



FIGURE 6-15. FAN DISCHARGE CONDITIONS.

actual system curve is Point 3. The resulting flow rate will, therefore, be deficient by the difference from 1 to 3. To compensate for this system effect, it will be necessary to add a "system effect factor" to the calculated system pressure. This will be equal to the pressure difference between Points 1 and 2 and will have to be added to the calculated system pressure losses. The fan then will be selected for this higher pressure (Point 2) but will operate at Point 1 due to loss in performance from system effects.

Figure 6-15 illustrates typical discharge conditions and the losses which may be anticipated. The magnitude of the change in system performance caused by elbows and other obstructions placed too close to a fan inlet or outlet can be estimated for the conditions shown on Figures 6-16 through 6-21 as follows:

$$\text{Addition to System Static Pressure} = \text{System Effect Factor} \times \text{VP}$$

A vortex or spin of the air stream entering the fan inlet may be created by non-uniform flow conditions as illustrated in Figure 6-20. These conditions may be caused by a poor inlet box, multiple elbows or ducts near the inlet or by other spin producing conditions. Since the variations resulting in inlet spin are many, no System Effect Factors are tabulated. Where a vortex or inlet spin cannot be avoided or is discovered at an existing fan inlet, the use of turning vanes, splitter sheets or egg-crate straighteners will reduce the effect.

6.4.2 Inspection and Maintenance: Wear or accumula-

tion on an impeller will cause weakening of the impeller structure and/or serious vibration. If these vibrations are severe, damage or failure also can occur at the bearings or fan structure.

Fan rotation often is reversed inadvertently during repair or alterations to wiring circuits or starters. As centrifugal fans do move a fraction of their rated capacity when running backward, incorrect rotation often goes unnoticed in spite of less effective performance of the exhaust system.

Scheduled inspection of fans is recommended. Items checked should include:

1. Bearings for proper operating temperature (greasing on an established schedule).
2. Excessive vibration of bearings or housing.
3. Belt drives for proper tension and minimum wear.
4. Correct coupling alignment.
5. Fan impeller for proper alignment and rotation.
6. Impeller free from excess wear or material accumulation.

REFERENCES

- 6.1. Air Movement and Control Association, Inc.: 30 W. University Dr., Arlington Heights, IL 60004.
- 6.2. N. Gibson, F.C. Lloyd and G.R. Perry: *Fire Hazards in Chemical Plants from Friction Sparks Involving the Thermite Reaction*. Symposium Series No. 25. Inst. Chem. Engrs., London (1968).
- 6.3. Air Movement and Control Association, Inc.: *Bulletin 201*. 30 W. University Dr., Arlington Heights, IL 60004.