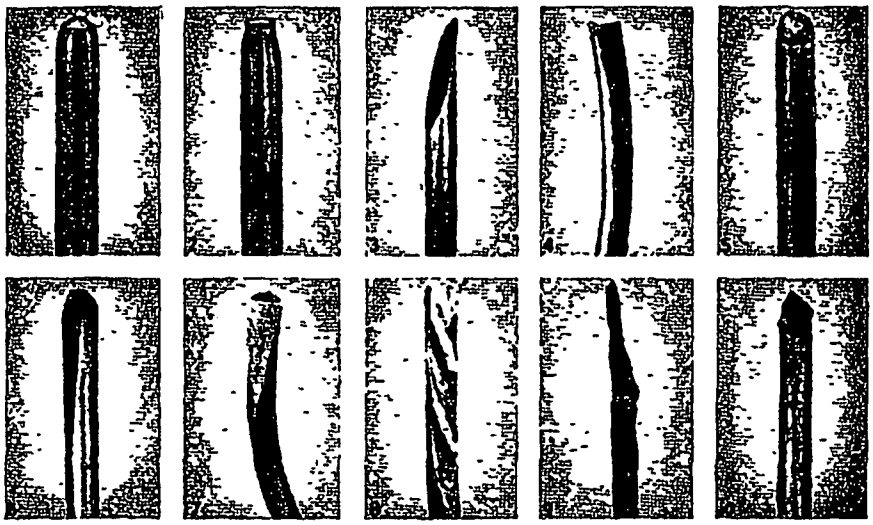


Type of Break	*Characteristics*	*Cause*
TENSION	Wire break shows one end of broken wire coned, the other cupped Necking down of broken ends is typical of this type of break (See Nos 1 and 2)	Where tension breaks occur, rope has been subjected to too great a strain, either for its original strength or for the strength remaining after other factors of deterioration have weakened it (See No 6 where wire is weakened by abrasion, but still shows characteristics of tension break) Frequently tension breaks are caused by suddenly applying a load to a slack rope, thereby setting up incalculable impact stresses
ABRASION	Wire break will show broken ends worn to a knife-edge thinness (See No 3)	Abrasive wear obviously will be concentrated at points at which the rope is rubbed most constantly These points usually are the grooves of sheaves and drums and other objects with which the rope comes into contact Unwarranted abrasive wear indicates improperly grooved sheaves and drums, or other localized abrasive condition
FATIGUE	Wire breaks are usually transverse or square showing granular structure (see No 4) Often these breaks develop a shattered fracture (No 5) Both of the above characteristics depend upon conditions of operation	Where fatigue breaks occur, rope most likely has been bent around too small a radius. Whipping, vibration, pounding, and torsional stresses will cause fatigue This action is accelerated by abrasion (No 7) and nicking (No 8)
CORROSION	Can easily be noted by pitted surface of wire, with break usually showing evidence of one of the three foregoing factors (See No 9)	Indicates improper lubrication Extent of damage by corrosion to interior of rope is extremely difficult to determine, consequently, corrosion is one of the most insidious and dangerous causes of rope deterioration If fiber core of wire rope is not lubricated and is allowed to dry out, it will collapse and fail to afford proper support for strands, thereby causing marked reduction in rope diameter and extreme internal wear
CUT or SHEAR	Wire will be pinched down and cut at broken ends, or will show evidence of a shear-like cut (No 10).	This condition is evidence of mechanical abuse caused by agents outside the installation, or by something abnormal or accidental on the installation itself

Fig 21-2 Typical characteristics and causes of broken wires in wire ropes

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