pressure at which each duct system is to be tested.
Pre-DALTS Meeting
Duct System Installation Complete
ROICC selects duct sections for testing
Notification of start of DALTS work
DALTS work commences
Proceed with DALTS testing by isolating test duct sections with blind flange connections and utilizing the pressure blower assembly and calibrated airflow orifice, as prescribed by SMACNA
TABS supervisor visits field
DALTS Completion
DALTS Prelim. Report
DALTS field check will be conducted in 48 hours.
Used in DALT field check, prepared within one day.
DALTS field check commences
The Contractor demonstrates repeatability of the test data. All duct systems must be successfully tested before insulation.
Final DALTS report submittal
DALTS Complete
All Complete
Season II TABS report submittal and approval
Season II TABS field verification tests conducted
Pipe Prep
Preparation of Installed Piping
There are three major phases in this process: initial flushing, pipe cleaning, and chemical treatment. These procedures are followed for all closed system hot and chilled water systems.
Flushing Procedures
Flush main line piping loops first, isolated from branch runout piping (to coils, control and balancing valves, air handlers) by bypasses. Install a water filtering system, fill the piping mains, and pressure test the installed bypasses. Finally, pump for at least 6 hours with the bypasses open.
Intermediate Corrosion Cleaning Stage
Remove Strainers and add muriatic acid to attain a 2-4 pH solution. Circulate solution for several hours with the same filtration as in the flushing stage. Do Not Flush thru branch piping/control valves. Conclude by flushing with a water/soda ash mixture to neutralize to 7-7.2 pH.
Intermediate-Grease/Oil/Flux Cleaning Stage
Reconnect system pump, removing and cleaning the pump suction strainers. Refill the main loop with water <50 ppm hardness. Add the degreaser to the system and circulate, maintaining isolation from the branch runout piping. Drain and refill the system with water <50 ppm hardness adding a corrosion control inhibitor chemical.
Intermediate Flushing of Branch Runout Piping
Maintaining isolation and a 4-fps minimum flow velocity in the branch runout piping, flush and back flush through each terminal coil device. Close the main pipe bypass and open the runout isolation valves, then flush all surfaces with a coating of corrosion inhibitor.
Pipe Prep Complete
TABS Complete
Season II ACATS performance verification tests

Measures for Improving the TABS/ACATS Processes:

- **Use tracking logs for timely planning:**
  - CI52 TABS Reports tracked on NEAMIS
  - Track the scheduling of TABS Work Activities
  - Track submittals on TABS/ACATS ensure timely completion
- **We need to insist on submittal of schedules of work for TABS during the review process**
- **We need to insist on submittal of schedule of prices for TABS work**



Direct Digital Controls Systems Are Complex!! They take time for check-out and to make sure they provide the needed performance.



HVAC SYSTEMS ARE MORE COMPLICATED THAN EVER

TABS SUBMITTALS-SECTION 15950

- **Qualifications**
  - TABS/DALTS NEBB/AABC CERTIFIED
  - AGENCY AND PERSONNEL MUST MEET RQMTS.
- **TABS Pre-Field Engineering Report**
  - Work Strategy and Schedule
  - Support Personnel required
  - Blank Prerequisite Checklists
- **TABS Design Review Report--Can we TAB It?**

TABS SUBMITTALS-SECTION 15950

- **Pre-requisite checklists (Completely filled out)**
- **TABS Certified Reports**
  - Submit completed data report forms--2 Seasons
  - Certification by TABS Supervisor

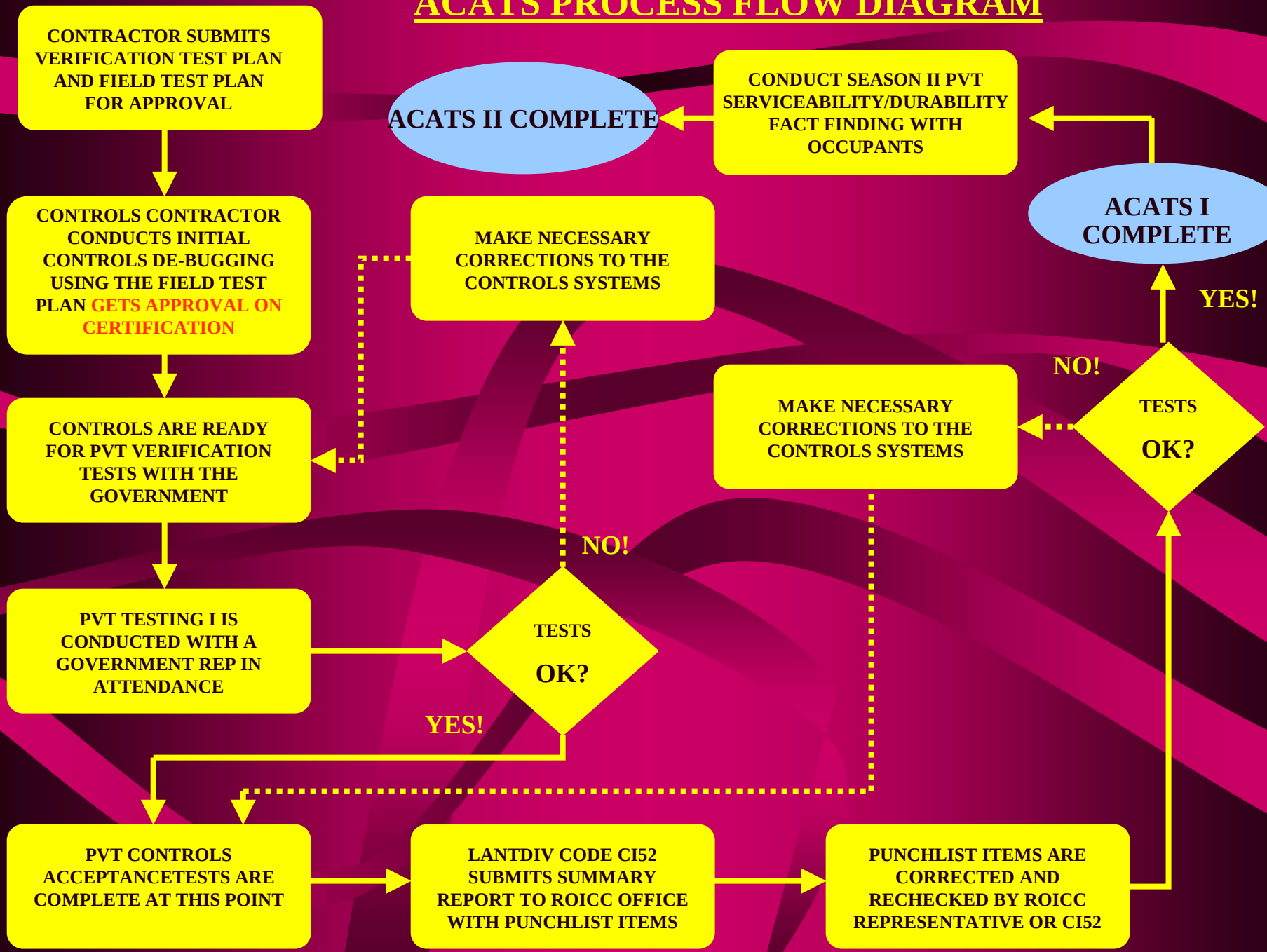
ACATS OVER-VIEW

- **The Contractor Prepares A Field Test Plan**
  - System Inspection Wiring
  - Normal Position Final Controlled Devices
  - Calibration Accuracy and Operation Inputs Tests
  - Operation of Outputs Test
  - Actuator Range Adjustment Test
  - Digital Start-Up and Memory Test
  - Surge Protection Check
  - Application Software Test

ACATS OVER-VIEW

- **We test all of the controls thru every mode of control**
  - **Performance Verification Test Plan** Prepared
  - Government Representative and Contractor meet at job site and test controls thru every mode of control
  - All controls are tested--checked for:
    - proper sequence
    - repeatability
    - stability
    - accuracy
- Most important testing to ensure trouble free installation

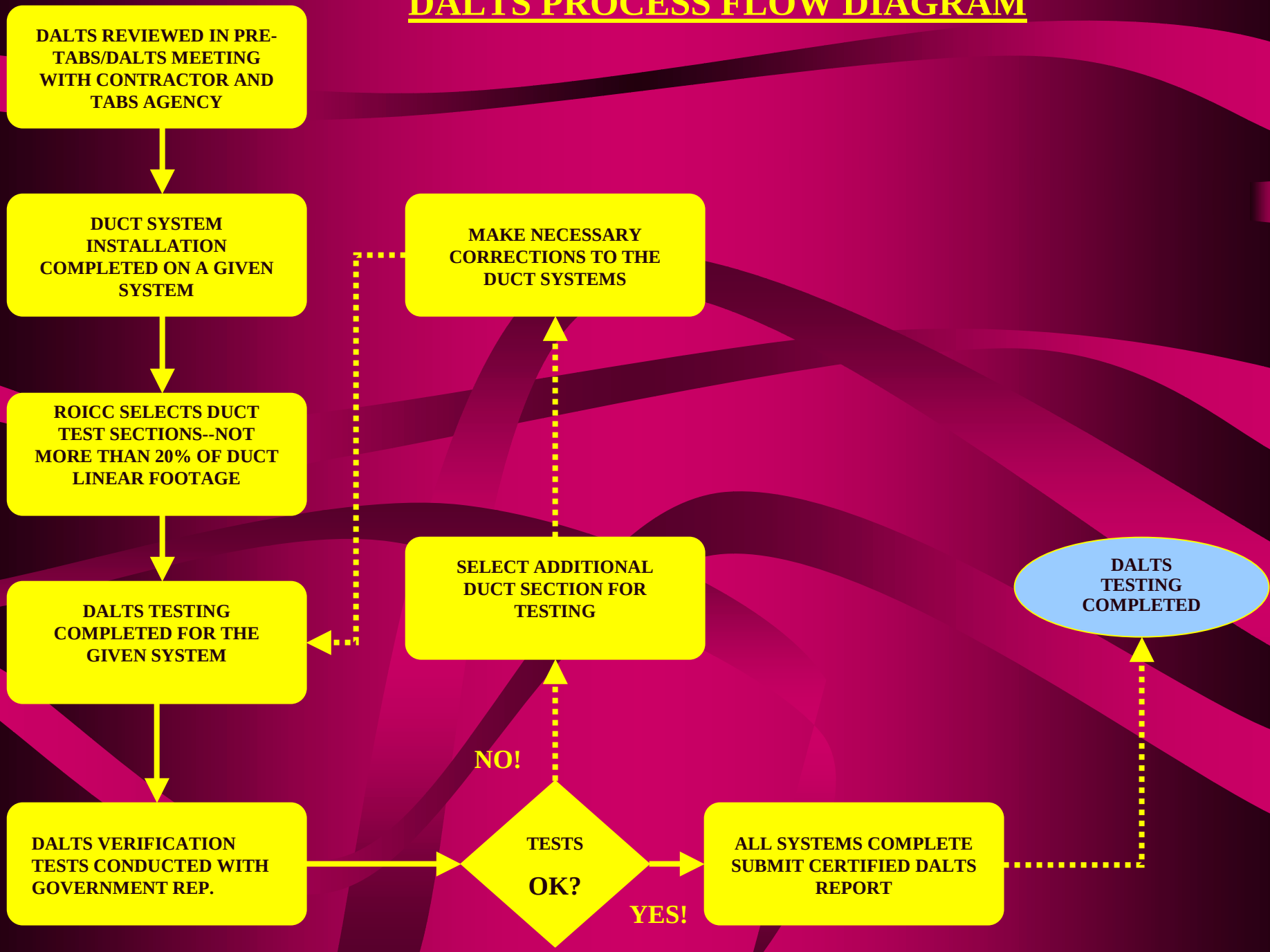
ACATS PROCESS FLOW DIAGRAM



DALTS OVERVIEW

- We use the DALTS process to quantify how much the installed ductwork is leaking
- This process takes the guess work out of evaluating the quality of the installed duct system.
- Brief Process Description:
  - Duct test sections are selected for testing after duct installation. (**Normally before insulation installation)**
  - Duct test section is pressurized using a variable capacity blower to pressurize the duct.
  - Air is pumped into the duct test section thru a venturi or sharp edged orifice device so actual air volume flow readings can be taken.

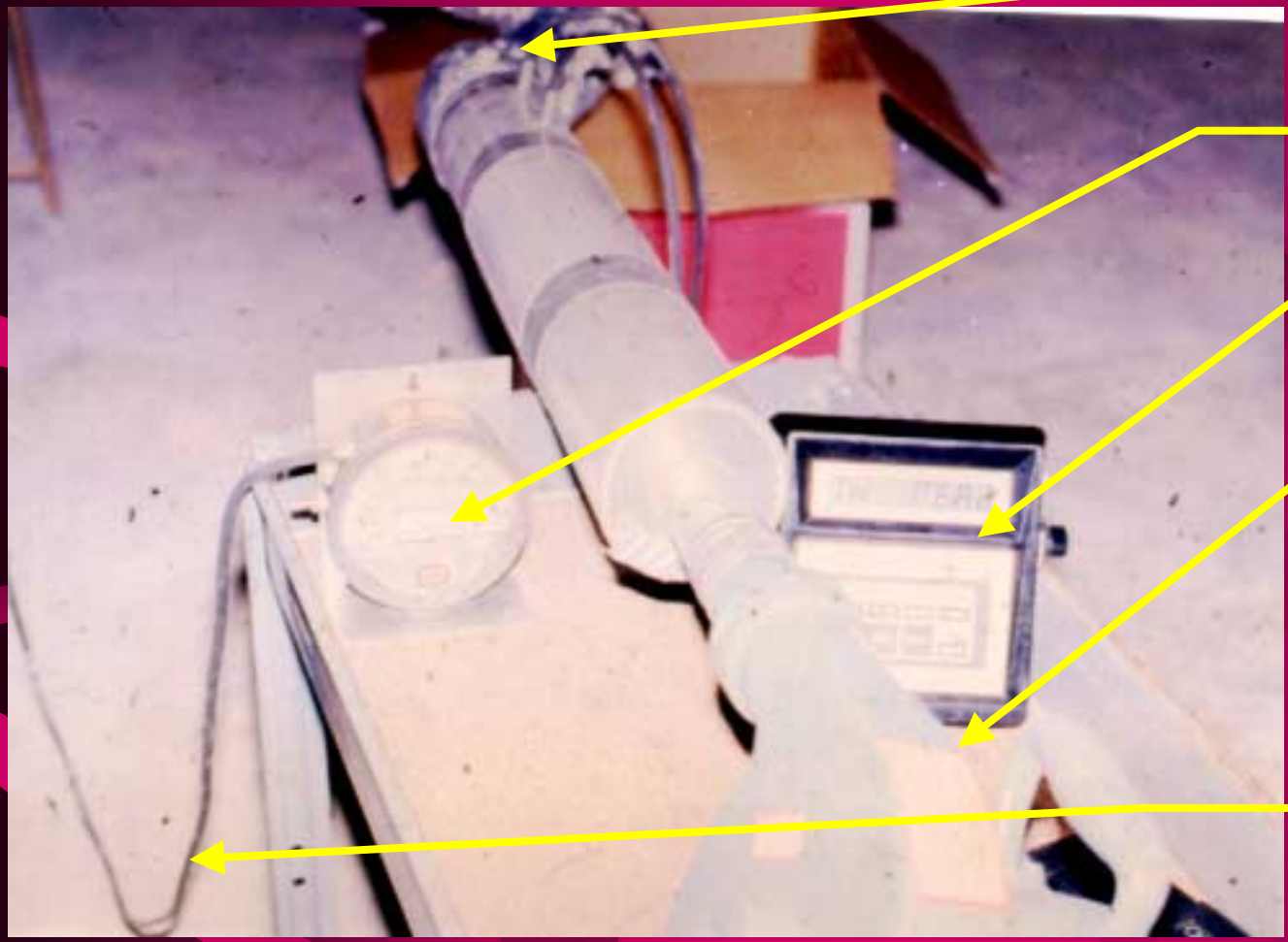
DALTS PROCESS FLOW DIAGRAM



TIPS FOR CONDUCTING DALTS:

- DO NOT ALLOW TESTING MORE THAN 20% ON A GIVEN SYSTEM AT THE EXPENSE OF NOT TESTING OTHER SYSTEMS.
- TEST THE SYSTEM DUCTWORK BEFORE DUCT INSULATION IS INSTALLED.
- NEVER ALLOW PREFERENTIAL TREATMENT OF TESTED SECTIONS IN ADVANCE OF TESTING.
- ALWAYS ENCOURAGE ADVANCE DIVIDING OF DUCT SYSTEMS UP INTO SECTIONS SUBJECT TO TESTING.
- WHEN CONDUCTING CONSTRUCTABILITY REVIEWS, ALWAYS MAKE SURE THAT A DUCT TEST SCHEDULE IS SHOWN ON THE DRAWINGS.

DALTS BLOWER/ORIFICE APPARATUS



ORIFICE TUBE

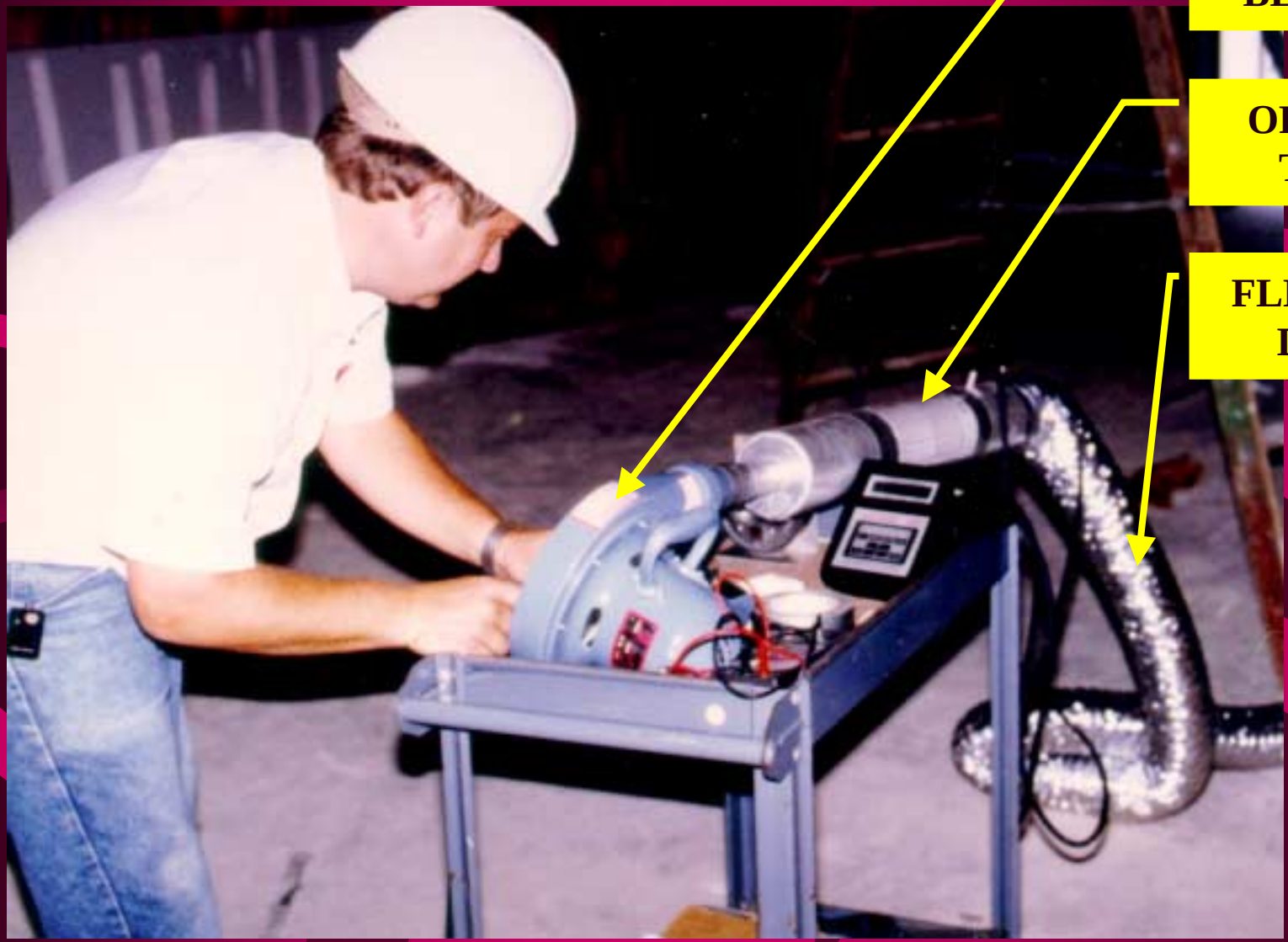
DUCT STATIC PRESSURE

ORIFICE DELTA P

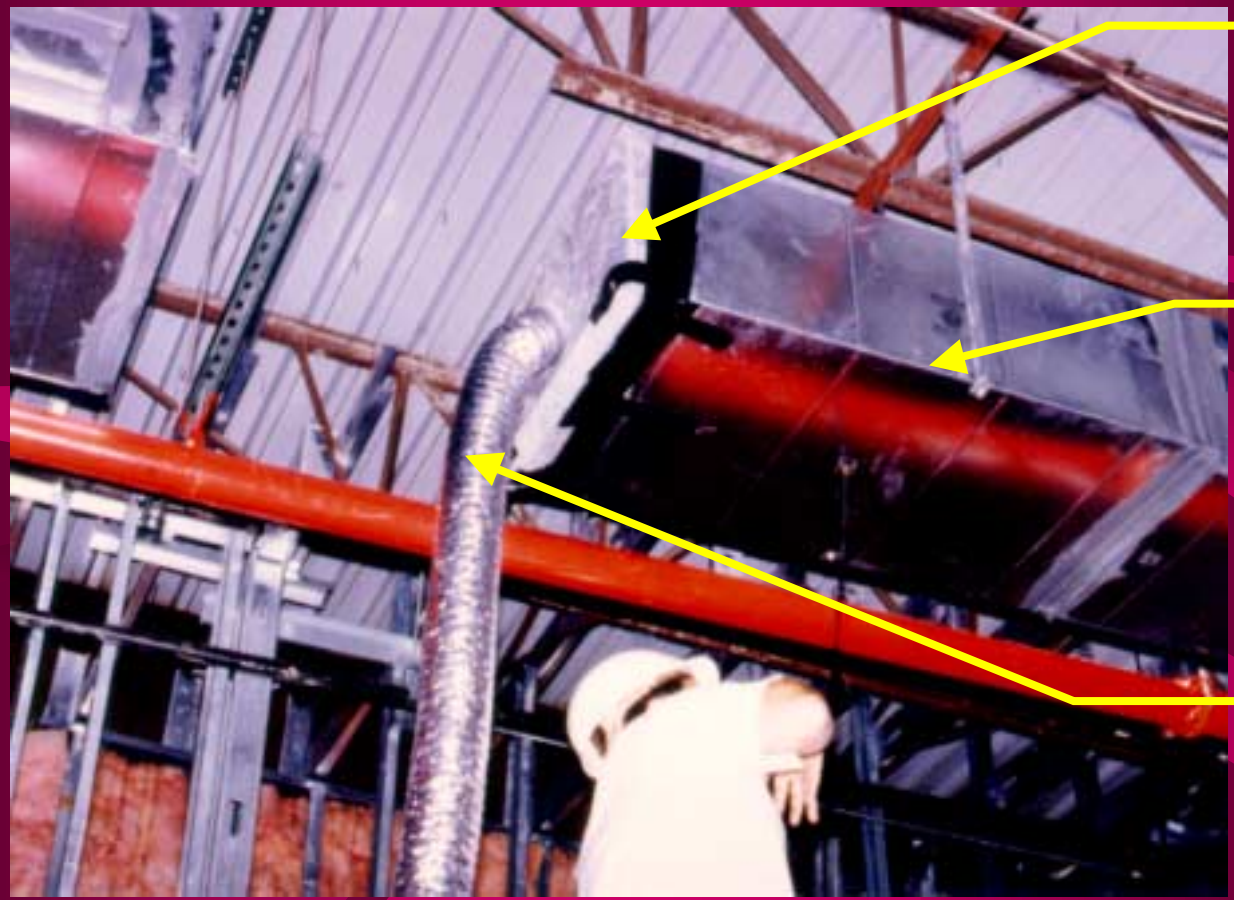
BLOWER

DUCT STATIC PRESSURE SENSING TUBE

DALTS TEST SETUP



DALTS TEST OF DUCT SECTION



BLANKING PLATE

TESTED DUCT SECTION

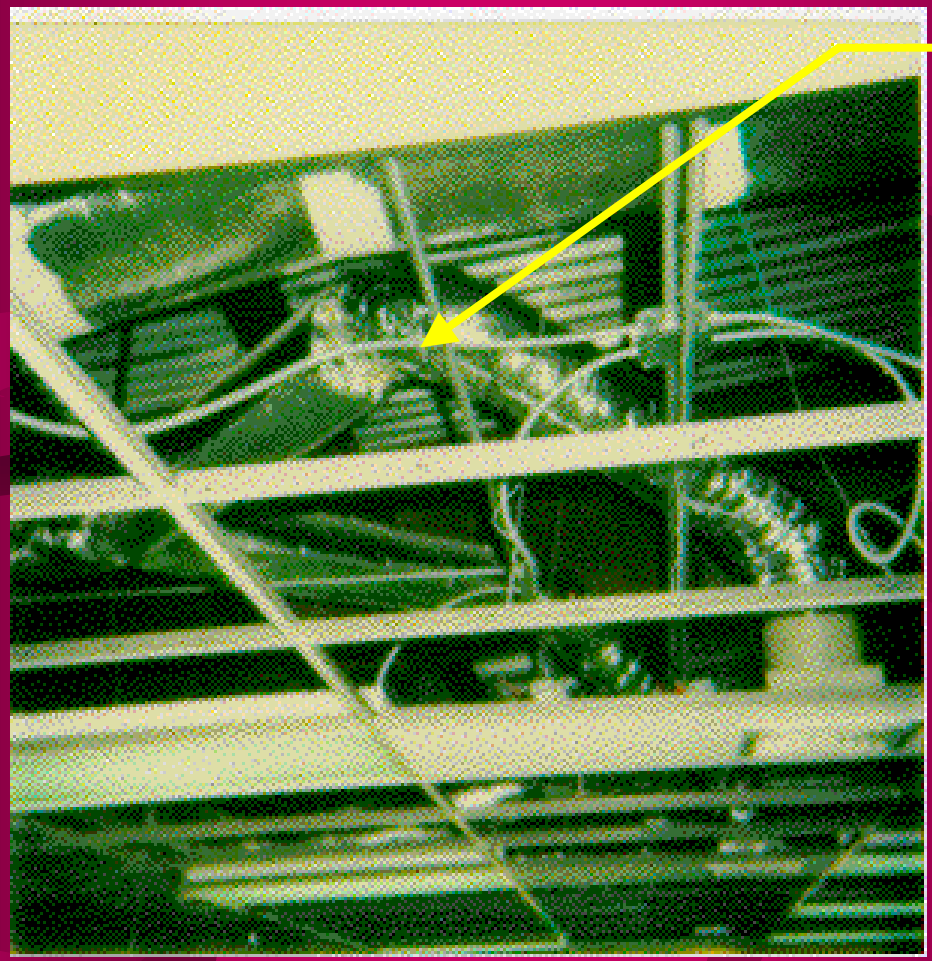
FLEXIBLE DUCT FROM BLOWER

DALTS TESTING

DUCT SECTION BEING TESTED

FLEXIBLE DUCT FROM TEST BLOWER

INSTALLATION PROBLEMS TO AVOID



ROUND BRANCH DUCT ABOVE

DROPPED CEILING

TOO MANY FITTING/TURNS AND MISALIGNED DUCT

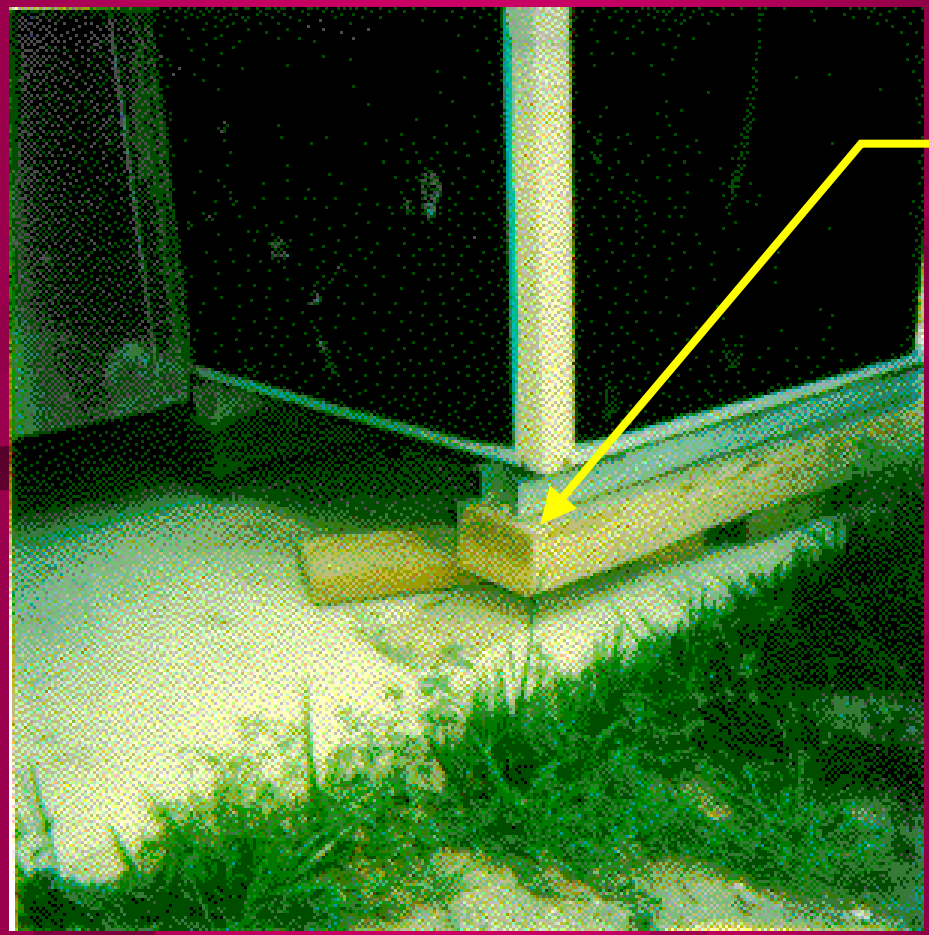
INSTALLATION PROBLEMS TO AVOID

ROUND BRANCH DUCT

DE-TACHED AT JOINT

DUCTWORK ABOVE DROPPED CEILING--JOINT DE-TACHED AND MIS-ALIGNED

INSTALLATION PROBLEMS TO AVOID



IMPROPER BASE SUPPORT FOR CONDENSER

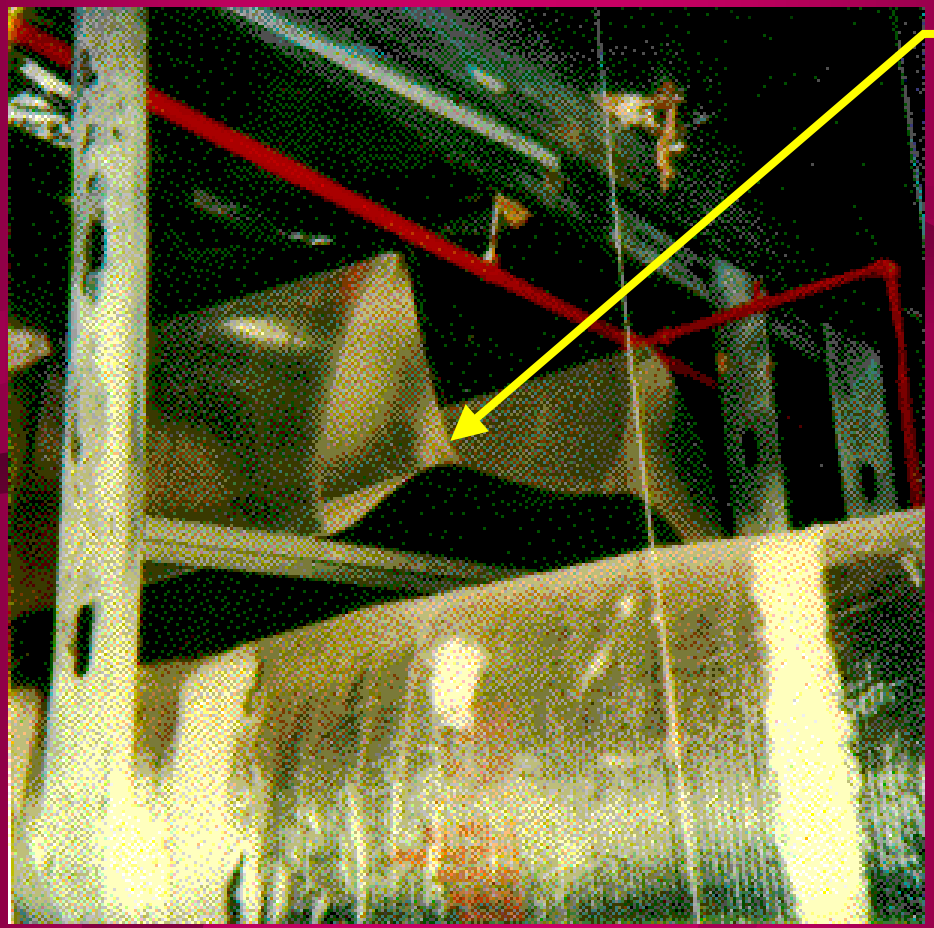
WOODEN BASE SUPPORTS FOR NEWLY INSTALLED CONDENSER

INSTALLATION PROBLEMS TO AVOID

CEILING DIFFUSER STUFFED WITH TISSUE PAPER-- OUTFITTED WITH A FILE FOLDER AIR DEFLECTOR

THE RESULTS OF INADEQUATE VOLUME DAMPERS/POOR BALANCE/POOR TERMINAL SELECTION

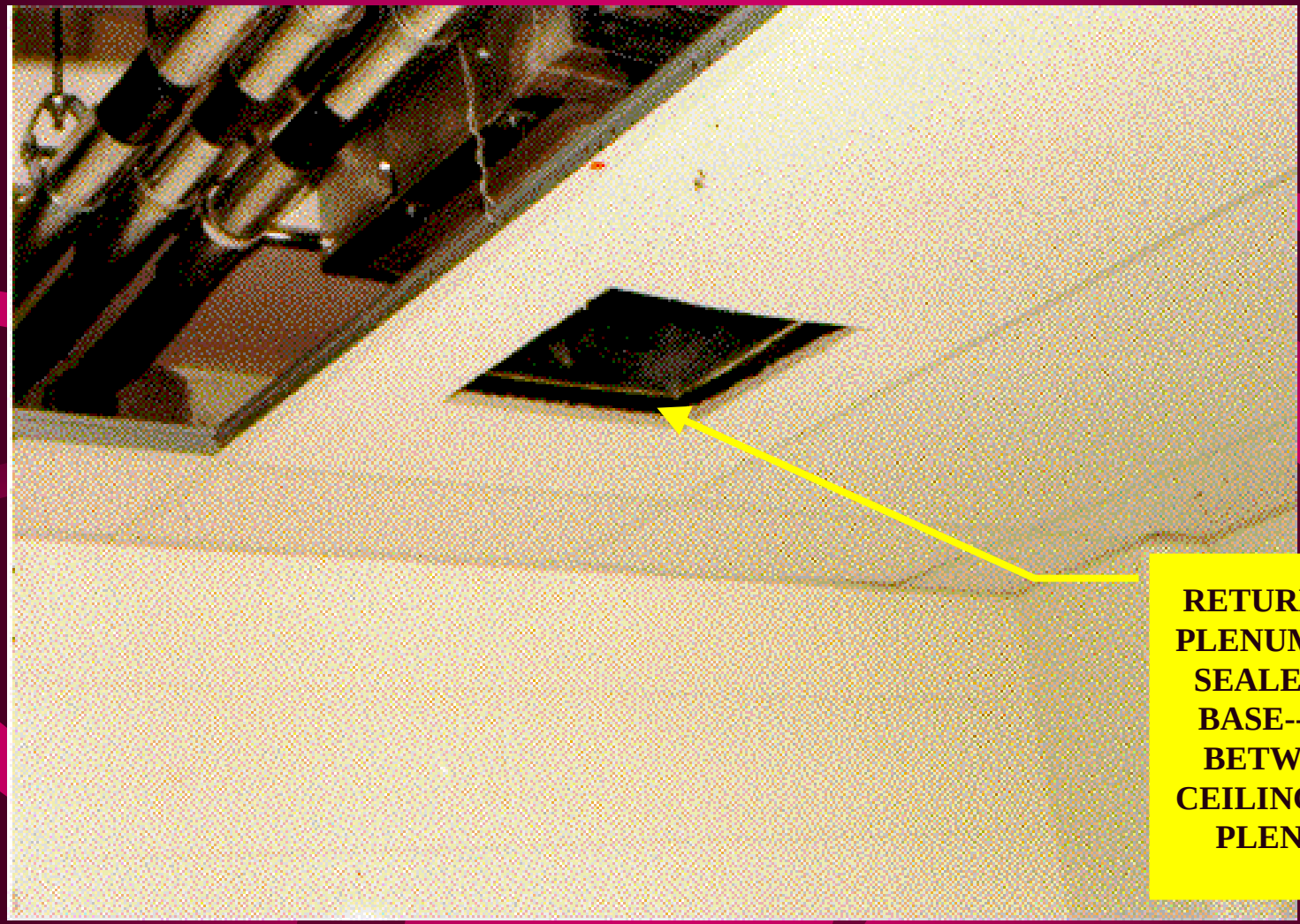
INSTALLATION PROBLEMS TO AVOID



COLLAPSED RETURN AIR DUCT DUE TO CLOSED DAMPER ON START-UP AND LACK OF DUCT RE-INFORCING

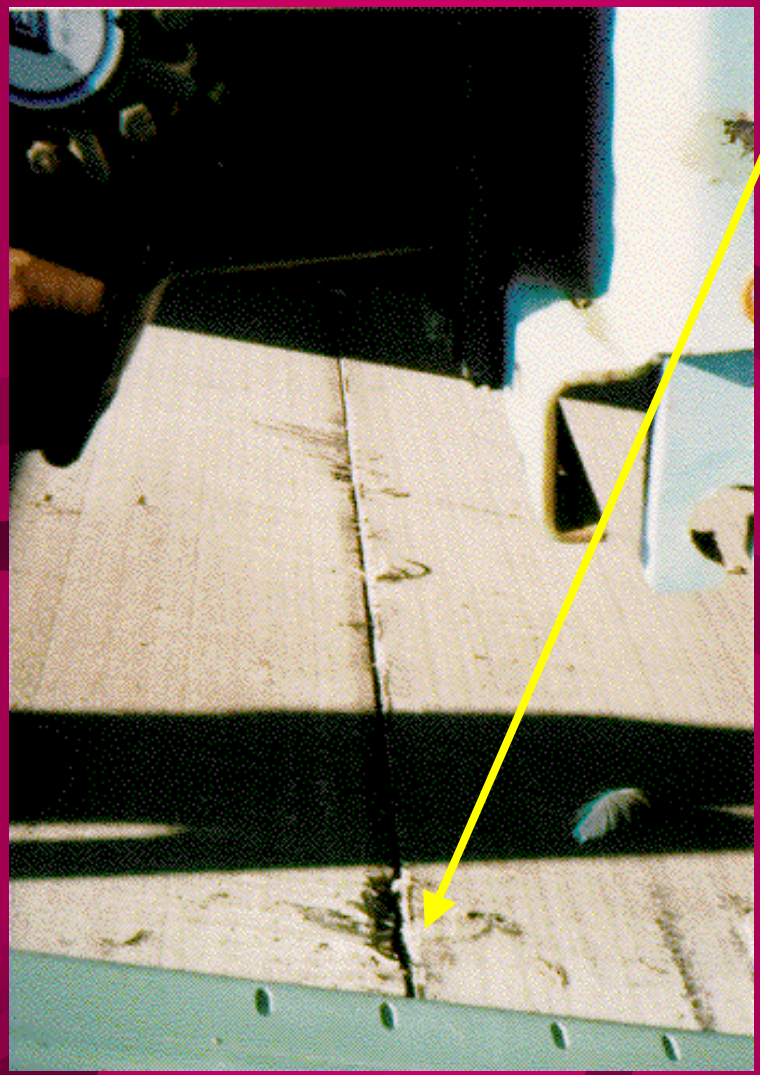
COLLAPSED RETURN AIR DUCT/CLOSED DAMPER IN DUCT ON START-UP

INSTALLATION PROBLEMS TO AVOID



PLENUM NOT FLANGED BELOW CEILING TO PREVENT AIR LEAKAGE ABOVE CEILING

INSTALLATION PROBLEMS TO AVOID



ALUMINUM FINS ON CONDENSER COIL BADLY CORRODED DUE TO SALT AIR EXPOSURE

NO EPOXY COATING FOR COIL

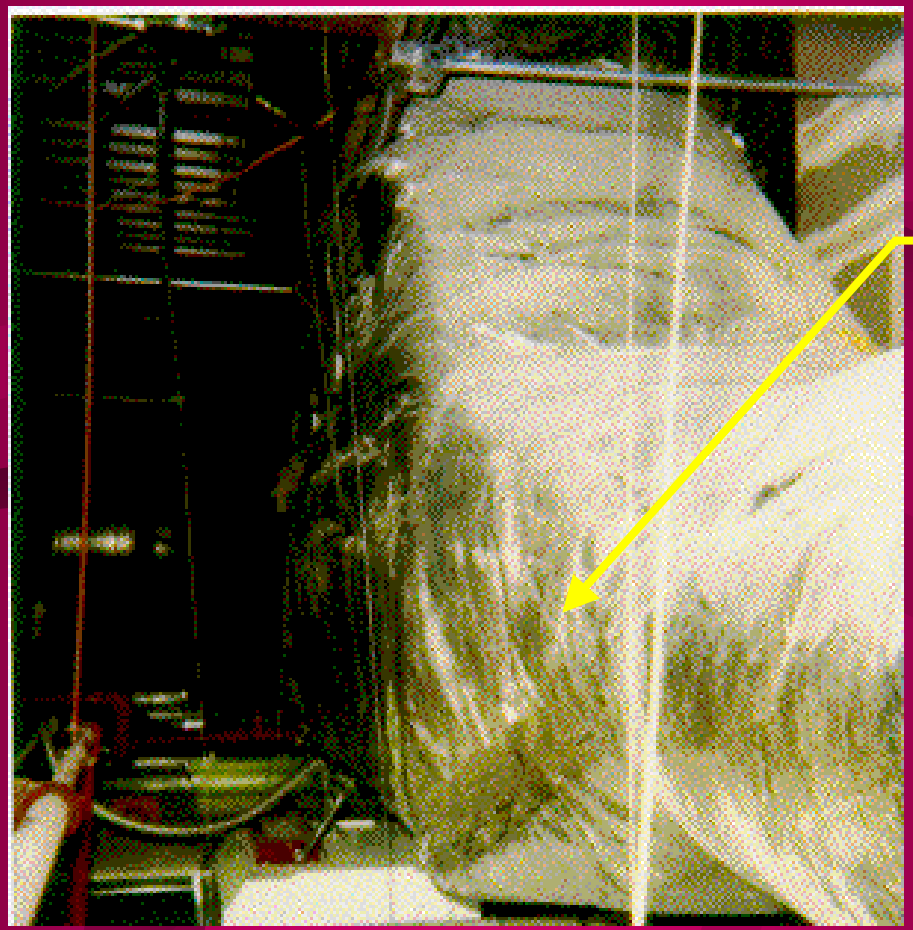
CORRODED ALUMINUM COIL FINS DUE TO LACK OF EPOXY COATING IN SALT ENVIRONMENT

INSTALLATION PROBLEMS TO AVOID

MISALIGNED MAIN DUCT W/TIGHT TURNED "OG"

INAPPROPRIATE DUCT FITTINGS WITH MISALIGNED OFFSET

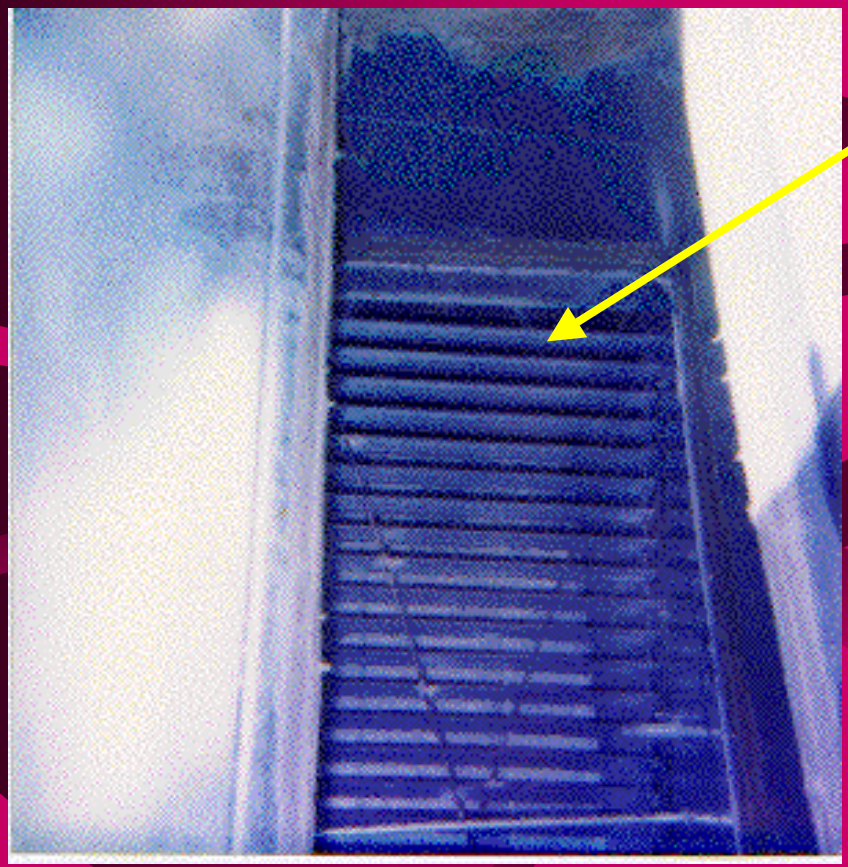
INSTALLATION PROBLEMS TO AVOID



STRANGE DUCT TRANSITION FROM VERTICAL DROP TO MAIN BRANCH DUCT

“FORCED” DUCT INSTALLATION DUE TO POOR PLANNING

INSTALLATION PROBLEMS TO AVOID



TRANSITION

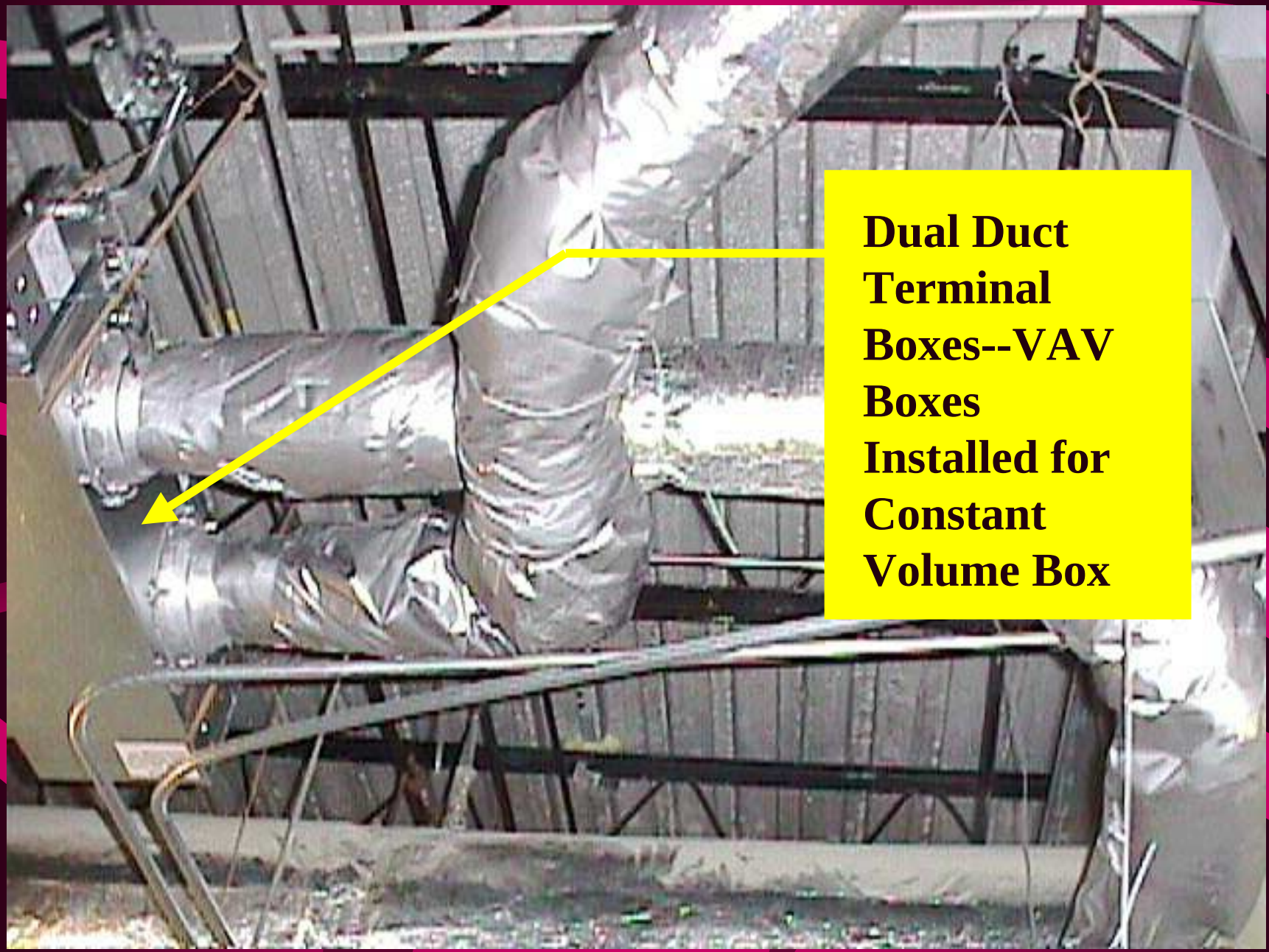
AT DISCHARGE OF ROOFTOP UNIT AROUND BAR JOIST

“FORCED” DUCT INSTALLATION DUE TO POOR PLANNING COORDINATION

INSTALLATION PROBLEMS TO AVOID

ROOF OPENING CUT FOR DUCT DROP WITH NO STRUCTURAL FRAME OUT OR SUPPORT

INAPPROPRIATE ROOFDECK PENETRATION BY DUCT W/NO STRUCTURAL FRAMING


Dual Duct Terminal Boxes--VAV Boxes Installed for Constant Volume Box

“It’s Not My Job”

attitude won’t get the job done.

TABS processes require close coordination and cooperation of trades.

Let’s not turn our project into painted road kill.