

SCOPE

- I 1.1 This practice covers the design, fabrication, and inspection of dampers and guillotines used for isolation and/or control in air and flue gas service associated with fired heaters, boilers, and other fired equipment.
- I 1.2 **An asterisk (*)** indicates that a decision by the Purchaser is required, or that additional information is furnished by the Purchaser.

SUMMARY OF ADDITIONAL REQUIREMENTS

- I 2.1 **Table 1** lists the practices, specification and standard which shall be used with this practice.
- I * 2.2 **Table 2** lists the practices which shall be used with this practice as specified by the Purchaser.

TABLE 1

PRACTICES			
IP 4-1-2	Structural Steel Design	IP 19-1-1	Paint and Protective Coatings
IP 18-7-1	Welding Procedures	IP 20-1-1	Inspection of Equipment and Materials
SPECIFICATION			
AMCA 850	Application and Specification guide for flue gas isolation and control dampers		
STANDARD			
API 560	Fired Heaters for General Refinery Service, including Appendix F		

TABLE 2

PRACTICES			
IP 4-5-1	Steel Stacks	IP 19-3-3	Fired Heater Linings
IP 15-1-1	Instruments for Fired Heaters	IP 20-1-2	Administrative Procedures for Obtaining Exxon Engineering Inspection
IP 18-12-1	Positive Materials Identification		

DOCUMENTATION

PROPOSAL INFORMATION

- I 3.1 **The Vendor shall submit** as a minimum the following information with his proposal:
 - a. General Arrangement drawings showing materials of construction, critical dimensions, and proposed blade and sealing design.
 - b. Proposed actuator and linkage design.
 - * c. Guaranteed leakage rates and test procedure (if specified).

REVIEW INFORMATION

- I ↗ 3.2 **The Vendor shall submit**, as a minimum, the following information for review:
 - a. Engineering drawings to include assembly drawing with parts list and materials of construction, details of blade clearances, bearing mounting and sealing, and any other information required to perform detailed ductwork design.
 - b. All calculations for shaft, blade and actuator design.

FINAL RECORDS

- I 3.3 **The following information** shall be submitted for final records:
 - a. Complete "as built" documentation issued for review.
 - b. Final calculations.

DESIGN

- O,R * 4.1 **Purchaser shall specify** maximum operating temperature and pressure, orientation, type of damper and direction of opening, along with the degree of shut-off required. Actuator design, and any externally applied loads shall also be specified.



IP 7-8-1		Dampers and Guillotines for Fired Equipment	EXXON INTERNATIONAL PRACTICE
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Rev. 1	March 1998		

(This practice is appropriate for attachment to Inquiry or Purchase Document)

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- R * 4.2 **Mechanical design** with respect to deflection and thermal expansion shall be based on a temperature 200°F (110°C) above the maximum operating temperature. For stack dampers, vendor shall check thermal expansion of damper during decoking operations.
- R * 4.3 The **design pressure** shall be the greater of 1.5 times the maximum differential operating pressure or 5 inches of water gauge (125 mm w. g.).
- O ♦ * 4.4 **Control dampers shall be of the multi-louver, opposed blade design.**
- R * 4.5 **All damper metal parts** in contact with the flue gas shall be maintained above the acid dew point.
- O,R 4.6 **Blades shall be attached to the shaft** by welding, with appropriate stiffeners to limit deflection and thermal distortion. Minimum blade thickness for single-layer designs shall be 3/16 inch (5 mm); minimum thickness for double-layer design is 1/8 inch (3 mm).
- O,R 4.7 **Shaft end deflection** shall not exceed 0.5 degrees due to weight and pressure loadings.
- R 4.8 **Thrust collars** shall be provided at the shaft ends to control axial movement of the shaft/blade assembly.
- R 4.9 **Shaft seals** and clearances shall allow for at least 2 degrees of deflection, and accommodate expected bearing misalignment.
- O ♦ 4.10 Tight shutoff dampers shall provide a **minimum of 98% shut-off on area.**

ACTUATOR AND LINKAGE DESIGN

- O,R 4.11 **All dampers shall be fitted with limit stops**, located external to the damper housing, to prevent the blade from going beyond the desired range of motion.
- O,R 4.12 All dampers shall be **lockable in position.**
- O,R * 4.13 **Damper and actuator linkage design** shall be approved and meet the following general requirements:
 - a. Linkage between blades of multi-bladed tight shut-off dampers shall be adjustable.
 - b. Linkage shall provide positive control in both directions. A counterweight or other means to ensure a fail open action in the event of linkage failure shall be provided.
 - c. All components shall be capable of accepting the full output force/torque of the actuator, in both directions, at the maximum local air supply pressure.
 - d. Actuator input arm (or flange) shall be welded to the shaft.

GUILLOTINES, ADDITIONAL DESIGN

- S * 4.14 Purchaser shall specify requirements **for personnel entry** on the isolated side of the guillotine, when required.
- O ♦ 4.15 Blade shall be **positively secured** in open position and require open/closed indication.

INSPECTION AND TESTING

- R 5.1 **All dampers shall be inspected** by the Owner's Representative prior to shipment.

PREPARATION FOR SHIPMENT

- R 6.1 **All dampers shall be secured** to prevent undue movement during shipment and installation. All temporary securing devices shall be clearly identified as such.
- R 6.2 **All dampers shall be protected** against atmospheric attack and mechanical damage during shipment and storage.

Revision Memo

6/96
3/98

Revision 0 - Original Issue of International Practice

Revision 1

Added "including Appendix F" to **Table 1**. Old Par. numbers deleted because requirements are in API-560: **3.2c, 4.1, 5.4, 5.11, 5.13, 5.17, 5.21 and 6.2**. Old Par. numbers deleted because they are commonly accepted practice or no justification: **1.3, 1.4, 5.12, 5.15, 5.19 and 6.3**. Minor editorial changes to **Pars. 3.2, 4.4, 4.10 and 4.14**.
Renummer Par's.

Old Par. No.	New Par. No.	Old Par. No.	New Par. No.
5.1-5.3	4.1-4.3	5.20	4.10
5.5-5.10	4.4-4.9	5.22-5.23	4.14-4.15
5.14	4.11	6.1	5.1
5.16	4.12	7.1-7.2	6.1-6.2
5.18	4.13		

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